NUREG-1900, Vol. 2

Safety Evaluation Report
Related to the License Renewal of Nine Mile Point Nuclear Station, Units 1 and 2

Docket Nos. 50-220 and 50-410

Constellation Energy Group, LLC

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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ABSTRACT

This safety evaluation report (SER) documents the technical review of the Nine Mile Point Nuclear Station Units 1 and 2 (NMPNS), license renewal application (LRA) by the staff of the U.S. Nuclear Regulatory Commission (NRC) (the staff). By letter dated May 26, 2004, Constellation Energy Group, LLC submitted the LRA for NMPNS in accordance with Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54). Due to concerns with the adequacy of support for and documentation of the license renewal activities in the initial submission, the applicant submitted an amended LRA (ALRA) on July 14, 2005. Constellation Energy Group, LLC is requesting renewal of the operating licenses for NMPNS (Facility Operating License Numbers DPR-63 and NPF-69, respectively), for a period of 20 years beyond the current expiration dates of midnight August 22, 2009, for Unit 1 (NMP1) and midnight October 31, 2026, for Unit 2 (NMP2).

NMPNS is located approximately six miles northeast of Oswego, NY. The NRC issued the construction permits for NMP1 on April 12, 1965, and for NMP2 on June 24, 1974. The NRC issued the operating licenses for NMP1 on December 26, 1974 and for NMP2 on July 2, 1987. NMP1 is a boiling water reactor design with a Mark 1 containment. The nuclear steam supply system was supplied by General Electric and the balance of the plant was originally designed and constructed by Stone and Webster with the assistance of its agent, Niagra Mohawk Power Corporation. NMP1's licensed power output is 1850 megawatt thermal, with a gross electrical output of approximately 615 megawatt electric. NMP2 is a boiling water reactor design with a Mark 2 containment. The nuclear steam supply system was supplied by General Electric and the balance of the plant was originally designed and constructed by Stone and Webster. NMP2's licensed power output is 3467 megawatt thermal, with a gross electrical output of approximately 1144 megawatt electric.

This SER presents the status of the staff's review of information submitted to the staff through April 21, 2006, the cutoff date for consideration in this SER. On March 3, 2006, the staff issued a draft SER which identified two open items that had to be resolved before the staff makes a final determination on the application. The two open items have now been resolved and SER Section 1.5 summarizes these items and their resolutions. SER Section 6 provides the staff's final conclusion on the review of the NMPNS License Renewal Application dated May 26, 2004, as amended July 14, 2005, and all its subsequent supplemental letters as listed in SER Appendix B.

TABLE OF CONTENTS

Appendices

Tables

ABBREVIATIONS

115KVAC	115KV AC electrical distribution
120VAC	120V AC electrical distribution
125VDC	125V DC electrical distribution
13.8KVAC	13.8KV AC electrical distribution
24VDC	24V DC electrical distribution
4.16KVAC	4.16KV AC electrical distribution
600VAC	600V AC electrical distribution
AC	alternating current
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agency Document Access Management System
AERM	aging effects requiring management
AFW	auxiliary feedwater
AISC	American Institute of Steel Construction
ALARA	as low as reasonably achievable
ALRA	amended license renewal application
AMP	aging management program
AMR	aging management review
ANSI	American National Standards Institute
ARI	alternate rod insertion
ART	adjusted reference temperature
ASB	auxiliary service building
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without scram
B24V	battery-24V-station
BSW	biological shield wall
BTP	branch technical position
BWR	boiling water reactor
BWROG	Boiling Water Reactor Owners Group
BWRVIP	boiling water reactor vessel internals project
CAP	corrective action program
CAS	compressed air system
CASS	cast austentitic stainless steel
CBF	cycle-based fatigue
CCCWS	closed-cycle cooling water system
CEG	Constellation Energy Group
CF	chemistry factor
CFR	*Code of Federal Regulations*
CGG	Constellation Generation Group
CI	confirmatory item
CLB	current licensing basis
CMEB	Chemical and Mechanical Engineering Branch

CNS	Constellation Nuclear Services
CR	condition report
CRB	control room building
CRD	control rod drive
CRDRL	control rod drive return line
CSH	high pressure core spray
CST	condensate storage tank
CUF	cumulative usage factor
DBA	design basis accident
DBD	design basis document
DBE	design basis event
DBTT	ductile-to-brittle transition temperature
DC	direct current
DER	deviation event report
DG	diesel generator
DGB	diesel generator building
EC	emergency condenser
ECCS	emergency core cooling systems
ECP	electrochemical cooling system
ECS	emergency cooling system
ECT	eddy current testing
EDG	emergency diesel generator
EFPY	effective full power years
EMA	equivalent margin analysis
EOL	end of life
EPRI	Electric Power Research Institute
EQ	environmental qualification
ERV	electromatic relief valve
ESF	engineered safety feature
EVT-1	enhanced VT-1 visual inspection
EYS	essential yard structures
FAC	flow-accelerated corrosion
F_{en}	environmental fatigue life correction factor
FMP	fatigue monitoring program
FP	fire protection
FPEE	fire protection engineering evaluation
FSAR	final safety analysis report
FW	feedwater
FW/HPCI	feedwater/ high pressure coolant injection
FWS	feedwater system
GALL	Generic Aging Lessons Learned Report
GDC	general design criteria or general design criterion
GE	general electric
GEIS	Generic Environmental Impact Statement
GL	generic letter

GSI	generic safety issue
GWT	ground water table
HCU	hydraulic control unit
HELB	high-energy line break
HEPA	high efficiency particulate air
HFIR	high flux isotope reactor
HPCI	high pressure coolant injection
HPCS	high pressure core spray
HVAC	heating, ventilation, and air conditioning
HWC	hydrogen water chemistry
HX	heat exchanger
I&C	instrumentation and controls
IASCC	irradiation assisted stress corrosion cracking
IBA	intermediate-break accident
IEEE	Institute of Electrical and Electronics Engineers
IGA	intergranular attack
IGSCC	intergranular stress corrosion cracking
IN	information notice
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
ISG	interim staff guidance
ISI	inservice inspection
ISP	integrated surveillance program
J	joule
J-R	joule-resistent
KV	kilovolt
KVA	kilovolt Amperes
LBS	leakage boundary (spatial)
LOCA	loss of coolant accident
LOOP	loss of offsite power
LPCI	low pressure coolant injection
LPCS	low pressure core spray
LR	license renewal
LRA	license renewal application
LRT	leak rate test
MCC	motor control center
MEL	master equipment list
MIC	mircrobiologically induced corrosion
MG	motor generator
MS	main steam
MSIV	main steam isolation valve
MWe	megawatt electric
MWt	megawatt thermal

NDE	non-destructive examinations
NEI	Nuclear Energy Institute
NEIL	Nuclear Electric Insurance Limited
NEPA	National Environmental Policy Act of 1969
NER	Nuclear Engineering Report
NFPA	National Fire Protection Association
NMP1	Nine Mile Point Unit 1
NMP2	Nine Mile Point Unit 2
NMPC	Niagra Mohawk Power Corporation
NMPNS	Nine Mile Point Nuclear Station
NRC	U.S. Nuclear Regulatory Commission
NSR	nonsafety-related
NSSS	nuclear steam supply system
NUMARC	Nuclear Management and Resources Council (now NEI)
NUREG	U.S. Nuclear Regulatory Commission Regulatory Guide
OCCW	open-cycle cooling water
ODSCC	outside-diameter stress-corrosion cracking
OGB	offgas building
OI	open item
ORNL	Oak Ridge National Laboratory
P&ID	piping and instrumentation diagram
PAA	program attribute assessment
PCS	primary containment structure
PEO	period of extended operation
PM	preventive maintenance
PMT	post-maintenance test
P-T	pressure-temperature
PTS	pressurized thermal shock
PUAR	plant-unique analysis report
PWR	pressurized water reactor
PWSCC	primary water stress-corrosion cracking
RAI	request for additional information
RB	reactor building
RBCLC	reactor building closed look cooling
RBEDT	reactor building equipment drain tank
RCIC	reactor core isolation cooling
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RG	regulatory guide
RHR	residual heat removal
RI-ISI	risk-informed inservice inspection
RPS	reactor protection system
RPT	reactor recirculation pump trip
RPV	reactor pressure vessel
RSSB	radwaste solidification and storage building
RT_{NDT}	reference temperature nil ductility transition

RVID	reactor vessel integrity database
RVSP	Reactor Vessel Surveillance Program
RWB	radwaste building
RWCU	reactor water cleanup
S&W	Stone and Webster
SBA	small-break accident
SBF	stress based fatigue
SBO	station blackout
SC	structure and component
SCC	stress-corrosion cracking
SDC	shutdown cooling
SE	safety evaluation
SER	safety evaluation report
SGTB	standby gas treatment building
SGTS	standby gas treatment system
SHE	standard hydorgen reference electrode
SIA	structural integrity attached
SIL	service information letters
SOC	statements of consideration
SPH	screen and pumphouse
SR	safety-related
SRP	Standard Review Plan
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
SSC	system, structure, and component
SSE	safe-shutdown earthquake
SWB	screenwell building
t	thickness
TAP	torus attached piping
TB	turbine building
TBCLC	turbine building closed loop cooling
TER	technical evaluation report
TLAA	time-limited aging analysis
TS	technical specification
UFSAR	updated final safety analysis report (for Nine Mile Point Unit 1)
UPS	uninterruptible power supplies
USAR	updated safety analysis report (for Nine Mile Point Unit 2)
USAS	United States of America Standards
USE	upper-shelf energy
UT	ultrasonic testing
UV	ultra violet
V	Volt
WDB	waste disposal building
WO	work order

SECTION 3

AGING MANAGEMENT REVIEW RESULTS

This section of the safety evaluation report (SER) contains the staff's evaluation of the applicant's aging management programs (AMPs) and aging management reviews (AMRs). In amended license renewal application (ALRA) Appendix B, the applicant described the 43 AMPs that it relies on to manage or monitor the aging of long-lived, passive components and structures.

In ALRA Section 3, the applicant provided the results of the AMRs for those structures and components that were identified in ALRA Section 2 as being within the scope of license renewal and subject to an AMR.

3.0 Applicant's Use of the Generic Aging Lessons Learned Report

In preparing its ALRA, Constellation Energy Group, LLC (CEG or the applicant) credited NUREG-1801, Revision 0, "Generic Aging Lessons Learned (GALL) Report," The GALL Report contains the staff's generic evaluation of the existing plant programs, and it documents the technical basis for determining when existing programs are adequate without modification, and when existing programs should be augmented for the extended period of operation. The evaluation results documented in the GALL Report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components for license renewal without change. The GALL Report also contains recommendations on specific areas for which existing programs should be augmented for license renewal. An applicant may reference the GALL Report in its LRA to demonstrate that the programs at its facility correspond to those reviewed and approved in the report.

The purpose of the GALL Report is to provide the staff with a summary of staff-approved AMPs to manage or monitor the aging of structures and components that are subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA will likely be reduced, thereby improving the efficiency and effectiveness of the license renewal review process. The GALL Report also serves as a reference for applicants and staff reviewers to quickly identify those AMPs and activities that the staff has determined will adequately manage or monitor aging during the period of extended operation.

The GALL Report identifies: (1) systems, structures, and components (SSCs); (2) structure and component (SC) materials; (3) the environments to which the SCs are exposed; (4) the aging effects associated with the materials and environments; (5) the AMPs that are credited with managing or monitoring the aging effects; and (6) recommendations for further applicant evaluations of aging management for certain component types.

To determine whether using the GALL Report would improve the efficiency of the license renewal review, the staff conducted a demonstration project to exercise the GALL process and to determine the format and content of a safety evaluation based on this process. The results of the demonstration project confirmed that the GALL process will improve the efficiency and effectiveness of the LRA review, while maintaining the staff's focus on public health and safety. NUREG-1800, Revision 0, "Standard Review Plan for the Review of License Renewal Applications" (SRP-LR) was prepared based on both the GALL Report model and lessons learned from the demonstration project.

The staff performed its review in accordance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," the guidance provided in the SRP-LR, and the guidance provided in the GALL Report.

In addition to its review of the ALRA, the staff conducted an onsite audit of selected AMRs and associated AMPs, as described in the "Audit and Review Plan for Plant Aging Management Reviews and Programs, Nine Mile Point Nuclear Power Station, Units 1 and 2," (Audit and Review Report) dated January 18, 2006. The onsite audits and reviews are designed to maximize the efficiency of the staff's review of the LRA. The need for formal correspondence between the staff and the applicant is reduced, thereby resulting in an improvement in the review's efficiency. Also, the applicant could respond to questions and the staff could readily evaluate the applicant's responses.

3.0.1 Format of the License Renewal Application

The applicant submitted an application that followed the standard LRA format, which was agreed to by the Nuclear Regulatory Commission (NRC or the staff) and the Nuclear Energy Institute (NEI) (see letter dated April 7, 2003, ML030990052). This revised LRA format incorporates lessons learned from the staff's reviews of the previous five LRAs. These previous applications used a format developed from information gained during an NRC staff and NEI demonstration project that was conducted to evaluate the use of the GALL Report in the staff's review process.

The organization of the amended LRA (ALRA) Section 3 parallels SRP-LR Chapter 3. The AMR results information in ALRA Section 3 is presented in the following two table types:

- Table 1: Table 3.x.1.A or 3.x.1.B – where "3" indicates the ALRA section number, "x" indicates the subsection number from the GALL Report, "1" indicates that this is the first table type in ALRA Section 3; "A" and "B" indicate that the table applies to Nine Mile Point Unit 1 (NMP1) or Nine Mile Point Unit 2 (NMP2), respectively.
- Table 2: Table 3.x.2.A-y or 3.x.2.B-y – where "3" indicates the ALRA section number; "x" indicates the subsection number from the GALL Report; "2" indicates that this is the second table type in ALRA Section 3; "A" and "B" indicate that the table applies to NMP1 or NMP2, respectively; and "y" indicates the system table number.

The content of the original LRA and the Nine Mile Point Nuclear Station (NMPNS) ALRA is essentially the same. The intent of the ALRA revised format was to modify the tables in LRA Section 3 to provide additional information that would assist the staff in its review. Table 1 of ALRA Section 3, summarizes portions of the application that it is considered to be consistent with the GALL Report. In Table 2 of ALRA Section 3, the applicant identified the linkage between the scoping and screening results in ALRA Section 2 and the AMRs in ALRA Section 3.

3.0.1.1 Overview of Table 1

Table 3.x.1.A or 3.x.1.B (Table 1) provides a summary comparison of how the facility aligns with the corresponding tables of the GALL Report, Volume 1. The table is essentially the same as Tables 1 through 6 provided in the GALL Report, Volume 1, except that the "Type" column has been replaced by an "Item Number" column and the "Item Number in GALL" column has been replaced by a "Discussion" column. The "Item Number" column provides the reviewer with a means to cross-reference from Table 2 to Table 1. The "Discussion" column is used by the applicant to provide clarifying and amplifying information. The following are examples of information that might be contained within this column:

- further evaluation recommended – information or reference to where that information is located
- the name of a plant-specific program being used
- exceptions to the GALL Report assumptions
- a discussion of how the line is consistent with the corresponding line item in the GALL Report when this may not be intuitively obvious
- a discussion of how the item is different from the corresponding line item in the GALL Report (e.g., when there is exception taken to a GALL AMP)

The format of Table 1 allows the staff to align a specific Table 1 row with the corresponding GALL Report, Volume 1, table row so that the consistency can be verified.

3.0.1.2 Overview of Table 2

Table 3.x.2.A-y or 3.x.2.B-y (Table 2) provides the detailed results of the AMRs for those components identified in ALRA Section 2 as being subject to an AMR. The ALRA contains a Table 2 for each of the systems or components within a system grouping (e.g., reactor coolant systems, engineered safety features, auxiliary systems, etc.). For example, the engineered safety features group contains tables specific to the core spray system, high pressure coolant injection system, and residual heat removal system. Table 2 consists of the following nine columns:

(1) Component Type – The first column identifies the component types from ALRA Section 2 that are subject to aging management review. The component types are listed in alphabetical order.

(2) Intended Function – The second column contains the license renewal intended functions (including abbreviations, where applicable) for the listed component types. Definitions and abbreviations of intended functions are contained within ALRA Table 2.0-1.

(3) Material – The third column lists the particular materials of construction for the component type.

(4) Environment – The fourth column lists the environment to which the component types are exposed. Internal and external service environments are indicated and a list of these environments is provided in ALRA Table 3.0-1.

(5) Aging Effect Requiring Management – The fifth column lists aging effects requiring management (AERMs). As part of the aging management review process, the applicant determined any AERMs for each combination of material and environment.

(6) Aging Management Programs – The sixth column lists the AMPs that the applicant used to manage the identified aging effects.

(7) NUREG-1801 Volume 2 Item – The seventh column lists the GALL Report item(s) that the applicant identified as being similar to the AMR results in the ALRA. The applicant compared each combination of component type, material, environment, AERM, and AMP in Table 2 of the ALRA to the items in the GALL Report. If there were no corresponding items in the GALL Report, the applicant left the column blank. In this way, the applicant identified the AMR results in the ALRA tables that corresponded to the items in the GALL Report tables.

(8) Table 1 Item – The eighth column lists the corresponding summary item number from Table 1. If the applicant identifies AMR results in Table 2 that are consistent with the GALL Report, then the associated Table 1 line summary item number should be listed in Table 2. If there is no corresponding item in the GALL Report, then column eight is left blank. That way, the information from the two tables can be correlated.

(9) Notes – The ninth column lists the corresponding notes that the applicant used to identify how the information in Table 2 aligns with the information in the GALL Report. The notes, identified by letters, were developed by an NEI working group and will be used in future license renewal applications. Any plant-specific notes are identified by a number and provide additional information concerning the consistency of the line item with the GALL Report.

3.0.2 Staff's Review Process

The staff conducted the following three types of evaluations of the AMRs and associated AMPs:

(1) For items that the applicant stated were consistent with the GALL Report, the staff conducted either an audit or a technical review to determine consistency with the GALL Report.

(2) For items that the applicant stated were consistent with the GALL Report with exceptions and/or enhancements, the staff conducted either an audit or a technical review of the item to determine consistency with the GALL Report. In addition, the staff conducted either an audit or a technical review of the applicant's technical justification for the exceptions and the adequacy of the enhancements.

(3) For other items, the staff conducted a technical review.

The staff performed audits and technical reviews of the license renewal applicant's AMPs and AMRs. These audit and technical reviews are to determine whether the effects of aging on structures and components can be adequately managed so that their intended functions can be maintained consistently with the plant's current licensing basis (CLB) for the period of extended operation, as required by 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

3.0.2.1 Review of AMPs

For those AMPs for which the applicant claimed consistency with the GALL AMPs, the staff conducted either an audit or a technical review to verify that the applicant's AMPs were consistent with the AMPs in the GALL Report. For each AMP that had one or more deviations, the staff evaluated each deviation to determine: (1) whether the deviation was acceptable; and (2) whether the AMP, as modified, would adequately manage the aging effect(s) for which it was credited. For AMPs that were not evaluated in the GALL Report, the staff performed a full review to determine the adequacy of the AMPs. The staff evaluated the AMPs against the following 10 program elements defined in SRP-LR Appendix A.

(1) Scope of Program – Scope of the program should include the specific structures and components subject to an AMR for license renewal.

(2) Preventive Actions – Preventive actions should prevent or mitigate aging degradation.

(3) Parameters Monitored or Inspected – Parameters monitored or inspected should be linked to the degradation of the particular structure or component intended function(s).

(4) Detection of Aging Effects – Detection of aging effects should occur before there is a loss of structure or component intended function(s). This includes aspects such as method or technique (i.e., visual, volumetric, surface inspection), frequency, sample size, data collection, and timing of new/one-time inspections to ensure a timely detection of aging effects.

(5) Monitoring and Trending – Monitoring and trending should provide predictability of the extent of degradation, as well as timely corrective or mitigative actions.

(6) Acceptance Criteria – Acceptance criteria, against which the need for corrective action will be evaluated, should ensure that the structure or component intended function(s) are maintained under all CLB design conditions during the period of extended operation.

(7) Corrective Actions – Corrective actions, including root cause determination and prevention of recurrence, should be timely.

(8) Confirmation Process – Confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.

(9) Administrative Controls - Administrative controls should provide a formal review and approval process.

(10) Operating Experience – Operating experience of the AMP, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support the conclusion that the effects of aging will be adequately managed so that the SC intended function(s) will be maintained during the period of extended operation.

Details of the staff's audit evaluation of program elements (1) through (6) are documented in the Audit and Review Report dated January 18, 2006, and are summarized in SER Section 3.0.3.

The staff reviewed the applicant's corrective action program (CAP) and documented its evaluations in SER Section 3.0.4. The staff's evaluation of the CAP included assessment of the following program elements: (7) corrective actions, (8) confirmation process, and (9) administrative controls.

The staff reviewed the information concerning the (10) operating experience program element and documented its evaluation in the Audit and Review Report. The staff also included a summary of the program in SER Section 3.0.3.

The staff reviewed the respective NMP1 updated final safety analysis report (UFSAR) and NMP2 updated safety analysis report (USAR) supplements for each AMP to determine if it provided an adequate description of the program or activity, as required by 10 CFR 54.21(d).

3.0.2.2 Review of AMR Results

ALRA Table 2 contains information concerning whether or not the AMRs align with the AMRs identified in the GALL Report. For a given AMR in Table 2, the staff reviewed the intended function, material, environment, AERM, and AMP combination for a particular component type within a system. The AMRs that correlate between a combination in Table 2 and a combination in the GALL Report were identified by a referenced item number in column seven, "NUREG-1801 Volume 2 Item." The staff also conducted onsite audits to verify the correlation. A blank column seven indicates that the applicant was unable to locate an appropriate corresponding combination in the GALL Report. The staff conducted a technical review of these combinations that were not consistent with the GALL Report. The next column, "Table 1 Item," provided a reference number that indicated the corresponding row in Table 1.

3.0.2.3 UFSAR and USAR Supplements

Consistent with the SRP-LR, for the AMRs and associated AMPs that it reviewed, the staff also reviewed the UFSAR and USAR supplements that summarize the applicant's programs and activities for managing the effects of aging for the period of extended operation, as required by 10 CFR 54.21(d).

3.0.2.4 Documentation and Documents Reviewed

In performing its review, the staff used the ALRA, ALRA supplements, SRP-LR, and the GALL Report.

Also, during the onsite audit, the staff examined the applicant's justification, as documented in the staff's Audit and Review Report, to verify that the applicant's activities and programs will adequately manage the effects of aging on SCs. The staff also conducted detailed discussions and interviews with the applicant's license renewal project personnel and others with technical expertise relevant to aging management.

3.0.3 Aging Management Programs

SER Table 3.0.3-1 presents the AMPs credited by the applicant and described in ALRA Appendix B. The table also indicates the GALL AMP that the applicant claimed its AMP was consistent with (if applicable) and the SSCs it monitors and manages. The section of the SER, in which the staff's evaluation of the program is documented, is also provided.

Table 3.0.3-1 NMPNS's Aging Management Programs

NMPNS's AMP (ALRA Section)	GALL Comparison	GALL AMP(s)	ALRA Systems or Structures That Credit the AMP	Staff's SER Section
Existing AMPs				
ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1)	Consistent with exception	XI.M1	NMP1: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems NMP2: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems	3.0.3.2.1
Water Chemistry Control Program (B2.1.2)	Consistent with exception	XI.M2	reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems; structures and component supports	3.0.3.2.2
Reactor Head Closure Studs Program (B2.1.3)	Consistent with exception	XI.M3	reactor vessel, internals, and reactor coolant systems	3.0.3.2.3
BWR Vessel ID Attachment Welds Program (B2.1.4)	Consistent	XI.M4	reactor vessel, internals, and reactor coolant systems	3.0.3.1.1
BWR Feedwater Nozzle Program (B2.1.5)	Consistent with exception	XI.M5	reactor vessel, internals, and reactor coolant systems	3.0.3.2.4
BWR Stress Corrosion Cracking Program (B2.1.6)	Consistent with exception	XI.M7	NMP1: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems NMP2: reactor vessel, internals, and reactor coolant systems; engineered safety features	3.0.3.2.5
BWR Penetrations Program (B2.1.7)	Consistent	XI.M8	reactor vessel, internals, and reactor coolant systems	3.0.3.1.2

NMPNS's AMP (ALRA Section)	GALL Comparison	GALL AMP(s)	ALRA Systems or Structures That Credit the AMP	Staff's SER Section
BWR Vessel Internals Program (B2.1.8)	Consistent with enhancements	XI.M9	reactor vessel, internals, and reactor coolant systems	3.0.3.2.6
Flow-Accelerated Corrosion Program (B2.1.9)	Consistent	XI.M17	reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems	3.0.3.1.3
Open-Cycle Cooling Water System Program (B2.1.10)	Consistent with enhancements	XI.M20	engineered safety features; auxiliary systems	3.0.3.2.7
Closed-Cycle Cooling Water System Program (B2.1.11)	Consistent with enhancements	XI.M21	NMP1: auxiliary systems; steam and power conversion systems NMP2: auxiliary systems	3.0.3.2.8
Boraflex Monitoring Program, NMP1 Only (B2.1.12)	Consistent with enhancements	XI.M22	structures and component supports	3.0.3.2.9
Inspection of Overhead Heavy Load and Light Load Handling Systems Program (B2.1.13)	Consistent with enhancements	XI.M23	structures and component supports	3.0.3.2.10
Compressed Air Monitoring Program, NMP1 Only (B2.1.14)	Consistent with exceptions and enhancements	XI.M24	auxiliary systems	3.0.3.2.11
BWR Reactor Water Cleanup System Program (B2.1.15)	Consistent with exception	XI.M25	NMP1 auxiliary systems	3.0.3.2.12
Fire Protection Program (B2.1.16)	Consistent with exceptions and enhancements	XI.M26	auxiliary systems; structures and component supports	3.0.3.2.13
Fire Water System Program (B2.1.17)	Consistent with enhancements	XI.M27	auxiliary systems	3.0.3.2.14
Fuel Oil Chemistry Program (B2.1.18)	Consistent with exceptions and enhancements	XI.M30	auxiliary systems	3.0.3.2.15
Reactor Vessel Surveillance Program (B2.1.19)	Consistent with enhancements	XI.M31	reactor vessel, internals, and reactor coolant systems	3.0.3.2.16

NMPNS's AMP (ALRA Section)	GALL Comparison	GALL AMP(s)	ALRA Systems or Structures That Credit the AMP	Staff's SER Section
ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23)	Consistent with exception	XI.S1	structures and component supports; electrical and instrumentation and controls systems	3.0.3.2.17
ASME Section XI Inservice Inspection (Subsection IWL) Program, NMP2 Only (B2.1.24)	Consistent with exception	XI.S2	structures and component supports	3.0.3.2.18
ASME Section XI Inservice Inspection (Subsection IWF) Program (B2.1.25)	Consistent with exception	XI.S3	structures and component supports	3.0.3.2.19
10 CFR 50 Appendix J Program (B2.1.26)	Consistent	XI.S4	auxiliary systems; structures and component supports; electrical and instrumentation and controls systems	3.0.3.1.7
Masonry Wall Program (B2.1.27)	Consistent with enhancements	XI.S5	structures and component supports	3.0.3.2.20
Structures Monitoring Program (B2.1.28)	Consistent with enhancements	XI.S6	structures and component supports	3.0.3.2.21
Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program (B2.1.30)	Consistent with enhancements	XI.E2	electrical and instrumentation and controls systems	3.0.3.2.22
Non-EQ Inaccessible Medium-Voltage Cables Program, NMP2 Only (B2.1.31)	Consistent with enhancements	XI.E3	electrical and instrumentation and controls systems	3.0.3.2.27
Preventive Maintenance Program (B2.1.32)	Plant-specific		engineered safety features; auxiliary systems; steam and power conversion systems; electrical and instrumentation and controls systems	3.0.3.3.1
Systems Walkdown Program (B2.1.33)	Plant-specific		reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems	3.0.3.3.2
Non-Segregated Bus Inspection Program (B2.1.34)	Plant-specific		electrical and instrumentation and controls systems	3.0.3.3.3

NMPNS's AMP (ALRA Section)	GALL Comparison	GALL AMP(s)	ALRA Systems or Structures That Credit the AMP	Staff's SER Section
Bolting Integrity Program (B2.1.36)	Consistent with exception and enhancements	XI.M18	NMP1: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems NMP2: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems; structures and component supports	3.0.3.2.23
BWR Control Rod Drive Return Line (CRDRL) Nozzle Program (B2.1.37)	Consistent with exceptions	XI.M6	reactor vessel, internals, and reactor coolant systems	3.0.3.2.24
Protective Coating Monitoring and Maintenance Program (B2.1.38)	Consistent with exceptions and enhancements	XI.S8	structures and component supports	3.0.3.2.25
Environmental Qualification Program (B3.1)	Consistent	X.E1	reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems; structures and component supports	3.0.3.1.9
Fatigue Monitoring Program (B3.2)	Consistent with enhancements	X.M1	reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems; structures and component supports	3.0.3.2.26
Torus Corrosion Monitoring Program, NMP1 Only (B3.3)	Plant-specific		structures and component supports	3.0.3.3.7
New AMPs				

NMPNS's AMP (ALRA Section)	GALL Comparison	GALL AMP(s)	ALRA Systems or Structures That Credit the AMP	Staff's SER Section
One-Time Inspection Program (B2.1.20)	Consistent	XI.M32	NMP1: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems; structures and component supports NMP2: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems	3.0.3.1.4
Selective Leaching of Materials Program (B2.1.21)	Consistent	XI.M33	NMP1: reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion systems NMP2: auxiliary systems	3.0.3.1.5
Buried Piping and Tanks Inspection Program (B2.1.22)	Consistent	XI.M34	auxiliary systems	3.0.3.1.6
Non-EQ Electrical Cables and Connections Program (B2.1.29)	Consistent	XI.E1	electrical and instrumentation and controls systems	3.0.3.1.8
Fuse Holder Inspection Program (B2.1.35)	Plant-specific		electrical and instrumentation and controls systems	3.0.3.3.4
Non-EQ Electrical Cable Metallic Connections Inspection Program (B2.1.39)	Plant-specific		electrical and instrumentation and controls systems	3.0.3.3.5
Wooden Power Pole Inspection Program, NMP2 Only (B2.1.40)	Plant-specific		structures and component supports	3.0.3.3.6

3.0.3.1 AMPs That Are Consistent with the GALL Report

In ALRA Appendix B, the applicant identified that the following AMPs were consistent with the GALL Report:

- BWR Vessel ID Attachment Welds Program
- BWR Penetrations Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Buried Piping and Tanks Inspection Program
- 10 CFR 50 Appendix J Program
- Non-EQ Electrical Cables and Connections Program
- Environmental Qualification Program

3.0.3.1.1 BWR Vessel ID Attachment Welds Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.4, the applicant described the BWR Vessel ID Attachment Welds Program, stating that this is an existing program that is consistent with GALL AMP XI.M4, "BWR Vessel ID Attachment Welds." The BWR Vessel ID Attachment Welds Program manages the effects of cracking in reactor pressure vessel inside diameter attachment welds. The BWR Vessel ID Attachment Welds Program is based on industry guidelines issued by the Boiling Water Reactor Vessel Internals Project (BWRVIP) and approved by the staff. Implementation of the BWR Vessel ID Attachment Welds Program is discussed in the program description for the BWR Vessel Internals Program (ALRA Section B2.1.8). The attributes of the BWR Vessel ID Attachment Welds Program related to maintaining reactor coolant water chemistry are discussed in the program description for the Water Chemistry Control Program (ALRA Section B2.1.2).

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

As documented in the Audit and Review Report, the staff noted that NMP credited Revisions 1 and 2 of the Electric Power Research Institute (EPRI) TR-103515 guidelines for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant stated that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The staff's review and evaluation of the applicant's Water Chemistry Control Program are in SER Section 3.0.3.2.2. The staff found this method acceptable.

The staff reviewed those portions of the BWR Vessel ID Attachment Welds Program for which the applicant claimed consistency with GALL AMP XI.M4 and found them consistent.

Operating Experience. As documented in the Audit and Review Report, the applicant explained that no industry operating experience with vessel ID attachment weld flaws has emerged since the release of BWRVIP-48; therefore, there is no recent applicable operating experience. The applicant also stated that program changes and updates have resulted from the ongoing review of regulatory notices for applicability to the reactor vessel internals. NMP closely monitors the activity of the BWR Vessel Internals Program and ASME Section XI Code Committees. In these ways, the applicant addresses vessel internal degradation noted at other BWRs systematically and revises BWR Vessel Internals Program inspections accordingly. Operating experience issues affecting NMP1 include core shroud cracking, shroud support weld cracking, control rod drive (CRD) stub tube intergranular stress corrosion cracking (IGSCC) and leakage and top guide cracking. Operating experience issues identified at NMP2 include core shroud cracking and jet pump wedge wear. No other cracking has been identified for vessel internals at either unit.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's BWR Vessel ID Attachment Welds Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.11 and A2.1.12, the applicant provided the respective UFSAR and USAR supplements for the BWR Vessel ID Attachment Welds Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWR Vessel ID Attachment Welds Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.2 BWR Penetrations Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.7, the applicant described the BWR Penetrations Program, stating that this is an existing program that is consistent with GALL AMP XI.M8, "BWR Penetrations." The BWR Penetrations Program manages the effects of cracking in the various penetrations of the reactor pressure vessels. The BWR Penetrations Program is based on guidelines issued by the BWRVIP and approved by the NRC. Implementation of the BWR Penetrations Program is discussed in the program description for the BWR Vessel Internals Program (ALRA Section B2.1.8). The attributes of the BWR Penetrations Program related to maintaining reactor coolant water chemistry are included in the Water Chemistry Control Program (ALRA Section B2.1.2).

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

As documented in the Audit and Review Report, the staff noted that NMP credited Revision 1 and Revision 2 of the EPRI TR-103515 guidelines for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant stated that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The staff's review and evaluation reviewed the applicant's Water Chemistry Control Program are documented in SER Section 3.0.3.2.2. The staff found this method acceptable.

The staff reviewed those portions of the BWR Penetrations Program for which the applicant claimed consistency with GALL AMP XI.M8 and found them consistent. The staff found the applicant's BWR Penetrations Program acceptable because it conforms to the recommended GALL AMP XI.M8.

Operating Experience. As documented in the Audit and Review Report, the applicant explained that operating experience issues affecting NMP1 include core shroud cracking, shroud support weld cracking, CRD stub tube penetration IGSCC and leakage, and top guide cracking. Operating experience issues identified at NMP2 include core shroud cracking and jet pump wedge wear. No other cracking has been identified for vessel internals at either unit. The applicant also stated that program changes and updates have resulted from the ongoing review of industry operating experience and regulatory notices for applicability to the reactor vessel internals. NMP closely monitors the activity in the BWRVIP and ASME Section XI Code Committees. In these ways the applicant addressed vessel internal degradation noted at other BWRs in a systematic manner and revised the BWRVIP inspections accordingly.

The staff reviewed the operating experience referenced in the ALRA and interviewed the applicant's technical staff to confirm that (1) the plant-specific operating experience did not reveal any degradation not bounded by industry experience and (2) no industry operating experience with penetration and nozzle cracking has emerged since the release of BWRVIP-49 and BWRVIP-27.

The staff recognized that the CAP, which captures internal and external plant operating experience issues, ensures operating experience review and incorporation of objective evidence to support the conclusion that the effects of aging will be adequately managed.

UFSAR and USAR Supplements. In ALRA Sections A1.1.8 and A2.1.9, the applicant provided the respective UFSAR and USAR supplements for the BWR Penetrations Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWR Penetrations Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.3 Flow-Accelerated Corrosion Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.9, the applicant described the Flow-Accelerated Corrosion (FAC) Program, stating that this is an existing program that is consistent with GALL AMP XI.M17, "Flow-Accelerated Corrosion." The FAC Program, also referred to as the Erosion/Corrosion Program, manages aging effects due to flow-accelerated corrosion in carbon steel and low alloy steel piping containing single-phase and two-phase high-energy fluids. Program activities include: (1) analysis using a predictive code (CHECWORKS) to determine critical locations, (2) baseline inspections to determine the extent of thinning at the selected locations, (3) follow-up inspections to confirm the predictions, and (4) repair or replacement of components, as necessary. The inspection results provide input to the predictive computer code to calculate the number of refueling or operating cycles remaining before the component reaches the minimum allowable wall thickness. If the component trend indicates that an area will reach the minimum allowed thickness before the next scheduled outage, the component is repaired, replaced, or re-evaluated. The program considers the recommended actions in NRC Bulletin 87-01 and Information Notice (IN) 91-18, and implements the guidelines for an effective FAC program presented in EPRI Report NSAC-202L-R2. The program also implements the recommendations provided in NRC generic letter (GL) 89-08, "Erosion/Corrosion Induced Pipe Wall Thinning."

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

As documented in the Audit and Review Report, the staff requested that the applicant clarify the minimum acceptable wall thickness defined in its FAC Program. The applicant stated that its FAC Program minimum acceptable wall thickness is the thickness required by the design code to withstand design loads. The applicant's FAC Program uses 87.5 percent of the nominal wall thickness as the first threshold for minimum wall thickness because newly purchased pipe to a nominal design specification could have actual wall thickness as low as 87.5 percent of the nominal wall thickness. The applicant also explained that if degradation is detected such that the measured wall thickness is less than the minimum predicted thickness it will take additional examinations in adjacent areas and at similar locations in sister trains/parallel lines to bound the thinning and ensure that the actual minimum wall is measured. Because the applicant is using an industry-accepted 87.5 percent of the nominal pipe wall thickness based on the piping manufacturer's design tolerance for the minimum acceptable wall thickness determination and because the applicant is following the EPRI Report NSAC-202L-R2, "Recommendations for an Effective Flow Accelerated Corrosion Program," for selection of the sampling size the staff found this explanation satisfactory.

The staff found the applicant's FAC Program acceptable because it conforms to the recommended GALL XI.M17 as claimed by the applicant in the ALRA.

Operating Experience. In ALRA Section B2.1.9, the applicant explained that wall thinning problems in single- and two-phase systems have occurred throughout the industry, as documented in various NRC Bulletins and INs. NMPNS reviewed both industry and plant-specific operating experience in establishing the basis for the FAC Program, which is continually adjusted to account for further industry experience and research.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

As documented in the Audit and Review Report, the staff asked the applicant how well the CHECWORKS model predictions compared with the actual field measurements. The applicant informed the staff that the specific software inputs pertaining to the NMP application have been verified properly and tested satisfactorily. Although minor changes in wall thickness were detected the measurements confirmed that overall the CHECWORKS model was conservative. The applicant also stated that the model will be updated periodically, refined, and calibrated based on the comparison of inspection data with predicted wear rates.

As documented in the Audit and Review Report, the staff reviewed the applicant's carbon steel piping erosion/corrosion program review plan for high energy systems. This procedure lists all NMP1 SSCs inspected in the applicant's FAC Program. The staff noted that plant-specific operating experience has been incorporated into this procedure. The staff also sampled several condition reports (CRs) that resulted from flow-accelerated corrosion inspections. The staff noted that these inspection results were evaluated and documented properly. The staff also noted that the applicant's FAC Program resulted in the identification and replacement of susceptible piping sections with materials more resistant to FAC. For example, in 1997, at NMP, the reheater drain line inlet nozzles to the fifth point feedwater heat exchangers were found to be degrading due to FAC. As a corrective measure FAC-resistent materials were used to replace these piping components and in 2002 at NMP2 a second point feedwater heat exchanger low pressure drain line leaked before its scheduled FAC inspection. The degraded low pressure heater drain lines were replaced with FAC-resistent chrome-moly piping material. Based on this review, the staff concludes that continued review of operating experience will ensure that FAC aging effects will be adequately managed.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's FAC Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.19 and A2.1.19, the applicant provided the respective UFSAR and USAR supplements for the FAC Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's FAC Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.4 One-Time Inspection Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.20, the applicant described the One-Time Inspection Program, stating that this is a new program that is consistent with GALL AMP XI.M32, "One-Time Inspection." The One-Time Inspection Program manages aging effects with potentially long incubation periods for susceptible components within the scope of license renewal. Program activities include visual, volumetric, and other established inspection techniques consistent with industry practice to provide a means of verifying that an aging effect is either not occurring or progressing so slowly that it has a negligible effect on the intended function of the structure or component. The program also provides measures for verifying the effectiveness of existing AMPs. If a one-time inspection reveals an AERM, an evaluation is required to determine the ability of the affected component to perform its intended function(s) during the period of extended operation and any appropriate corrective action. For stagnant or low flow areas in treated-water systems, the One-Time Inspection Program will determine the effectiveness of the Water Chemistry Control Program in managing the effects of aging. For Class 1 piping less than four inches in diameter (nominal pipe size) that is directly connected to the reactor coolant pressure boundary, the One-Time Inspection Program will determine if cracking is occurring. If a flaw is detected, appropriate additional examinations will be performed using methods currently employed for similar components within the scope of the ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program. Selective leaching is also part of the One-Time Inspection Program. It is an aging effect that occurs very slowly, and NMPNS has identified potentially susceptible components in various systems.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

The staff reviewed those portions of the One-Time Inspection Program for which the applicant claimed consistency with GALL AMP XI.M32 and found them consistent. The staff found the applicant's One-Time Inspection Program acceptable because it conforms to the recommended GALL AMP XI.M32.

Operating Experience. In ALRA Section B2.1.20, the applicant explained that the One-Time Inspection Program is a new program at NMPNS; therefore, no programmatic operating experience is available.

The staff recognized that the CAP captures internal and external plant operating experience issues and ensures review and incorporation of operating experience for objective evidence to support the conclusion that the effects of aging are adequately managed.

UFSAR and USAR Supplements. In ALRA Sections A1.1.28 and A2.1.28, the applicant provided the respective UFSAR and USAR supplements for the One-Time Inspection Program.

The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's One-Time Inspection Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.5 Selective Leaching of Materials Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.21, the applicant described the Selective Leaching of Materials Program, stating that this is a new program that is consistent with GALL AMP XI.M33, "Selective Leaching of Materials." The Selective Leaching of Materials Program manages aging of components susceptible to selective leaching. The potentially susceptible components include valve bodies, valve bonnets, pump casings, and heat exchanger components in various systems. Implementation of the Selective Leaching of Materials Program is discussed in the program description for the One-Time Inspection Program.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute. The staff found the applicant's Selective Leaching of Materials Program acceptable because it conforms to the recommended GALL AMP XI.M33.

Operating Experience. In ALRA Section B2.1.21, the applicant explained that the Selective Leaching of Materials Program is implemented through its One-Time Inspection Program. However, the applicant has had plant-specific operating experience with selective leaching.

As documented in the Audit and Review Report, the staff reviewed the operating experience in the ALRA for the applicant's Selective Leaching of Materials Program and interviewed the applicant's technical staff. The staff determined that the plant-specific operating experience revealed no degradation not bounded by industry experience.

UFSAR and USAR Supplements. In ALRA Sections A1.1.33 and A2.1.33, the applicant provided the respective UFSAR and USAR supplements for the Selective Leaching of Materials Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Selective Leaching of Materials Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.6 Buried Piping and Tanks Inspection Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.22, the applicant described the Buried Piping and Tanks Inspection Program, stating that this is a new program that is consistent with GALL AMP XI.M34, "Buried Piping and Tanks Inspection." The Buried Piping and Tanks Inspection Program will manage the aging effects on the external surfaces of carbon steel, low-alloy steel, and cast iron components (e.g., tanks, piping) that are buried in soil. Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Periodicity of inspections will be based on plant operating experience and opportunities for inspection due to maintenance. If an opportunistic inspection does not occur within the first ten years of extended operation, NMPNS will excavate a representative sample for the purpose of inspection.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

In ALRA Section B2.1.22 the applicant stated that its new Buried Piping and Tanks Inspection Program will manage the aging effects and aging effects mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components buried in soil. However, GALL AMP XI.M.34 states that the program manages the effects of corrosion on the pressure-retaining capacity of buried carbon steel piping and tanks. During the staff audit and review of the original LRA documented in the March 3, 2005, initial Audit and Review Report (ML050660380) the staff asked the applicant to explain how aging effects and aging effects mechanisms of cast iron and low-alloy components will be managed, e.g., how selective leaching for cast iron will be detected and managed. The applicant responded that low alloy steel and malleable cast iron are in the same material group as carbon steel with similar AERM. Selective leaching is a gray cast iron AERM that will be diagnosed by visual inspection and hardness measurement of selected samples. These hardness measurements will be administered under the Selective Leaching of Materials Program.

The staff found the applicant's response acceptable. Low alloy steel and malleable cast iron have similar aging effects and aging effects mechanisms as carbon steel and selective leaching for cast iron components will be discovered by hardness testing. These hardness measurements will be administered under the Selective Leaching of Materials Program.

The following sentence has been added to ALRA Section B2.1.22, Buried Piping and Tanks Inspection Program, under the program description (Page B2-51): "If an opportunistic inspection does not occur within the first ten years of extended operation, NMPNS will excavate a representative sample for the purpose of inspection." The staff asked the applicant to explain why the program description in the ALRA for its Buried Piping and Tanks Inspection Program was revised to address the possible need for focused inspections for only the first 10-year period of extended operation and not also for the 10-year period prior to extended operation. The applicant responded that its Buried Piping and Tanks Inspection Program was incomplete and that the ALRA will be amended to address the need for possible focused inspections during the 10-year period prior to extended operation.

In its letter dated December 1, 2005, the applicant stated that Sections A1.1.6, A2.1.7, and B2.1.22 under the program description of the ALRA will be revised to read as follows:

> The Buried Piping and Tanks Inspection Program is a new program that will manage the aging effects/mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components (e.g. tanks, piping) that are buried in soil. Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of extended operation, NMP will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, NMP will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.

Sections A1.1.6 and A2.1.7 include the following additional last sentence:

> This program will be implemented prior to the period of extended operation.

The staff found the applicant's response acceptable. With the clarification statements added by the applicant to the ALRA to perform focused inspections as needed 10 years prior and within the first 10 years of license extension, the applicant's Buried Piping and Tank Inspection Program is now consistent with Element 4 of GALL AMP XI.M34.

The staff reviewed those portions of the Buried Piping and Tanks Inspection Program for which the applicant claimed consistency with GALL AMP XI.M34 and found them consistent. The staff found the applicant's Buried Piping and Tanks Inspection Program acceptable because it conformed to the recommended GALL AMP XI.M34.

Operating Experience. In ALRA Section B2.1.22, the applicant explained that the Buried Piping and Tanks Inspection Program is a new program at NMPNS; therefore, no programmatic operating experience is available.

The staff reviewed the operating experience provided in the ALRA (however, only information about related plant-specific and industry experience was available) and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

The staff recognized that the CAP, which captures internal and external plant operating experience issues, ensures operating experience review and incorporation for objective evidence to support the conclusion that the effects of aging are adequately managed.

UFSAR and USAR Supplements. In ALRA Sections A1.1.6 and A2.1.7, the applicant provided the respective UFSAR and USAR supplements for the Buried Piping and Tanks Inspection

Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Buried Piping and Tanks Inspection Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.7 10 CFR Part 50, Appendix J Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.26, the applicant described the 10 CFR Part 50, Appendix J Program, stating that this is an existing program that is consistent with GALL AMP XI.S4, "10 CFR Part 50, Appendix J." The 10 CFR Part 50, Appendix J Program [or Containment Leak Rate Test (LRT) Program] detects degradation of the containment structure and components that comprise the containment pressure boundary, including seals and gaskets. The program is not relied on to detect the onset or progression of degradation prior to it resulting in leakage. Containment leak rate tests are performed to assure that leakage through the primary containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the technical specifications (TSs). Type A tests measure the primary reactor containment overall integrated leakage rate, and include visual examination of the interior and exterior surfaces of the containment for evidence of structural deterioration. Type B tests measure leakage across each pressure-containing or leakage-limiting boundary, including: (1) containment penetrations whose design incorporates resilient seals, gaskets, or sealant compounds; (2) piping penetrations fitted with expansion bellows; (3) electrical penetrations fitted with flexible metal seal assemblies; (4) air lock door seals; and (5) doors with resilient seals or gaskets. Type C tests measure the leakage rates for containment isolation valves.

Staff Evaluation. During its audit and review, the staff reviewed those portions of the 10 CFR Part 50, Appendix J, Program for which the applicant claimed consistency with GALL AMP XI.S4 to confirm the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report dated January 18 2006. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

Operating Experience. In ALRA Section B2.1.26, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Containment LRT Program. Neither NMP1 nor NMP2 has experienced in the past two refueling outages a total leakage rate above Containment LRT Program acceptance criteria.

As documented in the Audit and Review Report, in response to the staff's inquiry the applicant stated that during the past two refueling outages the CAP identified no problems affecting its Appendix J Program. In March-May 2004 the Appendix J Program was appraised to be sound by the applicant's self-assessment and by an external independent organization. The staff noted that the applicant has demonstrated good operating experience in maintaining the integrity of the primary containment boundaries as shown by the selection of Option B of 10 CFR Part 50, Appendix J leakage testing requirements at established frequencies consistent with plant experience.

The staff sampled several items on the CR list that were associated with the containment LRT testing and did not identify any items related to the 10 CFR Part 50, Appendix J Program that would necessitate a change to NMP AMP B2.1.26.

The staff reviewed the operating experience provided in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

The staff found that based on the review of operating history, corrective actions, and self-assessments the applicant's 10 CFR Part 50 Appendix J Program is monitored continually and enhanced to incorporate the results of operating experience; as such it provides an effective means of managing aging affecting the structural integrity and leakproof tightness of the NMP containments.

After review of plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's 10 CFR 50 Appendix J Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.1 and A2.1.1, the applicant provided the respective UFSAR and USAR supplements for the 10 CFR Part 50, Appendix J Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's 10 CFR Part 50, Appendix J Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.8 Non-EQ Electrical Cables and Connections Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.29, the applicant described the Non-EQ Electrical Cables and Connections Program, stating that this is a new program that is consistent with GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The Non-EQ Electrical Cables and Connections Program manages aging of cables and connectors within the scope of license renewal exposed to adverse localized temperature, moisture, or radiation environments. Program activities include visual inspection of susceptible cables for evidence of cable and connection jacket surface anomalies. Inspections are conducted at least once every ten years, with the first representative sample of susceptible cables inspected prior to expiration of the current NMPNS licenses.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

The staff reviewed those portions of the Non-EQ Electrical Cables and Connections Program for which the applicant claimed consistency with GALL AMP XI.E1 and found them consistent. The staff found the applicant's Non-EQ Electrical Cables and Connections Program acceptable because it conformed to the recommended GALL AMP XI.E1.

Operating Experience. In ALRA Section B2.1.29, the applicant explained that the Non-EQ Electrical Cables and Connections Program is a new program at NMPNS; therefore, no programmatic operating experience is available.

The staff reviewed the plant-specific operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

As stated in the Audit and Review Report, the applicant will thoroughly review accessible non-EQ cables and connections documents (e.g., bulletins, letters, notices, advisories, et cetera) for applicability. If these documents are affecting or thought to affect NMP, the applicant will enter these documents into its CAP for resolution. Other nuclear power plants operating experience reports are reviewed to assess potential impact to NMP. Operating experience found to be applicable to NMP is added to its CAP for resolution.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's Non-EQ Electrical Cables and Connections Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

The staff recognizes that the CAP captures internal and external plant operating experience issues and ensures operating experience review and incorporation for objective evidence to support the conclusion that the effects of aging are adequately managed.

UFSAR and USAR Supplements. In ALRA Sections A1.1.24 and A2.1.24, the applicant provided the respective UFSAR and USAR supplements for the Non-EQ Electrical Cables and Connections Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Non-EQ Electrical Cables and Connections Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.9 Environmental Qualification Program

Summary of Technical Information in the Amended Application. In ALRA Section B3.1, the applicant described the Environmental Qualification Program, stating that this is an existing program that is consistent with GALL AMP X.E1, "Environmental Qualification (EQ) of Electric Components." The Environmental Qualification (EQ) Program manages thermal, radiation, and cyclical aging for electrical equipment important to safety and located in harsh plant environments at NMPNS. At NMP2, the EQ Program also manages these effects for active safety-related mechanical equipment located in harsh plant environments. EQ program activities (1) identify applicable equipment and environmental requirements; (2) establish, demonstrate, and document the level of qualification (including configuration, maintenance, surveillance, and replacement requirements); and (3) maintain (or preserve) qualification. The EQ Program employs aging evaluations based on 10 CFR 50.49(f) qualification methods. Components in the EQ Program must be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for environmentally qualified components that specify a qualification of at least 40 years are considered time-limited aging analysis (TLAAs) for license renewal. The EQ Program ensures that these SSCs are maintained within the bounds of their qualification bases.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the Audit and Review Report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

As documented in the Audit and Review Report, the staff identified one difference between the GALL AMP and the NMP EQ Program description. EQ of electrical equipment in ALRA Section 4.4 indicates that the aging effects and aging effects mechanisms of the EQ of electrical equipment identified in the TLAA will be managed during the extended period of operation under 10 CFR 54.21(c)(1)(iii). However, as documented in the Audit and Review Report, no information is provided on reanalysis of an aging evaluation to extend the qualification life of electrical equipment identified in the TLAA. Important attributes of a reanalysis are analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions. GALL AMP X.E1 under the EQ component reanalysis attributes describes each attribute under the program description. The EQ Program does not include this information.

As documented in the Audit and Review Report, the staff requested that the applicant address the reanalysis attributes listed in GALL AMP X.E1 or justify why this information was not included. In response to this request, the applicant informed the staff that it agreed to include the detailed EQ component reanalysis attributes in its NMP AMP. The staff concludes that the applicant's response is acceptable because the NMP AMP will be consistent with the GALL Report AMP program description. In its letter dated December 1, 2005, the applicant revised its ALRA to included a detailed description of reanalysis attributes.

As documented in the Audit and Review Report, the staff also asked if the applicant has plans to monitor temperature in order to extend the qualified life of components if the EQ reanalysis option is chosen. The applicant's response recognized that thermal aging is limiting component life. It plans to incorporate actual plant temperature monitoring data into the aging evaluation reanalysis for EQ components with a qualified life greater than 40 years similar to the temperature monitoring data used to assess equipment qualified life during the current operation period to represent existing plant thermal conditions accurately.

The staff reviewed those portions of the EQ Program for which the applicant claimed consistency with GALL AMP X.E1 and found them consistent. The staff found the applicant's EQ Program acceptable because it conforms to the recommended GALL AMP X.E1.

Operating Experience. In ALRA Section B3.1, the applicant explained that the EQ Program started in 1980 as a project at NMP1, and was developed as an integral part of construction at NMP2. Since its inception, consideration of plant and industry operating experience has been an important element of the EQ Program. Recorded measurements of ambient temperature have been used to define conditions for some harsh environments, and records of representative actual temperatures have been used as preliminary data to resolve concerns for certain terminal blocks installed in the NMP1 drywell. Qualified life evaluations for certain sealing materials and lamp assemblies were reevaluated to remove excess conservatism and eliminate unnecessary maintenance activities. The program is evolving as administrative improvements have been identified to address issues such as communication and organizational transitions. A major program reconstitution effort began in 2003, in response to internal assessments, to improve the overall strength of the EQ Program. With additional operating experience lessons learned will be used to adjust this program as needed. The applicant's EQ Program has been effective in managing thermal, radiative, and cyclical aging of components within the scope of 10 CFR 50.49.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's EQ Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.15 and A2.1.15, the applicant provided the respective UFSAR and USAR supplements for the Environmental Qualification Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Environmental Qualification Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2 AMPs That Are Consistent with the GALL Report with Exceptions or Enhancements

In ALRA Appendix B, the applicant identified that the following AMPs were, or will be, consistent with the GALL Report, with exception(s) or enhancement(s):

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Reactor Head Closure Studs Program
- BWR Feedwater Nozzle Program
- BWR Stress Corrosion Cracking Program
- BWR Vessel Internals Program
- Open-Cycle Cooling Water System Program
- Closed-Cycle Cooling Water System Program
- Boraflex Monitoring Program (NMP1 Only)
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Compressed Air Monitoring Program (NMP1 Only)
- BWR Reactor Water Cleanup System Program
- Fire Protection Program
- Fire Water System Program
- Fuel Oil Chemistry Program
- Reactor Vessel Surveillance Program
- ASME Section XI Inservice Inspection (Subsection IWE) Program
- ASME Section XI Inservice Inspection (Subsection IWL) Program (NMP2 Only)
- ASME Section XI Inservice Inspection (Subsection IWF) Program
- Masonry Wall Program
- Structures Monitoring Program
- Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program
- Bolting Integrity Program
- BWR Control Rod Drive Return Line (CRDRL) Nozzle Program
- Protective Coating Monitoring and Maintenance Program
- Fatigue Monitoring Program
- Non-EQ Inaccessible Medium Voltage Cables Program (NMP2 Only)

For AMPs that the applicant claimed are consistent with the GALL Report, with exceptions or enhancements, the staff performed an audit to confirm that those attributes or features of the program for which the applicant claimed consistency with the GALL Report were indeed consistent. The staff also reviewed the exceptions and enhancements to the GALL Report to determine whether they were adequate and acceptable. The results of the staff's audit and reviews are documented in the following sections.

3.0.3.2.1 ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.1, the applicant described the ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD)

Program, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD." The ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (referred to herein as the IWB/C/D ISI Program) manages aging of Class 1, 2, and 3 pressure-retaining components and their integral attachments. Program activities include periodic visual, surface, and/or volumetric examination and pressure tests of Class 1, 2, and 3 pressure-retaining components. The IWB/C/D ISI Program is based on ASME Section XI, 1989 edition, with no Addenda and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda. Examination categories B-F, B-J, C-F-1, C-F- 2 and IGSCC Category A are inspected using the EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by NRC plant-specific Relief Request.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justifications to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the IWB/C/D ISI Program for which the applicant claimed consistency with GALL AMP XI.M1 and found them consistent. The staff found the applicant's IWB/C/D ISI Program acceptable because it conforms to the recommended GALL AMP XI.M1 with exception.

In the ALRA the applicant stated that its IWB/C/D ISI Program is consistent with the GALL Report with exception in the "detection of aging effects" and "monitoring and trending" program elements. The program is based on the 1989 Edition of ASME Section XI with no addenda. Examination categories B-F, B-J, C-F-1, and C-F-2 and IGSCC Category A are inspected per the requirements of the EPRI risk-informed methodology and ASME Code Case N–578-1.

In addition in the ALRA the applicant stated that its IWB/C/D ISI Program based on the 1989 Edition with no addenda was found acceptable by the NRC in safety evaluations (SEs) dated October 5, 2000 and March 3, 2000, and that the IWB/C/D ISI Program for NMP1 and NMP2 implement the EPRI risk-informed methodology and ASME Code Case N-578-1 as approved by the staff in an NRC plant-specific relief request.

The GALL Report states that the 1989 Code Edition covers all examination categories identified in the 1995 Edition through the 1996 Addenda and that the 1995 ASME Code Edition eliminates the hydrostatic test because equivalent results are obtained from the leakage test. The staff also compared the acceptance criteria differences between the 1989 and 1995 Editions through the 1996 Addenda of ASME Section XI. The staff found the acceptance criteria of the 1989 Edition more conservative than those of the 1995 Edition through the 1996 Addenda. Subsection IWB-3640 in the 1989 Edition sets the acceptable flaw depth upper limit as 60 percent of wall thickness whereas Subsection IWB-3640 in the 1995 Edition through the 1996 Addenda sets the acceptable flaw depth upper limit as 75 percent of wall thickness for shielded metal-arc welds and submerged arc welds. The staff also reviewed the SERs for the NMP ISI plans based on the ASME Section XI 1989 Edition. On this basis, the staff finds the code edition exception acceptable.

As documented in the Audit and Review Report, the staff noted that the applicant's risk-informed Inservice inspection (RI-ISI) relief request is valid for a 10-year inspection interval under the CLB and requested that the applicant provide additional justification for extending this risk-informed relief request for the period of extended operation. In its letter dated December 1, 2005, the applicant stated that the program description had been revised by deleting "using the EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by the NRC plant-specific Relief Request" and inserting "using NRC approved Risk-Informed Methodology." Prior to the period of extended operation, the ISI Program will be updated to the latest Edition and Addenda of ASME Section XI as mandated by 10 CFR 50.55a and 10 CFR Part 54 requirements." At present, an RI-ISI program is approved for use on an ASME Code 10-year ISI for specific intervals. However, the applicant will have to request approval to use the RI-ISI program for specific intervals 12 months prior to each interval during the period of extended operation under 10 CFR 50.55a. Therefore, the staff determined that the ASME Section XI code in effect referenced in 10 CFR 50.55a, for which the applicant will request approval 12 months prior to each inspection interval, is acceptable for the period of extended operation. The staff concludes that the applicant's response is acceptable.

The staff determined that although the number of the examinations is reduced, the risk from implementation of RI-ISI is expected to decrease slightly from that estimated from the current requirements. The primary reason for the risk reduction is that examinations will be required for piping segments of safety significance that may not be inspected per the existing ASME Section XI Program. In addition the RI-ISI program is on ongoing program that requires update and expansion based on industry and site-specific inspection findings. On this basis the staff finds this exception acceptable.

Operating Experience. In ALRA Section B2.1.1, the applicant explained it has reviewed both industry and plant-specific operating experience relating to the IWB/C/D ISI Program. Review of plant-specific operating experience revealed CRs documenting indications of flaws in recirculation components, piping, and various nozzle connection welds. Deficiencies identified by IWB/C/D ISI Program activities have been repaired, replaced, or evaluated as acceptable in accordance with ASME Section XI and station implementing procedures.

The staff reviewed the applicant's supporting documents that evaluate industry experiences as identified in General Electric (GE) service information letters (SILs) against the applicant's ISI Program. The staff determined that the applicant continuously evaluates industry operating experience and adjusts its inspection plans accordingly.

The staff also reviewed the applicant's CAP, which revealed that CRs were initiated when ISI inspections found stress corrosion cracking (SCC) in the reactor coolant system. The staff reviewed the applicant's CRs as described in the Audit and Review Report and found that the applicant's ISI Program is effective in identifying degradation and implementing repairs.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's IWB/C/D ISI Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. The applicant provided its UFSAR and USAR supplements for the IWB/C/D ISI Program in ALRA Section A1.1.4 for NMP1 and Section A2.1.5 for NMP2 stating that the program manages aging of Class 1, 2, or 3 pressure-retaining components and their integral attachments. Program activities include periodic visual surface or volumetric examinations and pressure tests of Class 1, 2, and 3 pressure-retaining components. The applicant also stated that its IWB/C/D ISI Program is based on the ASME Section XI 1989 Edition with no Addenda and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda. Examination categories B-F, B-J, C-F-1, and C-F-2 and IGSCC Category A are inspected using EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by an NRC plant-specific relief request. These are program exceptions described in the GALL Report (which cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda).

As documented in the Audit and Review Report, the staff noted that the applicant's RI-ISI relief request is valid for a 10-year inspection interval under the CLB and requested that the applicant provide additional justification for extending this risk-informed relief request for the period of extended operation. The applicant stated that it would revise Appendix A to remove that relief request. In its letter dated December 1, 2005, the applicant stated that ALRA Sections A1.1.4 and A2.1.5 have been revised by deleting "using the EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by the NRC plant-specific Relief Request" and replacing it with "using NRC approved Risk-Informed Methodology." Prior to the period of extended operation, the ISI Program will be updated to the latest Edition and Addenda of ASME Section XI as mandated by 10 CFR 50.55a and 10 CFR 54 requirements." The staff reviewed the applicant's response, found the revised information to be adequate, and concludes that it is acceptable. The staff reviewed these sections and determined that the information in the UFSAR and USAR supplements also provides adequate summary program descriptions required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's IWB/C/D ISI Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exception and the associated justifications, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that the supplements provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.2 Water Chemistry Control Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.2, the applicant described the Water Chemistry Control Program, stating that this is an existing program that is consistent, with exceptions, with GALL AMP XI.M2, "Water Chemistry." The Water Chemistry Control Program manages aging effects by controlling the internal environment of the reactor water, feedwater, condensate, and control rod drive systems, and related auxiliaries (such as the NMP1 torus, NMP2 suppression pool, condensate storage tank, and spent fuel pool). The aging effects of concern are loss of material and crack initiation and growth. Program activities include monitoring and controlling concentrations of known detrimental chemical species below the levels known to cause degradation. The Water Chemistry Control Program implements the guidelines for BWR water chemistry presented in Electric Power Research Institute (EPRI) Reports TR-103515-R1 and TR-103515-R2. The Water Chemistry Control Program credits activities performed under the direction of the ASME Section XI Inservice Inspection (IWB, IWC, IWD) Program and the One-Time Inspection Program to verify program effectiveness, including areas of low flow or stagnant water.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exceptions and the associated justifications to determine whether the AMP, with the exceptions, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the Water Chemistry Control Program for which the applicant claimed consistency with GALL AMP XI.M2 and found them consistent. The staff found the applicant's Water Chemistry Control Program acceptable because it conforms to the recommended GALL AMP XI.M2 with exceptions.

In the ALRA the applicant stated that its Water Chemistry Control Program is consistent with the GALL Report with an exception to the "scope of program" program element. The program described in GALL AMP XI.M2 identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs. EPRI periodically updates the water chemistry guidelines as new industry experience becomes available. Revisions 1 and 2 of the EPRI report incorporate industry experience and are the basis for the NMP1 Water Chemistry Control Program whereas NMP2 uses only TR-103515 Revision 2.

The specific impacts of this scope of program exception are addressed with the program elements affected by the use of later revisions of the EPRI TR-103515 so no evaluation is provided for the "scope of program" element.

The applicant also stated in the ALRA that its Water Chemistry Control Program has an exception to the "parameters monitored/inspected" program element. The program described in GALL AMP XI.M2 identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs. EPRI TR-103515-R0 recommends that electrochemical potential (ECP) be monitored during power operations and does not distinguish between normal water chemistry and hydrogen water chemistry (HWC). The NMP1 program takes an exception in that ECP is monitored only under HWC operation. The NMP2 program also takes an exception by not monitoring ECP directly but the molar ratio of hydrogen-to-oxygen as an acceptable alternative. The GALL Report also recommends that hydrogen peroxide be monitored to manage stress corrosion cracking and corrosion in BWR plants. Both NMP1 and NMP2 programs takes exceptions to this recommendation because accurate measurement of this chemical is extremely difficult due to its rapid decomposition in the sample lines. As an alternative consistent with Revision 2 of the EPRI report NMP1 measures ECP and NMP2 measures the molar ratio of hydrogen to oxygen.

With regard to the NMP1 exception of monitoring ECP only when under HWC, EPRI TR-10315 Revision 2 recommends, based on the latest industry experience, that ECP be monitored only if plants implement HWC or HWC with noble metal chemical addition (NMCA). Based on the latest industry information the staff found this practice acceptable. In regard to NMP2 the applicant stated in the ALRA that it does not monitor ECP directly but rather the molar ratio of hydrogen to oxygen as an acceptable alternative based on the latest industry guidance of EPRI TR-10315 Revision 2. The staff found acceptable this use of an alternative measurement providing the same level of effectiveness.

From review of the information provided in the ALRA the staff determined that the applicant proposed acceptable alternative methods for both NMP1 and NMP2 for measuring the level of hydrogen peroxide in the coolant. As described in the exception, NMP1 measures electrochemical potential. The molar ratio of hydrogen to oxygen is used by NMP2 to monitor the presence of excessive hydrogen peroxide. The staff found these exceptions acceptable.

In addition, in the ALRA the applicant stated that its Water Chemistry Control Program also takes an exception to the "monitoring and trending" program element. The program described in GALL AMP XI.M2 identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs. EPRI TR-103515-R0 recommends that chlorides and sulfates in reactor water be sampled daily. NMP2 takes an exception to this recommendation by sampling for these chemical species only three times per week. EPRI TR-103515-R0 also recommends that ECP be monitored continuously for reactor water. NMP2 takes an exception to this recommendation by not monitoring ECP. EPRI TR-103515-R0 recommends that the sampling frequencies and action levels for feedwater iron and copper commence at > 10 percent power. Both NMP1 and NMP2 takes exceptions to this recommendation by not commencing these sampling activities until 25 percent power.

With regard to the NMP2 exception to daily monitoring of chlorides and sulfates, the applicant stated in the ALRA that these species are part of the conductivity measurement monitored continuously and any increase in conductivity above Action Level 1 requires daily sampling to determine the concentration of monitored species. The applicant further stated that this sampling plan is consistent with the guidance of Revisions 0 and 2 of the EPRI report. Because the program does not reduce the effectiveness of the NMP2 Water Chemistry Control Program, the staff found this exception acceptable.

With regard to NMP2 not continuously monitoring ECP the applicant stated in the ALRA that the molar ratio of hydrogen to oxygen is used as an acceptable alternative. Furthermore, the applicant stated that BWRVIP-62 provides the technical correlation between these two parameters and establishes an operating goal for the value of hydrogen-to-oxygen molar ratio. Because the use of the BWRVIP-62 correlation does not reduce the effectiveness of the NMP2 Water Chemistry Control Program, the staff found this exception acceptable.

With regard to initiating sampling frequencies and action levels for feedwater iron and copper at > 10 percent power, the applicant states, in the ALRA, that, for both NMP1 and NMP2, the justification for this exception is that the filter samples collected below 25 percent power are not representative and the operating time between 10 and 25 percent power is short enough to be considered insignificant. Because of the limited time between 10 and 25 percent power, the staff concludes that this does not reduce the effectiveness of the applicant's Water Chemistry Control Program. On this basis, the staff found this acceptable.

Furthermore, in the ALRA the applicant stated that its Water Chemistry Control Program takes an exception to the "acceptance criteria" program element. The program described in GALL AMP XI.M2 identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs. EPRI periodically updates water chemistry guidelines as new industry experience becomes available. Revisions 1 and 2 of the EPRI report incorporating industry experience are the basis for the NMP1 Water Chemistry Control Program whereas NMP2 uses only TR-103515 Revision 2. EPRI TR-103515-R0 recommends that an action level be established for ECP during power operations. NMP1 takes an exception to the establishment of an action level but establishes an administrative goal of the same value. EPRI TR-103515-R0 recommends specific values for action levels 2 and 3 for reactor water chlorides and sulfates under HWC/NMCA conditions during power operations. NMP2 takes an exception to these values by using the corresponding values recommended in Revision 2 of the EPRI report.

With regard to NMP1 establishing an action level for ECP in the ALRA, the applicant stated that it establishes a plant-specific administrative goal for ECP and the actions required by the NMP administrative procedure are consistent with the EPRI recommended actions for exceeding the value. The applicant further stated that there is, therefore, no impact on program effectiveness. Because NMP1 has established an administrative procedure that does not reduce the effectiveness of the applicant's Water Chemistry Control Program the staff found this exception acceptable.

With regard to establishing action levels 2 and 3 for reactor water chlorides and sulfates in the ALRA, the applicant stated that the latest industry experience indicates that these higher values do not reduce the effectiveness of the applicant's Water Chemistry Control Program while operating at power using HWC. For maintaining program effectiveness the staff found this exception acceptable.

Operating Experience. In ALRA Section B2.1.2, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Water Chemistry Control Program. As chemistry control guidelines were evolving in the industry, NMP experience with reactor water system chemistry was similar to that of the industry. Review of plant-specific operating experience revealed CRs documenting instances where monitored parameters exceeded specified action levels or goals. In those instances where a chemistry action level was exceeded, prompt corrective actions were taken to re-establish proper chemistry.

As documented in the Audit and Review Report dated January 18, 2006, the staff reviewed the summary of specific operating experience for the applicant's Water Chemistry Control Program. The staff found a significant number of CRs on water chemistry control limit monitoring, demonstrating the effectiveness of the program in minimizing propagation of aging effects and aging effects mechanisms of concern for SSCs for which water chemistry is controlled.

The staff also reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's Water Chemistry Control Program adequately manages the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.37 and A2.1.36, the applicant provided the respective UFSAR and USAR supplements for the Water Chemistry Control Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Water Chemistry Control Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.3 Reactor Head Closure Studs Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.3, the applicant described the Reactor Head Closure Studs Program, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.M3, "Reactor Head Closure Studs." The Reactor Head Closure Studs Program manages cracking of and loss of material from the reactor pressure vessel closure studs. The Reactor Head Closure Studs Program implements the preventive measures of Regulatory Guide 1.65. Inservice examinations are performed in accordance with the 1989 edition of the ASME Boiler and Pressure Vessel Code with no Addenda, and ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," 1995 Edition through 1996 Addenda as approved by the NRC in plant-specific exemptions.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justifications to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

The staff reviewed portions of the Reactor Head Closure Studs Program for which the applicant claimed consistency with GALL AMP XI.M3 and found them consistent. The staff found the applicant's Reactor Head Closure Studs Program acceptable because it conforms to the recommended GALL AMP XI.M3.

In the ALRA, the applicant stated that its Reactor Head Closure Studs Program is consistent with the GALL Report with an exception to the program description. The program described in GALL AMP XI.M3 cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda. The IWB/C/D ISI Programs for NMP1 and NMP2 are based on the 1989 Edition with no addenda.

The staff noted that the code of record is updated and approved by the staff for each inspection interval in accordance with 10 CFR 50.55a and that this regulation mandates the application of ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," (1995 Edition with the 1996 Addenda). On this basis, the staff found this exception acceptable.

Operating Experience. In ALRA Section B2.1.3, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Reactor Head Closure Studs Program. NMP reactor vessel studs have experienced very little degradation. A review of plant-specific operating experience revealed only a few CRs initiated as a result of inspections of the studs, associated nuts, and washers. The review demonstrated that the CRs were related to normal maintenance issues and not to age-related defects. There are no existing defects in the head studs or nuts.

The staff determined that the applicant's inspection program is adequate to detect timely indications of aging to allow for repair or replacement prior to bolting failure.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that the applicant's Reactor Head Closure Studs Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.31 and A2.1.31, the applicant provided the respective UFSAR and USAR supplements for the Reactor Head Closure Studs Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Reactor Head Closure Studs Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exception and the associated justifications, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.4 BWR Feedwater Nozzle Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.5, the applicant described the BWR Feedwater Nozzle Program, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.M5, "BWR Feedwater Nozzle." The NMP1 and NMP2 Feedwater Nozzle Programs are existing programs that require ultrasonic testing (UT) inspections of the feedwater nozzles every 10 years to verify the nozzles are acceptable for continued service. The Feedwater Nozzle Programs are implemented through the ISI Program which at the time the original LRA was submitted conformed to the requirements in ASME Code, Section XI, Subsection IWB, Table IWB 2500-1 (1989 Edition, no Addenda), and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda, "Performance Demonstration for Ultrasonic Examination Systems," to ASME Section XI, Division 1. UT and PT inspections discussed in NUREG-0619 have been superseded because the inspections are now performed in accordance with ASME Section XI, Appendix VIII.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justifications to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the BWR Feedwater Nozzle Program for which the applicant claimed consistency with GALL AMP XI.M5 and found them consistent. The staff found the applicant's BWR Feedwater Nozzle Program acceptable because it conforms to the recommended GALL AMP XI.M5 with an exception.

In the ALRA, the applicant stated that its BWR Feedwater Nozzle Program is consistent with the GALL Report with an exception to the program description. The NMP Inservice Inspection Program does not comply with the specific edition and addenda of ASME Section XI cited in the GALL Report because prior to the start of each inspection interval, the program is updated to the latest edition and addenda of ASME Section XI as mandated by 10 CFR 50.55a. This exception (i.e., updating the ISI Program to the latest edition and addenda of ASME Section XI as mandated by 10 CFR 50.55a) is acceptable because the NMP ISI Programs are consistent with the recommendation of GALL AMP XI.M5 in that the feedwater nozzles are subject to ASME Section XI requirements.

In the ALRA, the applicant further stated that the program described in GALL AMP XI.M5 cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda. The IWB/C/D ISI Programs for NMP are based on the 1989 Edition with no addenda and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda. As documented in the Audit and Review Report, the staff noted that the code of record is updated and approved by the NRC staff for each inspection interval under 10 CFR 50.55a. On this basis the staff found this exception acceptable.

Operating Experience. In ALRA Section B2.1.5, the applicant explained that no industry experience was identified that indicates that existing programs and practices will not be effective in the timely identification of feedwater nozzle cracking.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that the applicant's BWR Feedwater Nozzle

Program will adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.7 and A2.1.8, the applicant provided the respective UFSAR and USAR supplements for the BWR Feedwater Nozzle Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWR Feedwater Nozzle Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exception and the associated justifications, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.5 BWR Stress Corrosion Cracking Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.6, the applicant described the BWR SCC Program, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.M7, "BWR Stress Corrosion Cracking." The BWR SCC Program manages intergranular stress corrosion cracking in reactor coolant pressure boundary piping made of stainless steel as delineated in NUREG-0313, Revision 2, and Generic Letter 88-01 and its Supplement 1, as modified by BWRVIP-75. Augmented inspections are performed in accordance with these documents. The attributes of the BWR SCC Program related to maintaining reactor coolant water chemistry are included in the Water Chemistry Control Program.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justifications to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

As documented in the Audit and Review Report, the staff noted that NMP credited Revision 1 and Revision 2 of the EPRI TR-103515 guidelines for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant stated that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The staff reviewed the applicant's Water Chemistry Control Program and documented its evaluation in SER Section 3.0.3.2.2. The staff found this exception acceptable.

The staff reviewed those portions of the BWR SCC Program for which the applicant claimed consistency with GALL AMP XI.M7 and found them consistent. The staff found the applicant's BWR SCC Program acceptable because it conforms to the recommended GALL AMP XI.M7 with an exception.

In the ALRA, the applicant stated that its BWR SCC Program is consistent with the GALL Report with an exception to the "acceptance criteria" program element. The current NMP licensing is based on the 1989 Edition of ASME Section XI whereas the GALL Report cites the 1995 Edition with the 1996 Addenda of the ASME Section XI Code.

The staff compared the 1989 Edition to the 1995 Edition through 1996 Addenda of ASME Section XI Subsection IWB-3640. The staff found the acceptance criteria in the 1989 Edition more conservative than those in the 1995 Edition through 1996 Addenda. Subsection IWB-3640 in the 1989 Edition sets the acceptable flaw depth upper limit as 60 percent of the wall thickness whereas IWB-3640 in the 1995 Edition through 1996 Addenda sets the acceptable flaw depth upper limit as 75 percent of the wall thickness for the shielded metal-arc welds and submerged arc welds. On this basis the staff found the exception acceptable.

Operating Experience. In ALRA Section B2.1.6, the applicant explained it has reviewed both industry and plant-specific operating experience relating to BWR stress corrosion cracking. Along with other plants in the BWR fleet, NMP1 has found indications of IGSCC in recirculation system piping and welds that were evaluated and dispositioned in accordance with the applicable ISI Program plan.

The staff reviewed the applicant's CAP, which shows that CRs were initiated when ISI inspections found SCC in the reactor coolant system.

The staff reviewed the applicant's CRs as described in the Audit and Review Report and found that operating experience indicates that the BWR SCC Program at NMP1 has been generally effective in managing aging effects and aging effects mechanisms in BWR coolant pressure-retaining boundary piping.

The staff also reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's BWR SCC Program adequately manages the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.10 and A2.1.11, the applicant provided the respective UFSAR and USAR supplements for the BWR SCC Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWR SCC Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exception and the associated justifications, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.6 BWR Vessel Internals Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.8, the applicant described the BWR Vessel Internals Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M9, "BWR Vessel Internals." The BWR Vessel Internals Program manages aging of materials inside the reactor vessel. Program activities include: (1) inspections for the presence and effects of cracking and (2) monitoring and control of water chemistry. This program is based on guidelines issued by the BWRVIP and approved (or pending approval) by the NRC. The attributes of the BWR Vessel Internals Program related to maintaining reactor coolant water chemistry are included in the Water Chemistry Control Program. Inspections and evaluations of reactor vessel internal components are consistent with the guidelines provided in the following BWRVIP reports:

- BWRVIP-18, BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines
- BWRVIP-25, BWR Core Plate Inspection and Flaw Evaluation Guidelines
- BWRVIP-26, BWR Top Guide Inspection and Flaw Evaluation Guidelines
- BWRVIP-27, BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines
- BWRVIP-38, BWR Shroud Support Inspection and Flaw Evaluation Guidelines
- BWRVIP-41, BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines (NMP2 only)
- BWRVIP-42, LPCI Coupling Inspection and Flaw Evaluation Guidelines (NMP2 only)
- BWRVIP-47, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines
- BWRVIP-48, Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines
- BWRVIP-49, Instrument Penetration Inspection and Flaw Evaluation Guidelines
- BWRVIP-74, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines
- BWRVIP-76, BWR Core Shroud Inspection and Flaw Evaluation Guidelines

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

As documented in the Audit and Review Report, the staff noted that the applicant credited Revisions 1 and 2 of EPRI TR-103515, "BWR Water Chemistry Guidelines – 1996," for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant stated that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The staff reviewed the applicant's Water Chemistry

Control Program and documented its evaluation in SER Section 3.0.3.2.2. The staff found this method acceptable.

As documented in the Audit and Review Report, the staff has stated that BWRVIP-62 has not been approved by the NRC, the staff requested that the applicant provide a program with respect to BWRVIP-62. The applicant responded that BWRVIP-62 allows inspection relief for plants using HWC. Furthermore, the applicant responded that NMP2 credited BWRVIP-62 in a shroud evaluation during 2000-2004 but is not invoking BWRVIP-62 currently and that NMP1 has never taken credit for HWC in shroud reinspection evaluations. In the future the applicant plans to credit the relief allowed by BWRVIP-62 when the document is approved for license renewal by the staff. The staff found this response acceptable.

The staff reviewed those portions of the BWR Vessel Internals Program for which the applicant claimed consistency with GALL AMP XI.M9 and found them consistent. The staff found the applicant's BWR Vessel Internals Program acceptable because it conforms to the recommended GALL AMP XI.M9 with enhancements.

In the ALRA, the applicant stated that its BWR Vessel Internals Program is consistent with GALL AMP XI.M9 with enhancements. As stated in the ALRA, the first enhancement in meeting the GALL Report for the "detection of aging effects" program element is that NMP will address open items identified in the staff's SER for the BWRVIP, herein referred as BWRVIP open items, regarding the inspection of inaccessible welds for core spray, jet pump, and low pressure coolant injection (LPCI) components (NMP1 and NMP2 Commitment 13).

In the ALRA, the applicant also stated that BWRVIP-18, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines," BWRVIP-41, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines (NMP2 Only)," and BWRVIP-42, "LPCI Coupling Inspection and Flaw Evaluation Guidelines (NMP2 Only)" identify BWRVIP open items regarding the inspection of inaccessible welds for core spray, jet pump, and LPCI components respectively. The applicant additionally stated that it will implement the resolution of these BWRVIP open items as documented in the BWR Vessel Internals Program response to be reviewed and accepted by the NRC. These three BWRVIP open items are applicable to NMP2. For NMP1 only the open item for core spray components is applicable due to the design of the plant. The staff found that this enhancement addresses the renewal application BWRVIP open items. The staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA, the applicant further stated that its BWR Vessel Internals Program is consistent with the GALL Report with the second enhancement in meeting the "detection of aging effects" program element by the steam dryers inspection (NMP1 and NMP2 Commitment 13). The applicant stated that the inspection and evaluation guidelines for steam dryers are currently under development by the BWR Vessel Internals Program committee. Once these guidelines are documented, reviewed, and accepted by the NRC staff, actions will be implemented at NMP1 and NMP2 according to the BWR Vessel Internals Program. The staff was aware that BWRVIP-139, "BWR Vessel and Internals Project, Steam Dryer Inspection and Flaw Evaluation Guidelines," issued by the BWR Vessel Internals Program is under staff review to address steam dryer inspection activities. The staff found this enhancement consistent with the GALL Report and acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In addition, in the ALRA, the applicant stated that its BWR Vessel Internals Program is consistent with the GALL Report with the third enhancement in meeting the "detection of aging effects" program element, access cover holes inspection.

In the ALRA, the applicant stated that the inspection and evaluation guidelines for access hole covers are currently under development by the BWR Vessel Internals Program committee. Once these guidelines are documented, reviewed, and accepted by the NRC, the actions will be implemented at NMP2 according to the BWR Vessel Internals Program (NMP2 Commitment 13). This issue is not applicable to NMP1 due to the design of the plant. The staff found that currently, inspection of access cover holes per a GE SIL and the BWR Vessel Internals Program will develop guidelines for such inspections. Because the applicant's enhancement is consistent with the GALL Report, the staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Furthermore, in the ALRA the applicant stated that its BWR Vessel Internals Program is consistent with the GALL Report with the fourth enhancement in meeting the GALL Report "detection of aging effects" program element. The baseline inspections for the BWR lower plenum components will be incorporated into the appropriate program and implementation documents (NMP1 and NMP2 Commitment 13).

In the ALRA, the applicant stated that the baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the appropriate program and implementation documents. The staff found that this enhancement meets the recommendation of the BWRVIP-47 report. The staff found this enhancement acceptable because these changes to the applicant's program provide assurance that aging effects will be adequately managed.

Regarding the fifth enhancement, in the ALRA, the applicant also stated that its BWR Vessel Internals Program is consistent with the GALL Report in meeting the "detection of aging effects" program element, top guide inspection regarding BWRVIP-26 (NMP1 and NMP2 Commitment 13).

In the ALRA, the applicant stated that a schedule for additional inspections of the top guide locations (using enhanced VT-1 visual inspection (EVT-1) or techniques demonstrated to be appropriate in BWRVIP-03, "BWR Vessel and Internals Project, Reactor Pressure Vessel and Internals Examination Guidelines") will be incorporated into the appropriate program and implementation documents. A minimum of 10 percent of the locations will be inspected within 12 years of the beginning of the period of extended operation with at least 5 percent of the inspections completed within six years. As documented in the Audit and Review Report, the staff noted that the inspection commitment (NMP2 Commitment 13) is within 12 years of the beginning of the period of extended operation only. The staff asked the applicant to confirm that the commitment also addressed subsequent intervals. The staff reviewed the latest NMP1 top guide inspection findings and requested that the applicant provide additional plant-specific information regarding the reinspection and scope expansion to additional locations. In its letter dated December 1, 2005, the applicant provided its plant-specific information regarding the top guide inspection summarized as follows:

- Prior to 2003 the NMP1 top guide fluence was estimated, using the latest best estimate transport techniques, to have exceeded the GALL Report identified 5E20 n/cm^2 threshold for irradiation-assisted stress corrosion cracking (IASCC) concerns.
- Consistent with the GALL Report guidance and a GE SIL recommendation, NMP1 implemented the recommended EVT-1 sample inspection in 2003 (Refueling Outage 17 (RFO17)) and found one crack.
- In the subsequent 2005 outage (RFO18), NMP1 expanded the inspection scope to include all accessible top guide grid beam locations using UT inspection methods. The scope expansion achieved essentially 95 percent coverage of the grid beam. This scope expansion and the UT inspection method are fully consistent with the current guidance in BWRVIP-26, "BWR Vessel and Internals Project, Top Guide Inspection and Flaw Evaluation Guidelines," and with a GE SIL specifically issued for the top guide grid beam. This UT inspection verified the presence of the crack identified by the 2003 EVT-1 examination and identified five others.
- A CR provides the disposition of the indications identified in the 2005 inspection. The CR disposition references the NMP1 flaw handbook and justifies at least one operating cycle prior to the next inspection. The CR corrective actions include a reanalysis of the as-found condition and the definition of the appropriate inspection scope and frequency. This plan is consistent with the guidance provided in BWRVIP-26 for top guide grid beam flaw analysis (i.e., to perform a plant-specific flaw analysis to define the structural margin and the appropriate inspection interval and scope) to which NMP is committed.

In its letter dated December 1, 2005, the applicant also stated that the top guide grid beam inspection sample plan addressed in the GALL Report is a sample program. At NMP1 the inspection program included a sample inspection similar to the GALL Report recommendation and the program has identified top guide cracking.

BWRVIP-26 does not identify any inspection plan for the top guide. The BWRVIP-47 sample inspection plan was chosen for the top guide grid beam. NMP1 implemented a scope expansion inspection of the grid beam during RFO18 (2005) as a result of the inspection results from RFO17 (2003). This scope expansion was performed using UT inspection methods which achieved approximately 95 percent coverage of the grid beam. The volumetric coverage was capable of detecting flaws through the height of both the upper and lower grid beams and at the intersections. The 2005 UT inspection is the NMP1 top guide grid beam baseline inspection identified in the BWRVIP-47 guidance. The staff determined that the applicant's sample inspection plan was acceptable and concludes that the program identified in the ALRA enhancements needed for its sample inspection plan. As documented in the Audit and Review Report, the applicant stated that NMP will (1) revise its program basis document to address inspection locations and re-inspection frequency, (2) revise ALRA Sections A1.1.12, A1.4, and B2.1.8 to address the top guide inspection enhancement, and (3) revise ALRA Sections A2.1.13, A2.4, and B2.1.8 to address the top guide inspection enhancement. In its letter dated December 1, 2005, the applicant provided its ALRA revisions:

> In Sections A1.1.12 and A1.4 the existing enhancement and commitment on top guide inspections for NMP1 will be revised to address re-inspection frequency as follows:

The reinspection scope and frequency for the grid beam going forward will be based on BWRVIP-26 guidance for plant-specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years, consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least two locations with accessible indications within the initial six years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions.

In Sections A2.1.13 and A2.4, the existing enhancement and commitment to perform the top guide inspections for NMP2 will be revised as follows:

NMP2 will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47 for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the applicant's BWRVIP will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline.

In Section B2.1.8, the existing enhancement to the "detection of aging effects" program element to perform the top guide inspections will be revised as follows:

The reinspection scope and frequency for the NMP1 grid beam going forward will be based on BWRVIP-26 guidance for plant-specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years, consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least two locations with accessible indications within the initial six years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions.

NMP2 will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47 for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the applicant's BWR

Vessel Internals Program will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline.

Because the applicant's enhancement is consistent with the GALL Report recommendations, the staff found the enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA, the applicant also stated that its BWR Vessel Internals Program is consistent with the GALL Report with another enhancement in meeting the GALL Report "corrective actions" program element by performing CRD stub tube repair (NMP1 Commitment 36).

In RAI 3.1.2-1 dated January 13, 2005, the staff requested that the applicant address the difference between the alternative repair roll/expansion techniques and the accepted ASME Code weld repair for NMP1 CRD stub tube penetration leakage. In a letter dated February 14, 2005, the applicant responded to RAI 3.1.2-1, stating that, "NMP committed to implement a strategy whereby during the period of extended operation a leaking CRD stub tube penetration would be roll repaired. If following the roll repair, this stub tube was to leak within acceptable limits, then a weld repair would be effected no later than one operating cycle following discovery of the leakage." In the ALRA, the applicant stated that it will follow the status of the proposed ASME Code change with respect to allowing roll/expansion techniques for CRD stub tubes and will implement the final code change or provide an alternative plan for the NMP1 period of extended operation at least one year prior to the expiration of the current operating license.

As documented in the Audit and Review Report, the staff noted that the wording in ALRA Table 3.1.1.A and in the applicant's response to RAI 3.1.2-1 imply that NMP1 will operate with CRD stub tube leakage for one operating cycle (two years). The staff did not consider this implication acceptable for the period of extended operation. The staff's safety evaluation dated March 25, 1987, allowing NMP1 to operate with CRD stub tube leakage was acceptable only as a temporary repair. Specifically, Item (6) of the staff's safety evaluation conclusions stated that, "The proposed leakage criteria provide sufficient time to complete the final development of the prototype mechanical seal and associated tooling and to investigate other methods like weld repair."

In a-RAI 3.1.2-1 dated November 2, 2005, the staff requested that the applicant address CRD stub tube leaking for an additional operating cycle.

In its response by letter dated November 30, 2005, the applicant revised ALRA Section 2.1.8 Commitment 36 in ALRA Section A1.4 and ALRA Table 3.1.1.A Item 3.1.1.A-30 to clarify its position related to the use of roll/expansion techniques for the repair of leaking NMP1 CRD stub tubes as follows:

> The 2nd paragraph of ALRA Table 3.1.1.A, LA Item 3.1.1.A-30 (Page 3.1-29), Commitment 36 of ALRA Section A1.4 (Page A1-42), and the Corrective Action bullet in ALRA Section B2.1.8 (Page B2-25) is replaced with:
>
>> If the 10/19/05 draft of Code Case N-730 is approved by the ASME, NMP Unit 1 will implement the final code case as conditioned by the NRC. If the code case is not approved by the

ASME, NMP1 will seek NRC approval of the 10/19/05 code case draft on a plant specific basis as conditioned by the NRC.

During the period of extended operation, should a CRD stub tube rolled in accordance with the provisions of the code case resume leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:

(1) A welded repair consistent with BWRVIP-58-A, "BWRVIP Internal access Weld Repair" and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.

(2) A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1.

(3) A future developed mechanical/welded repair method subject to the approval of the NRC.

The staff found the applicant's response acceptable because it is consistent with the GALL Report recommendation. The staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed. Therefore, the staff's concern described in RAI 3.1.2-1 is resolved.

In its letter dated November 17, 2005, the applicant revised its original enhancement in meeting the GALL Report for the "detection of aging effects" program element as follows: add management of fracture toughness of NMP1 and NMP2 Cast Austenitic Stainless Steel (CASS) components (NMP1 Commitment 37 and NNP2 Commitment 35).

In the ALRA, the applicant stated that maintenance procedures for the inspection of the orificed fuel support casting will be enhanced to include a sample VT-1 inspection of the casting and an EVT-1 inspection if any evidence of impact or mishandling is identified. In a letter dated November 17, 2005, the applicant provided its self-identified changes and its basis for change to the ALRA for the management of the fracture toughness of NMP1 and NMP2 CASS components with the BWR Vessel Internals Program as follows:

> In Sections A1.1.12, A2.1.13 and B2.1.8, clarify that the program activities include effects on fracture toughness due to neutron fluence and thermal embrittlement by 1) replacing the last bullet on Page A1-6 of Section A1.1.12; 2) replacing the last bullet on Page A2.6 of Section A2.1.13; and 3) replacing the text under the "parameters monitored/inspected" program element in NMP AMP B2.1.8 with the following:
>
>> Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect.
>
> In Sections A1.4 and A2.4, replace the commitments in Item 37 of Section A1.4 and Item 35 in Section A2.4 as follows:

> Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect.

The staff reviewed the applicant's self-identified ALRA change. The staff found this acceptable since its change meets the GALL Report's recommendation. On this basis, the staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In its letter dated December 1, 2005, the applicant provided an additional enhancement to the GALL Report "detection of aging effects" program element: Inspect additional locations to address the aging management for reactor vessel feedwater nozzle thermal sleeves (NMP1 Commitment 38 and NMP2 Commitment 37) and control rod drive return line nozzle thermal sleeves (NMP1 Commitment 40). An EVT-1 examination of the NMP1 and NMP2 feedwater sparger end bracket welds will be performed. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP2 feedwater thermal sleeves concludes that the hidden welds are not IGSCC susceptible the NMP2 inspections will be discontinued as appropriate (NMP1 Commitment 38 and NMP2 Commitment 37). NMP1 will perform an EVT-1 inspection of the thermal shield to flow shield weld starting 2007 and proceed at a 10 year-frequency thereafter consistent with the ISI inspection interval (NMP1 Commitment 40).

In a letter dated September 15, 2005, the applicant stated that its BWR Feedwater Nozzle Program and BWR CRDRL Nozzle Program had been removed as credits for the feedwater nozzle and CRDRL nozzle thermal sleeves. As documented in the Audit and Review Report, the staff asked the applicant to address aging management for the thermal sleeves. In a letter dated December 1, 2005, the applicant stated that it will use inspections performed under its BWR Vessel Internals Program using surrogate components more readily accessible for examination. For NMP1 the surrogate components will be the feedwater sparger end bracket welds. In this letter the applicant also provided its basis for choosing the feedwater sparger end bracket welds:

> The NMP1 feedwater nozzle thermal sleeves are fabricated from nickel-based Alloy 600 (Inconel 600). A full penetration weld joins the thermal sleeve to the outboard end of the carbon steel feedwater sparger. This weld was made with Alloy 82 and Alloy 182 weld fillers. The thermal-sleeve to sparger weld, or the heat affected zone in the Alloy 600 base material, is considered the most likely location for IGSCC in the thermal sleeve.

The applicant added that each feedwater sparger is supported by end brackets providing a spring force that helps hold the thermal sleeve in place. The feedwater sparger end bracket welds consist of three welds, sparger arm to sparger end plate welds (Weld #1), sparger end plate to bracket end plate weld (Weld #2), and sparger bracket end plate to end bracket assembly welds (Weld #3), which are dissimilar metal welds that use Alloy 182 or 82 weld fillers.

In addition the applicant stated that SCC of the feedwater thermal sleeves or the associated welds is possible but considered less likely than for other welds with the same weld filler associated with the feedwater sparger because the inconel to carbon steel welds are heat-treated shop welds and are not creviced. Service experience has demonstrated that Alloy 82 is resistant to IGSCC in BWR coolant. Alloy 182 is less resistant to IGSCC than Alloy 82 but performs acceptably with such aggravating factors as lack of fusion or a creviced condition. These conditions are more likely in field welds. The Alloy 600-to-carbon steel welds in the thermal sleeve are full penetration and do not create a creviced condition. Additionally, the thermal sleeve assembly was heat-treated after welding. The #1 end bracket welds use Alloy 182 filler metal in a mildly creviced condition, making them more susceptible to IGSCC than the thermal sleeve-to-sparger welds. Additionally, the #1 welds are exposed to reactor coolant chemistry on the outer diameter, which has a higher ECP, and thus are more likely to cause IGSCC than feedwater, which has a much lower ECP. Therefore, the applicant stated, if cracking is not found in the #1 welds inspection of the thermal sleeve-to-sparger welds is not necessary.

Furthermore, the applicant stated that the most susceptible of the three feedwater sparger end bracket welds (Weld #2) is subject to EVT-1 under a BWRVIP. If cracking is found in these welds the other end bracket welds (#1 and #3) will be inspected. If cracking is found in the less susceptible end bracket welds the necessity to inspect the thermal sleeve-to-sparger welds will be evaluated. The applicant's BWR Vessel Internals Program will, therefore, be credited with managing cracking bounded of the thermal sleeve as the susceptibility of the critical thermal sleeve weld to IGSCC is covered by other welds inspected under the applicant's BWR Vessel Internals Program. In its letter dated December 1, 2005, the applicant stated that it will revise the ALRA to add an EVT-1 examination of the NMP1 feedwater sparger brackets as a BWR Vessel Internals Program enhancement to address this issue. The staff found the applicant's response acceptable because it demonstrated that inspection of surrogate components includes the NMP1 feedwater nozzle thermal sleeves.

In its letter dated December 1, 2005, the applicant stated that NMP2 also will use inspections performed under the BWR Vessel Internals Program using surrogate components that are more readily accessible for examination. For NMP2 the surrogate components will be the feedwater sparger end bracket welds. In this letter the applicant also provided its basis for choosing the feedwater sparger end bracket welds:

> ...a similar evaluation of the NMP2 feedwater sparger welds and the selection of surrogate welds that are accessible for inspection would also be acceptable for NMP2. These accessible welds would be used as a leading indicator for potential IGSCC cracking of the thermal sleeve. If cracking is found in these welds, a supplemental evaluation of the thermal sleeve integrity would be required.

The applicant also stated that the review of the NMP2 feedwater thermal sleeve and sparger had been completed and had confirmed that the thermal sleeve material is 316L with several hidden stainless steel welds. The incomplete fabrication method review will determine the welding procedures and whether the welds were stress-relieved. If the hidden welds were stress-relieved they would not be considered susceptible to IGSCC and the cracking aging mechanism would not be considered applicable to NMP2.

In addition the applicant stated that the review of the NMP2 feedwater sparger installation details found that the field installation applied a 20,000 lbs load creating a 0.125" cold spring to the sparger. The sparger end brackets were pinned, locking in the cold spring, and then final field-welded with a fillet weld. The applicant further stated that this installation detail is similar to that of NMP1. The result of the cold spring is a fit-up net tensile stress superimposed on the weld residual stress. The combination of the fit-up stress (cold spring) and the residual stress of the field weld conditions and the fillet weld crevice geometry creates a susceptibility to IGSCC higher than that of the thermal sleeve welds. The corrosion potential of the reactor water in the region of the feedwater sparger end bracket welds is equivalent to if not greater than that of the reactor water in contact with the outside diameter weld of the thermal sleeve. The applicant also stated that an EVT-1 examination of the NMP1 and NMP2 feedwater sparger end bracket welds will be added to its BWR Vessel Internals Program as a program enhancement. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP2 feedwater thermal sleeve finds that the hidden welds are not IGSCC susceptible the NMP2 inspections will be discontinued.

Furthermore, the applicant stated that examination of the NMP2 feedwater sparger end bracket welds is a representative inspection of the material condition of the hidden thermal sleeve welds regarding potential IGSCC cracking. Therefore, consistent with the discussion between the staff and the applicant documented in the Audit and Review Report, cracking of the NMP2 feedwater nozzle thermal sleeves will be a matter for the applicant's BWR Feedwater Nozzle Program, BWR Vessel Internals Program, and Water Chemistry Control Program. In its letter dated December 1, 2005, the applicant stated that an EVT-1 examination of the NMP1 and NMP2 feedwater sparger end bracket welds will be added to its BWR Vessel Internals Program as a program enhancement (NMP1 Commitment 38 and NMP2 Commitment 37). The inspection extent and frequency of the end bracket weld inspection will be the same as for the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP2 feedwater thermal sleeve finds that the hidden welds are not IGSCC susceptible the NMP2 inspections will be discontinued. The staff reviewed the applicant's response and found it acceptable since the applicant's surrogate weld inspection provides adequate aging management for the NMP2 feedwater thermal sleeve. The staff found that the applicant appropriately addressed the aging effect and aging effect mechanism for NMP2 feedwater nozzle thermal sleeves.

In its letter dated December 1, 2005, the applicant also narrated operating experience in addressing the CRDRL nozzle thermal sleeves:

> The inspections of the CRDRL nozzle and safe-ends in 1978 identified IGSCC cracking of the safe-end material, but did not identify fatigue-related cracking. The CRDRL safe-end and the thermal sleeve were replaced in 1978 with design changes to improve resistance to both IGSCC and fatigue. The replacement thermal sleeve material is IGSCC resistant low carbon Type 316L stainless steel material. The thermal sleeve is welded to the safe-end with low carbon Type 308L weld filler. To reduce the probability of fatigue, the thermal sleeve pipe protrudes 7 inches out from the flow shield which promotes mixing away from the vessel wall thus preventing thermal cycling at the vessel wall and at the flow shield.

The applicant stated that as a result of industry operating experience from 2002 and 2003, NMP completed detailed thermal fatigue assessments and expanded inspections of the safe-end, the thermal sleeve attachment weld to the safe-end, and the thermal sleeve weld to the flow shield. These inspections were performed in 2004 and 2005. The inspections to date have identified no IGSCC or thermal fatigue-related cracking. Because the 2003 operating experience identified cracking of the thermal shield flow baffle additional EVT-1s of the thermal shield to flow shield weld from the vessel ID are planned for 2007 and at a 10-year frequency thereafter consistent with the ISI inspection interval. This EVT-1 examination of the CRDRL thermal sleeve flow shield weld visible from the vessel ID during each ISI interval is consistent with the frequency that has been adopted for the feedwater nozzle surrogate weld location on the feedwater end brackets.

In addition the applicant stated that a one-time UT of the CRDRL safe-end base metal in 2004 was performed under the NMP augmented ISI program 26 years of operation after the 1978 replacement (three outages prior to the license renewal term). This inspection identified no IGSCC or thermal fatigue cracking of the safe-end location. The inspection was a manual performance demonstration initiative (PDI) qualified inspection and the PDI mockup included the thermal sleeve attachment weld to the safe-end. The inspection records note the presence of the thermal sleeve attachment weld. This inspection is considered sufficient to detect significant circumferential IGSCC cracking of the thermal sleeve at the thermal sleeve attachment weld; however, consistent with the surrogate weld inspection methodology employed for the feedwater nozzle thermal sleeve, the EVT-1 inspection of the thermal sleeve flow shield weld also will be used as a surrogate weld inspection location for the thermal sleeve to safe-end attachment weld.

In addition to the inspections the applicant stated that temperature monitoring for thermal cycling was performed to confirm that the CRD return flow rates were sufficient at NMP1 to ensure that no unstable thermal cycling caused by hot reactor water return flow occurs. The testing and analyses have found the minimum CRD return flow required to ensure stable return line conditions and that no reverse flow.

The applicant's overall assessment is that the safe-end and thermal sleeve replacement with IGSCC-resistant materials and the one-time UT of the thermal sleeve attachment weld after 26 years establish that the thermal sleeve attachment weld is not a high risk IGSCC location. In addition the thermal monitoring of this location and the inspection after 26 years of operation also found no high-cycle thermal fatigue conditions at this location that could create high thermal cycle fatigue-related cracking.

Furthermore, the applicant continued, the analyses and one-time inspections performed in 2004 to 2005 are adequate to detect potential cracking of the CRDRL nozzle thermal sleeve to safe-end attachment weld from either IGSCC or fatigue. Even though IGSCC is considered a low probability for this location for materials of construction the BWR Vessel Internals Program will include an enhancement starting in 2007. An EVT-1 inspection of the thermal shield to flow shield weld from the vessel ID will be performed at that time and thereafter at a 10-year frequency consistent with the ISI inspection interval.

The applicant also stated that in addition to determining the condition of the flow shield weld this EVT-1 inspection will be used as a surrogate weld inspection location for the thermal sleeve to the safe-end attachment weld. In its letter dated December 1, 2005, the applicant provided its ALRA revisions:

- Revise ALRA Sections A1.1.12, A1.4, and B2.1.8 to incorporate the commitment to perform the EVT-1 inspection of the thermal shield to flow shield weld starting in 2007 and proceeding at a 10 year frequency consistent with the ISI inspection interval thereafter.
- Revise ALRA Table 3.1.1.A-1, Item 3.1.1.A-27 and ALRA Table 3.1.2.A-1 to reflect the changes.

The staff reviewed the applicant's response and found it acceptable because the applicant's surrogate weld inspection in addition to the results of its one-time inspections 2004 to 2005 provide adequate aging management for the CRDRL thermal sleeve. The staff concludes that the applicant appropriately addressed the aging effect and aging effect mechanism for NMP1 CRDRL nozzle thermal sleeves.

Operating Experience. In ALRA Section B2.1.8, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the BWR Vessel Internals Program. Review of plant-specific operating experience revealed conditions discovered by BWRVIP examinations similar to those identified elsewhere in the BWR fleet. In each case, indications were evaluated and either found acceptable for further service or appropriately repaired. The BWRVIP is continually adjusted to account for industry experience and research (including activities of the BWRVIP and ASME Section XI Code Committees). In 2001, the Institute of Nucear Power Operations (INPO) conducted a review of activities related to BWR Vessel Internals Program at NMP2. Several strengths were identified, and recommendations for improvement were addressed by program upgrades at NMP1 and NMP2.

The staff reviewed the operating experience provided in the ALRA and the applicant's operating issues related to SCC and determined that the current program has proven to be effective in managing the aging of the vessel internals within the scope of license renewal. The following is a sample list of NMP1 operating experience issues including core shroud cracking, shroud support weld cracking, CRD stub tube IGSCC and leakage, and top guide cracking:

- NMP1 identified CRD stub tube leakage in 1984. The root cause investigation and inspection confirmed IGSCC of the furnace-sensitized 304 CRD stub tubes. The applicant implemented a roll repair of the leakage and a structural evaluation of the tolerability of the cracking. NMP1 is also working through its BWR Vessel Internals Program to obtain approval of an ASME Section XI code case for the roll repair technique for this location.
- NMP1 identified core shroud horizontal weld cracking following the BWRVIP-01, "BWR Vessel and Internals Project, BWR Core Shroud Inspection and Flaw Evaluation Guideline (Revision 2)," baseline inspection in 1995. The corrective action taken was to install a pre-emptive core shroud tie-rod repair which followed the BWRVIP-02, "BWR Vessel and Internals Project, BWR Core Shroud Repair Design Criteria," shroud repair guidelines. This repair was designed for a 20-year license renewal term.
- NMP1 identified core shroud vertical weld cracking in 1997 following a baseline inspection required by BWRVIP-02 guidelines. This inspection safeguarded operations

for at least two years until the next inspection. A pre-emptive repair was installed in 1999 for the core shroud vertical welds. This repair was designed for a 20-year license renewal term.

- NMP1 detected indications in the core shroud support H9 vessel attachment weld during baseline BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines," inspections in 2001. This attachment weld is an Alloy 182 nickel-based alloy with operational experience from an overseas BWR of IGSCC. The analysis was consistent with BWRVIP-38 methods and the detected indications were deemed acceptable over a 10-year re-inspection frequency. Supplemental sampling inspections have shown the indications are confined to the weld with no propagation into the vessel low-alloy steel. The indications were similar to those discussed in a GE SIL. Other core shroud indications were found in weld H8, weld H3, and weld H6A.
- NMP1 completed a sample baseline inspection of the top guide grid beam identified in BWRVIP-26, "BWR Top Guide Inspection and Flaw Evaluation Guidelines," as having the potential for IASCC and as such representing a condition that warranted review for license renewal. The inspection of the top guide based on the recommendations of a GE SIL detected one indication consistent with grid beam cracking at Oyster Creek. The indication was evaluated consistently with BWRVIP-26 methods and found to be tolerable for continued service. Ongoing inspection and monitoring consistent with BWRVIP-26 requirements are proper long-term based on the current top guide fluence predictions and extent of cracking.

Operating experience problems that have been identified at NMP2 include core shroud cracking and jet pump wedge wear. The applicant's BWR Vessel Internals Program has not identified other cracking of internals covered by its BWR Vessel Internals Program. The BWR Vessel Internals Program recommended actions to inspect the core shroud and internals welds for cracks illustrate the effectiveness of the BWR Vessel Internals Program inspections. For example:

- NMP2 detected core shroud horizontal weld cracking during the BWRVIP-01 required baseline inspection in 1998. The inspection found that the core shroud welds H4, H5, and H7 had greater than 30 percent cracking warranting plant-specific evaluation. The condition was evaluated consistently with BWRVIP-01 methods and judged to be fit for conditioned service without repair. The limiting inspection interval is four years for each re-inspection. The condition currently is managed through IGSCC mitigation and re-inspection. Core shroud repair according to BWRVIP-02 is considered a contingency dependent on observed IGSCC growth.
- The BWRVIP-41 required baseline inspections are approximately 75 percent complete with no cracking detected. The baseline inspections that detected wedge bearing surface wear contact and set screw gaps were recommended by the BWR Vessel Internals Program based on industry operating experience. The inspections detected jet pump wedge wear in the sample population. The required BWRVIP-41 scope expansion was completed and the results showed the wear isolated to one location. The scope expansion identified set screw gaps one of which warranted a preemptive auxiliary wedge installation to eliminate it. The program has identified corrective measures needed to prevent flow- induced vibration if NMP2 operates above rated core flow.
- NMP2 detected several cracks in the steam dryer upper support ring side of drain channel 1, 2, and 3 horizontal 304 stainless steel welds ranging in length from 0.1 to

0.7 inches during inspections in RFO6. A GE evaluation concludes the indications observed are typical of IGSCC. Factors contributing to the initiation of IGSCC (weld residual stresses, weld sensitized 304 stainless steel in the heat affected zone (HAZ), and surface cold work due to fabrication) are all present in the steam dryer upper support ring. The cracking discovered at the NMP2 steam dryer upper support ring is similar to but less severe than that seen on several similar steam dryers at other plants. The ISI program plan was revised to re-inspect the locations of the cracks to detect any significant increase in length or number.

- NMP2 detected several cracks on the stiffener to upper guide ring welds at various locations between the shroud head bolts during inspections performed in 1998. A GE evaluation concluded that the indications detected are characteristic of IGSCC known to occur in weld-sensitized type 304 stainless steel. NMP2 determined that no repair was required during the current outage; however, the ISI program plan was revised to re-inspect the locations of the indications to detect any significant increase in length or number.

The staff found that the applicant's BWR Vessel Internals Program recommended actions to inspect the core shroud and internal welds for cracks indicate the effectiveness of its BWR Vessel Internals Program inspections. The staff also found that changes and updates to the applicant's BWR Vessel Internals Program have resulted from the ongoing review of industry operating experience and regulatory notices as these are reviewed regularly for applicability to the reactor vessel internals. In these ways the applicant addressed vessel internals degradation noted at other BWRs systematically and revised its BWR Vessel Internals Program inspections accordingly.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's BWR Vessel Internals Program will adequately manage the aging effects identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. The applicant provided its UFSAR and USAR supplements for the BWR Vessel Internals Program in ALRA Section A1.1.12 for NMP1 and Section A2.1.13 for NMP2 stating that its BWR Vessel Internals Program manages aging of materials inside the reactor vessel. Program activities include (1) inspections for the presence and effects of cracking and (2) monitoring and control of water chemistry. This program is also used to manage loss of material for carbon steel vessel instrumentation penetrations for NMP2. This program is based on guidelines issued by the BWRVIP and approved (or pending approval) by the staff. Inspections and evaluations of reactor vessel components are consistent with the guidelines provided in the applicable BWRVIP reports.

The applicant has completed or will complete each of the license renewal BWRVIP action items described in the staff safety evaluations for these BWRVIP reports. In addition the applicant will implement the NRC-approved inspection and flaw evaluation guidelines for the steam dryer and inaccessible core spray components weld at NMP1, and for the steam dryer, access hole cover, inaccessible core spray, jet pumps, and LPCI components welds at NMP2.

The applicant also provided its UFSAR supplement for NMP1 enhancements to its BWRVIP including the following revisions to existing activities credited for license renewal.

- The reinspection scope and frequency for the grid beam will be based on BWRVIP-26 guidance for plant-specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition the reinspection scope will include an EVT-1 sample inspection of at least two locations with accessible indications within the initial six years of the 10-year interval. The intent of the EVT-1 is tò monitor the known cracking to test flaw analysis crack growth assumptions.
- As stated in the ALRA, the applicant will implement the resolution of the BWRVIP-18 open items regarding the inspection of inaccessible welds for core spray. It will be included in its BWRVIP response to be reviewed and accepted by the staff.
- Once the guidelines for inspection and evaluation for steam dryers currently under development by the BWRVIP committee are documented, reviewed and accepted by the staff, the actions will be implemented in accordance with the BWRVIP.
- The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the program.

If the October 19, 2005 draft of Code Case N-730 is approved by the ASME, NMP1 will implement the final code case as conditioned by the staff. If the code case is not approved by the ASME, NMP1 will seek staff approval of the 10/19/05 code case draft on a plant specific basis from the staff.

If during the period of extended operation, a CRD stub tube, rolled in accordance with the provisions of the code case, resumes leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:

(1) A welded repair consistent with BWRVIP-58-A, "BWRVIP Internal access Weld Repair" and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.

(2) A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1.

(3) A future developed mechanical/weldéd repair method subject to the approval of the staff.

  - Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and Inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect. (Note: This enhancement was revised through its letter dated December 1, 2005).
  - An EVT-1 examination of the NMP1 feedwater sparger end bracket welds will be performed. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. (Note: This enhancement was revised through its letter dated December 1, 2005).

- NMP1 will perform an EVT-1 inspection of the thermal shield to flow shield weld starting 2007 and proceeding at a 10 year frequency thereafter consistent with the ISI inspection interval. (Note: This enhancement was revised through its letter dated December 1, 2005).

The applicant also provided its USAR supplement for NMP2 enhancements to its BWRVIP including the following revisions to existing activities credited for license renewal:

- NMP2 will perform inspections of the guide beams similar in methods, scope, and frequency to the inspections specified in BWRVIP-47 for the control rod guide tube components. The extent of examination and its frequency will be based on inspection of a 10 percent sample of the total population, which includes all grid beam and beam-to-crevice slots, within 12 years of entry into the period of extended operation with 5 percent of the population inspected within the first six years. The sample locations selected for inspection will be in areas exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum the applicant's BWRVIP will follow the same guidance for the subsequent 12-year interval as defined for the initial 12-year baseline. (Note: This enhancement was revised through letters dated December 1, 2005, and December 13, 2005).
- The applicant will implement the resolution of the open items documented in BWRVIP-18, BWRVIP-41, and BWRVIP-42 regarding the inspection of inaccessible welds for core spray, jet pump, and LPCI components, respectively. It will be included in its BWRVIP response to be reviewed and accepted by the staff. (Note: This enhancement was provided in the ALRA).
- Once the guidelines for inspection and evaluation for steam dryers currently under development by the BWRVIP committee are documented, reviewed, and accepted by the staff they will be implemented according to the BWRVIP. (Note: This enhancement was provided in the ALRA).
- Once the inspection and evaluation guidelines for access hole covers guidelines are documented, reviewed, and accepted by the staff they will be implemented according to the BWRVIP. (Note: This enhancement was provided in the ALRA).
- The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the program. (Note: This enhancement was provided in the ALRA).
- The applicant will enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed as necessary to ensure that intended functions are not impacted by the aging effect. (Note: This enhancement was revised through a letter).
- An EVT-1 examination of the NMP2 feedwater sparger end bracket welds will be performed. The extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP2 feedwater thermal sleeves finds that the hidden welds are not IGSCC- susceptible NMP2 inspections will be discontinued. (Note: This enhancement was revised through its letter dated December 1, 2005).

The staff reviewed the information in the supplements and found that they provide adequate summary descriptions of the program required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWRVIP, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.7 Open-Cycle Cooling Water System Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.10, the applicant described the Open-Cycle Cooling Water System (OCCWS) Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M20, "Open-Cycle Cooling Water System." The OCCWS Program manages aging of components exposed to raw, untreated (e.g., service) water. For NMP1 this includes portions of the service water system, the emergency service water system, shell side of the RBCLC heat exchangers, the EDG cooling water system, containment spray raw water system, and portions of the circulating water system. Also included are other components WSLR wetted by the service water system that are credited in the AMR. The NMP2 OCCWS scope includes a portion of the alternate decay heat system with associated portions of the service water system, the RHR heat exchangers, diesel generator jacket water coolers, and control room chillers. Also included are components within the scope of license renewal that are wetted by the service water system and credited in the AMR. Program activities include: (1) surveillance and control of biofouling (including biocide injection); (2) verification of heat transfer capabilities for components cooled by the service water system; (3) inspection and maintenance; (4) walkdown inspections; and (5) review of maintenance, operating and training practices and procedures. Inspections may include visual, UT, and ECT methods. The OCCWS Program is based on the recommendations of GL 89-13.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the OCCWS Program for which the applicant claimed consistency with GALL AMP XI.M20 and found them consistent. The staff found the applicant's OCCWS Program acceptable because it conforms to the recommended GALL AMP XI.M20 with enhancements.

In the ALRA, the applicant stated that its OCCWS Program is consistent with GALL AMP XI.M20 with enhancements and that the enhancements in meeting the GALL Report program description, "scope of program," "preventive actions," and "monitoring and trending" program elements revises procedures to address the following:

- Ensure that the applicable NMP1 commitments made for GL 89-13 and the recommendations in GALL AMP XI.M20 are stated in the NMP1 implementation documents for GL 89-13. (NMP1Commitment 14).
- Ensure that the applicable NMP2 commitments made for GL 89-13 and the recommendations in GALL AMP XI.M20 are stated in N2-TDP-REL-0104, "GL 89-13, Service Water System Problems Affecting Safety Related Equipment Program Plan," (NMP2 Commitment 14).
- Incorporate into the OCCWS Program GALL AMP XI.M20 recommendations when they are more conservative than the GL 89-13 commitments (NMP1 and NMP2 Commitment 14).

As documented in the audit and review report, the applicant stated that it is developing an implementing program for both units to integrate the commitments made according to GL 89-13 and the recommendations made in the GALL Report for GALL AMP XI.M20. When the GALL Report recommendations are more conservative than the GL 89-13 commitments, the GALL Report recommendations will be integrated. This enhancement will make the applicant's AMP consistent with the GALL Report and is, therefore, acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Also in its letter dated November 17, 2005, the applicant revised the ALRA to expand the discussion of the program to clarify that it includes internal portions of nonsafety-related segments of the circulating water and service water systems within the scope of license renewal under 10 CFR 54.4(a)(2) to maintain their pressure integrity. This letter also stated that this program manages all aging effects for components subject to the recommendations for GL 89-13. The staff found this enhancement acceptable because it clarifies the overall program scope.

In addition in the ALRA the applicant stated that its OCCWS Program is consistent with the GALL Report with another enhancement and that the enhancement in meeting the GALL Report "aceptance criteria" program element revises procedures to address the following:

- Revise the NMP1 and NMP2 preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies. (NMP1 and NMP2 Commitment 14).

As documented in the Audit and Review Report, the applicant stated that the heat exchanger preventive maintenance procedures will be revised to incorporate inspection criteria to ensure thorough cleaning of all affected OCCW components and to initiate appropriate corrective actions prior to the loss of intended function if progressive degradation persists. This enhancement makes the applicant's AMP consistent with the GALL Report and is, therefore, acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Operating Experience. In ALRA Section B2.1.10, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the OCCWS Program. Inspections implementing the guidance of GL 89-13 have identified deterioration (including pipe wall thinning, pinhole leakage, and microbiologically influenced corrosion (MIC)) and degradation (including clogged lines, flow restrictions, and fouling). These deficiencies were documented in CRs and resulted in cleaning, repair, or replacement of the affected components prior to loss of system function.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's OCCWS Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.29 and A2.1.29, the applicant provided the respective UFSAR and USAR supplements for the OCCWS Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's OCCWS Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.8 Closed-Cycle Cooling Water System Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.11, the applicant described the Closed-Cycle Cooling Water System Program (CCCWS), stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M21, "Closed-Cycle Cooling Water System." The CCCWS Program manages loss of material and fouling of components exposed to closed-cycle cooling water environments. The applicable piping systems at NMPNS include the NMP1 and NMP2 reactor building closed loop cooling systems, NMP1 control room HVAC system, the NMP2 control building ventilation chilled water system, the heat exchanger jacket water cooling portions of the NMP1 emergency diesel generator system and the NMP2 standby diesel generator protection (generator) system. Program activities include chemistry monitoring, surveillance testing, data trending, and component inspections. The CCCWS Program implements the guidelines for controlling system performance and aging effects described in EPRI Report TR-107396.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the CCCWS Program for which the applicant claimed consistency with GALL AMP XI.M21 and found them consistent. The staff found the applicant's CCCWS Program acceptable because it conforms to the GALL AMP XI.M21 recommendations with enhancements.

In the ALRA, the applicant stated that its CCCWS Program is consistent with GALL AMP XI.M21 with enhancements to meet the GALL Report "preventive actions" program element by revising procedures to address the following:

- Expand periodic chemistry checks of CCCW systems consistent with the guidelines of EPRI TR-107396 (NMP1 and NMP2 Commitment 15).
- Implement a program to use corrosion inhibitors in the NMP1 and NMP2 reactor building closed loop cooling systems, NMP1 control room HVAC system, and NMP2 control building ventilation chilled water system (NMP1 and NMP2 Commitment 15).

In the ALRA, the applicant stated that it is expanding chemistry parameters for the closed-cycle cooling water systems for consistency with the guidelines of EPRI TR-107396. The staff found this enhancement acceptable because it will make the applicant's AMP consistent with the GALL Report. Furthermore, in the ALRA the applicant stated that it will develop an enhancement to implement the use of corrosion inhibitors in the NMP1 and NMP2 reactor building closed loop cooling system, NMP1 control room HVAC system, and NMP2 control building ventilation chilled water system according to the guidelines in EPRI TR-107396. The staff found this enhancement acceptable because it will make the applicant's AMP consistent with the GALL Report.

As documented in the Audit and Review Report, the staff asked the applicant to clarify whether the chromate corrosion inhibitor used in the NMP1 diesel generator jacket cooling water is consistent with the guidelines in EPRI TR-107396. The applicant responded that the chromate concentrations are outside the range of values provided in that document. The staff asked the applicant to justify the use of a corrosion inhibitor concentration outside the range of values recommended in EPRI Report TR-107396.

In a letter dated December 1, 2005, the applicant stated that the chromate concentration is above the EPRI recommended control limit but consistent with vendor recommendations. In this letter the applicant further stated that the lower concentration limit in the EPRI report is based on the potential impact that the more highly concentrated corrosion inhibitor could have on the life of mechanical seals. The applicant further stated that it had reviewed the maintenance history of mechanical seals at NMP1 and found no occurrence of catastrophic failure. In order to manage the impact of the higher concentration of corrosion inhibitor on the mechanical seal life, the applicant stated that it will establish a required seal replacement frequency of 10 years maximum in lieu of the recommended replacement frequency of every 12 years. Based on satisfactory operation with the vendor-recommended chromate corrosion inhibitor concentration and the establishment of a program to replace the mechanical seals more frequently than recommended. In summary, the staff found the enhancement as committed in ALRA Appendix B2.1.11 acceptable (NMP1 and NMP2 Commitment 15):

For NMP2 the applicant is using a nitrite corrosion inhibitor in the diesel generator jacket cooling water. As documented in the Audit and Review Report, the staff asked the applicant to clarify whether the nitrite corrosion inhibitor used in the NMP2 diesel generator jacket cooling water is consistent with the guidelines in EPRI TR-107396. The applicant stated that the nitrite concentrations are within the range of values provided in that report. The staff found this use acceptable because it is consistent with the chemistry basis recommended in the GALL Report.

In the ALRA, the applicant stated that its CCCWS Program is consistent with the GALL Report with additional enhancements to meet the GALL Report "parameters monitored/inspected" and "detection of aging effects" program elements by revising procedures to address the following:

- Direct periodic inspections to monitor for loss of material in CCCW systems piping (NMP1 and NMP2 Commitment 15).
- A corrosion monitoring program for larger bore CCCW piping not subject to inspection under another NMP1 program (NMP1 Commitment 15).

As documented in the Audit and Review Report, the applicant stated that expanding the existing corrosion monitoring program for small bore CCCW piping to include larger bore (greater than 3-inch outer diameter) makes its CCCWS Program consistent with the GALL Report. The staff found this enhancement consistent with the GALL Report and, therefore, acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Furthermore, in the ALRA the applicant stated that its CCCWS Program is consistent with the GALL Report with enhancements to meet the GALL Report "monitoring and trending" program element by revising procedures to address the following:

- Establish inspection frequencies for degradation of components in CCCW systems, including heat exchanger tube wall thinning (NMP1 and NMP2 Commitment 15).
- Perform a heat removal capability test for the NMP1 control room HVAC system at least every five years (NMP1 Commitment 15).
- Establish periodic monitoring, trending, and evaluation of performance parameters for the NMP1 and NMP2 reactor building closed loop cooling, NMP1 control room HVAC, and NMP2 control building ventilation chilled water systems (NMP1 and NMP2 Commitment 15).
- Specify chemistry sampling frequency for the NMP2 control building ventilation chilled water system. (NMP2 Commitment 15).

The staff found these enhancements to be consistent with the GALL Report and therefore acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA, the applicant stated that its CCCWS Program is consistent with the GALL Report with additional enhancements to meet the GALL Report "acceptance criteria" program element by revising procedures to address the following:

- Provide controls and sampling necessary to maintain water chemistry parameters in CCCW systems within the guidelines of EPRI Report TR-107396. (NMP1 and NMP2 Commitment 15).
- Ensure acceptance criteria are specified in implementing procedures for indications of degradation (NMP1 and NMP2 Commitment 15).

The staff reviewed these enhancements and found them consistent with the GALL Report and therefore acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA, the applicant stated that these enhancements are scheduled for completion prior to the period of extended operation.

Operating Experience. In ALRA Section B2.1.11, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the CCCWS Program. Review of plant-specific operating experience revealed various forms of degradation that were discovered by CCCWS Program activities at NMP. Corrective actions for observed degradation included increased monitoring, component repair, or component replacement as deemed necessary. Periodic monitoring of CCCW systems assures that any worsening trends are identified and the capabilities of CCCWS components within the scope of license renewal are maintained.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's CCCWS Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.13 and A2.1.14, the applicant provided the respective UFSAR and USAR supplements for the CCCWS Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's CCCWS Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.9 Boraflex Monitoring Program (NMP1 Only)

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.12, the applicant described the Boraflex Monitoring Program for NMP1, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M22, "Boraflex Monitoring." The Boraflex Monitoring Program manages degradation of neutron absorbing material in spent fuel pool storage racks resulting from radiation exposure and possible water ingress. Program activities include: (1) inspection of the NMP1 test coupons to detect dimensional changes; (2) correlation of measured levels of silica in the spent fuel pool with analysis using a predictive code (e.g., RACKLIFE) to estimate boron loss from Boraflex panels; and (3) neutron attenuation testing to measure the boron areal density of the short-length test coupons. The Boraflex Monitoring Program will be enhanced to require periodic in-situ neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of test coupons to those of Boraflex racks that remain in use during the period of extended operation.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the Boraflex Monitoring Program for which the applicant claimed consistency with GALL AMP XI.M22 and found them consistent. The staff found the applicant's Boraflex Monitoring Program acceptable because it conforms to the recommended GALL AMP XI.M22, "Boraflex Monitoring Program," with enhancements.

In the ALRA and in its letter dated November 17, 2005, the applicant stated that its Boraflex Monitoring Program is consistent with GALL AMP XI.M22 with enhancements to meet the GALL Report "preventive actions," "parameters monitored/inspected,""detection of aging effects," and "monitoring and tranding" program elements. These enhancements include (1) performance of periodic neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of the test coupons to those of the Boraflex racks remaining in use during the period of extended operation and (2) establishing monitoring and trending instructions for in-situ test results, silica levels, and coupons results. (NMP1 Commitment 16).

In the LRA, the applicant stated that it originally planned to rely mainly on the test coupons, both short and full-length versions, to monitor the Boraflex panel condition. During the initial audit and review (August 9-13, 2004), the staff expressed concem that there is no plan to perform periodic boron areal density testing in the current NMP Boraflex panel conditions. To address the staff's concern, the applicant revised its plan and stated in the ALRA and in its letter dated November 17, 2005, that it will provide direction for periodic performance of neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of the test coupons to those of the Boraflex racks remaining in use during the period of extended operation and establishing monitoring the trending instructions for in-situ test results, silica levels, and coupons results. The staff found these enhancements acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Operating Experience. In ALRA Section B2.1.12, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Boraflex Monitoring Program. Plant-specific operating experience at NMP is related to testing of surveillance coupons, whose results indicate expected levels of degradation. Review of plant-specific operating experience revealed additional conditions that were discovered by Boraflex Monitoring Program activities in 2002. When the results of chemistry analysis indicated silica levels in the NMP1 spent fuel pool slightly greater than the established criteria for plant operation, a CR was initiated. A technical evaluation determined that actual silica levels were acceptable and the operating range was revised accordingly.

As documented in the Audit and Review Report, the staff noted that the applicant is managing the current Boraflex rack conditions. For NMP1 the applicant is in the process of replacing six of the eight Boraflex racks with racks made of Boral. Boraflex racks remaining in the spent fuel pool will be used only in low flux areas and not in the vicinity of freshly discharged fuel. For NMP2 the applicant plans to replace all Boraflex panels with Boral panels prior to period of extended operation (NMP2 Commitment 36).

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff conclude that the Boraflex Monitoring Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR Supplement. In ALRA Section A1.1.5 and in its letter dated November 17, 2005, the applicant provided the UFSAR supplement for the Boraflex Monitoring Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Boraflex Monitoring Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.10 Inspection of Overhead Heavy Load and Light Load Handling Systems Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.13, the applicant described the Inspection of Overhead Heavy Load and Light Load Handling Systems Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems." The Inspection of Overhead Heavy Load and Light Load Handling Systems Program (referred to herein as the Crane Inspection Program) manages loss of material due to corrosion of cranes within the scope of license renewal. Program activities include: (1) performance of various maintenance activities on a specified frequency and (2) pre-operational inspections of equipment prior to lifting activities. Crane inspection activities are based on applicable industry standards and the guidance of NUREG-0612.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

During the initial audit and review (August 9-13, 2004) the applicant stated in the program attribute assessment document "Units 1 and 2 Inspection of Overhead Heavy Load and Light Load Handling Systems Program" (since superseded) that under the GALL Report program element "parameters monitored/inspected" comparison "the program ensures that crane operation is within the design limits in regards to the number and magnitude of lifts." The staff asked the applicant during the initial audit and review to explain how the number and magnitude of lifts for each crane within the scope of license renewal have been documented historically and will be documented in the future under a renewed license. The applicant also was asked to explain how the individual or individuals responsible for ensuring that crane operations are within crane design limits on the number and magnitude of lifts for license renewal cranes track and maintain this information on a daily or outage basis.

During the initial audit and review, the applicant stated in response to the staff's questions that the statement in the program attribute assessment document that the program ensures crane operation is within the design limits on the number and magnitude of lifts is a qualitative and not a quantitative review. The applicant stated in the superseded program attribute assessment document that the cranes at NMP within the scope of license renewal are designed for standby or infrequent service like most cranes in similar applications. Crane capacity loads may be handled for initial installation of equipment and for infrequent maintenance. This crane use is the lightest (Class A) duty cycle according to the Crane Manufacturers Association of America crane service classifications. The applicant concludes that the infrequent use of the cranes below their capacity rated by industry experience and engineering judgment meets the recommendation of GALL AMP XI.M23 for the number and magnitude of lifts and that a documented history is not required. The staff found that the applicant maintained this same view of this GALL AMP XI.M23 program element in the ALRA.

The staff found this explanation acceptable because the cranes within the scope of license renewal are used infrequently. A qualitative review of the number and magnitude of crane lifts is reasonable because recording of the number and magnitude of every crane lift would be an undue documentation burden where crane utilization is well below their design life.

The staff reviewed those portions of the Inspection of Overhead Heavy Load and Light Load Handling Systems Program for which the applicant claimed consistency with GALL AMP XI.M23 and found them consistent. Furthermore, the staff concludes that the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program provides reasonable assurance that aging management of loss of material from corrosion of crane structural components within the scope of license renewal will be performed. The staff found the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program acceptable because it conforms to the recommended GALL AMP XI.M23 with an enhancement.

In the ALRA, the applicant stated that its Inspection of Overhead Load and Light Load Handling Systems Program is consistent with GALL AMP XI.M23 with an enhancement to meet the GALL Report "parameters monitored/inspected," "acceptance criteria," and "detection of aging effects" program elements. The applicant stated that various cranes and hoists are not inspected for loss of material of the load-bearing components; therefore, an enhancement to the corresponding preventive maintenance procedure will be made to add a visual inspection for loss of material of the hoist lifting assembly components (NMP1 Commitment 17 and NMP2 Commitment 16).

As documented in the Audit and Review Report, the applicant stated that each crane within the scope of license renewal has a procedure which periodically performs an inspection of the crane. This inspection, however, is not specifically of components for loss of material and corrosion. Also, the procedures do not identify specifically the effects of wear on the rails in the rail system. Procedures will be enhanced to add visual inspection for loss of material from corrosion and wear on the rails in the rail system.

In addition, as documented in the Audit and Review Report, the applicant stated that this enhancement will add specific inspection steps for general corrosion to the preventive maintenance procedures for each crane within the scope of license renewal. Adding visual inspections to the procedures will be adequate to ensure that loss of material is detected before a loss of intended function. With these additional inspections, the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program inspection will meet the program recommendations described in GALL AMP XI.M23. The staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Operating Experience. In ALRA Section B2.1.13, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Crane Inspection Program. Review of plant-specific operating experience revealed no failures caused by loss of material in crane structural components.

The staff also reviewed the summary of specific operating experience as documented in the Audit and Review Report. The review indicated the Inspection of Overhead Heavy Load and Light Load Handling Systems Program is effective in identifying crane degradation and implementing repairs. A review of NMP plant corrective action records revealed that there have been no failures from loss of material of crane structural components. Any deficiencies in NMP cranes have been attributed to design flaws, installation deficiencies, adjustments, or improper maintenance procedures. None of these deficiencies resulted in loss of intended function from age-related degradation. These findings provided assurance that loss of material of crane and trolley structural components had not occurred since the inception of the program. After enhancement program procedures will be more effective in detecting age-related degradation, implementing repairs, and maintaining the integrity of NMP load handling systems within the scope of license renewal to ensure discovery and evaluation of loss of material before a loss of intended function.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.22 and A2.1.22, the applicant provided the respective UFSAR and USAR supplements for the Inspection of Overhead Heavy Load and Light Load Handling Systems Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.11 Compressed Air Monitoring Program (NMP1 Only)

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.14, the applicant described the Compressed Air Monitoring Program for NMP1, stating that this is an existing program that is consistent, with exceptions and enhancements, with GALL AMP XI.M24, "Compressed Air Monitoring." The Compressed Air Monitoring Program manages aging effects for portions of the compressed air systems within the scope of license renewal, including cracking and loss of material due to general corrosion, by controlling the internal environment of systems and components. Program activities include air quality checks at various locations to detect contaminants that would affect the system's intended function. Additional visual inspections are credited for identification and monitoring of degradation for air compressors, receivers, and air dryers. The Compressed Air Monitoring Program is based on GL 88-14 and recommendations presented in INPO Significant Operating Event Report 88-01. The Compressed Air Monitoring Program is only applicable to NMP1 since the components requiring aging management for the NMP2 compressed air system are managed under the 10 CFR Part 50, Appendix J Program and the One-Time Inspection Program.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exceptions and enhancements and the associated justifications to determine whether the AMP, with the exceptions and enhancements, remains adequate to manage the aging effects for which it is credited.

In the "Exceptions to NUREG-1801" section of the ALRA the applicant stated that it took specific exception to any maintenance recommended in EPRI TR-108147, "Compressor and Instrument Air System Maintenance Guide: Revision to NP-7079," not endorsed also by the equipment manufacturers and to the pre-service and in-service testing guidelines of ASME OM-S/G-1998, Part 17, "Performance Testing of Instrument Air Systems Information Notice Light-Water Reactor Power Plants." As documented in the Audit and Review Report, the staff asked the applicant to clarify why this exception was not mentioned in the "NUREG-1801 Consistency" section of the ALRA. In its letter dated December 1, 2005, the applicant stated that it will revise NMP AMP B2.1.14, to read:

> The Compressed Air Monitoring Program is an existing program that will be consistent with NUREG-1801, Section XI.M24 (Compressed Air Monitoring) (Reference 2), with exceptions, after enhancements are incorporated.

The staff reviewed those portions of the Compressed Air Monitoring program for which the applicant claimed consistency with GALL AMP XI.M24 and found them consistent. The staff found the applicant's Compressed Air Monitoring Program acceptable because it conforms to the recommended GALL AMP XI.M24 with exceptions and enhancements.

During the audit, the applicant stated that its Compressed Air Monitoring Program is consistent with GALL AMP XI.M24 with an exception. The Compressed Air Monitoring Program takes exception to the GALL Report "preventive actions" and "detection of aging effects" program elements. As stated in the ALRA, NMP1 takes a limited exception related to maintenance suggestions in EPRI NP-7079 and EPRI TR-108147 not also endorsed by the manufacturer. NMP1 takes specific exception to the pre-service and in-service testing guidelines of ASME OM-S/G-1998, Part 17. It also takes specific exception to the pre-service and in-service testing guidelines of ASME OM-S/G-1998, Part 17.

The applicant also stated in justification for the GALL Report exception that (1) the maintenance practices reviewed and enhanced under the NMP1 response to GL 88-14 are adequate to manage aging without additional testing and (2) there have been no age-related failures of the compressed air monitoring system under its current program.

As documented in the Audit and Review Report, the staff noted that the applicant did not list ANSI/ISA-S7.0.01-1996 in NMP AMP B2.1.14. The staff inquired whether the applicant used this standard for air quality. In its letter dated December 1, 2005, the applicant stated that it will add the following for clarification:

NMP also takes exception to the use of ISA-S7.0.01-1996 for air quality standards. This is acceptable because the system air quality is monitored and maintained in compliance with the requirements of ANSI/ISA-S7.3-1975, "Air Quality Standards for Pneumatic Instruments" which meets or exceeds the quality requirements for dew point, hydrocarbons, and particulate of Section 4.4 of EPRI TR-108147 and ISA-S7.0.01-1996.

The staff agreed with the applicant's assessment because the ANSI/ISA-S7.3-1975 air quality standard is higher than the ANSI/ISA-S7.0.01-1996 standard.

As documented in the Audit and Review Report, the staff noted that (1) the applicant had performed a satisfactory design and operations verification of the instrument air system in response to GL 88-14, (2) the applicant has incorporated the INPO good engineering practice recommendations on the instrument air system into its maintenance procedures, as described in the INPO Significant Operating Experience Report (SOER) 88-01, (3) the applicant's air sampling analysis procedure specifies the quality requirements of dew point, oil, water, and particle size based on ANSI/ISA-S7.0.01-1975, "Quality Standard for Instrument Air," (4) the applicant routinely performs preventative maintenance and inspection on the compressor and carbon steel components to limit the introduction of contaminants into the air supply, and (5) the applicant regularly tests the active compressed air system valves and skid mounted compressor components to ensure their operability. All of these activities demonstrate that the applicant has an adequate preventive maintenance program for inoperability of air-operated components due to corrosion and the presence of oil, water, rust, and other contaminants. In addition review of the applicant's operating experience indicated that the its Compressed Air Monitoring Program has an acceptable record of ensuring maintenance of the design basis function of the system. Therefore, the staff agreed with the applicant's assessment and concludes that the applicant's Compressed Air Monitoring Program includes good practice for general maintenance and inspection of the compressor, receiver, and dryer as addressed in EPRI TR-108147 and ASME OM-S/G-1998, Part 17. On these bases the staff found this exception acceptable.

In the ALRA, the applicant stated that its Compressed Air Monitoring Program is consistent with GALL AMP XI.M24 with enhancements to meet the GALL Report "scope of program," "preventive actions," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements by revising procedures to address such elements.

- "Scope of program," "preventive action," and "detection of aging effects" program elements - develop new activities to manage loss of material and SCC, perform periodic system leak checks, and expand the scope, periodicity, and inspection techniques to ensure aging management of aging of certain subcomponents of the dryers and compressors (e.g., valves, heat exchangers) (NMP1 Commitment 18).
- "Monitoring and trending" program element - establish activities that manage the aging of internal surfaces of carbon steel piping and that require system leak checks to detect deterioration of the pressure boundaries (NMP1 Commitment 18).
- "Acceptance criteria" program element - expand the acceptance criteria to ensure aging management of certain subcomponents of the dryers and compressors (e.g., valves, heat exchangers) (NMP1 Commitment 18).

As documented in the Audit and Review Report, the applicant stated that these enhancements are required to develop activities that manage loss of material due to general corrosion of such carbon steel components upstream of the dryers as piping, receivers, and valves. Other new required activities will address red brass pipe SCC and perform periodic system leak checks. Certain existing activities will be revised to expand the scope and frequency of inspections so that aging of such sub-components of the dryers and compressors as solenoid-operated valves and heat exchangers is addressed adequately. As documented in the Audit and Review Report, the staff noted that these additional activities are results of the applicant's ongoing evaluation of its Compressed Air Monitoring Program to account for internal and external plant operating experience problems. The staff found these enhancements acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Operating Experience. In ALRA Section B2.1.14, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Compressed Air Monitoring Program. Since its inception in 1992, the Compressed Air Monitoring Program has effectively detected the buildup of corrosion products and prevented component failure. NMP1 has experienced age related degradation due to stress corrosion cracking in unannealed red brass piping in areas that may have been chemically contaminated. However, no pneumatic component within the scope of license renewal has experienced a loss of intended function due to corrosion, corrosion product buildup, or dirt buildup in the instrument air system.

The applicant also stated in the ALRA that it reviews both industry and plant-specific operating experience relating to its Compressed Air Monitoring Program and continually adjusts to account for internal and external plant operating experience issues. After discussions with the applicant's technical staff and a sampling review of the CR list associated with the applicant's Compressed Air Monitoring Program the staff concurred that the applicant incorporates the operating experience into its operations effectively.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's Compressed Air Monitoring Program (NMP1 only) will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR Supplement. In ALRA Section A1.1.14, the applicant provided the UFSAR supplement for the Compressed Air Monitoring Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Compressed Air Monitoring Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.12 BWR Reactor Water Cleanup System Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.15, the applicant described the BWR Reactor Water Cleanup System Program, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.M25, "BWR Reactor Water Cleanup System." The BWR Reactor Water Cleanup System Program manages the effects of SCC or IGSCC on the intended function of austenitic stainless steel piping in the reactor water cleanup (RWCU) system. This program is based on the NRC criteria related to inspection guidelines for RWCU piping welds outboard of the containment isolation valve as delineated in NUREG-0313, Revision 2, and GL 88-01. An exception is taken to the acceptance criteria program element in that NMP1 utilizes the 1989 edition with no addenda of the ASME Section XI code versus the 1995 edition through the 1996 addenda as defined in the GALL. The design of the NMP2 RWCU system is such that carbon steel piping welds are not required to be examined in accordance with GL 88-01. The attributes of the BWR Reactor Water Cleanup System Program related to maintaining reactor coolant water chemistry are included in the Water Chemistry Control Program.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justifications to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the BWR Reactor Water Cleanup System Program for which the applicant claimed consistency with GALL AMP XI.M25 and found them consistent. The staff found the applicant's BWR Reactor Water Cleanup System Program acceptable because it conforms to the recommended GALL AMP XI.M25 with an exception.

In the ALRA, the applicant stated that its BWR Reactor Water Cleanup System Program is consistent with GALL AMP XI.M25 with an exception. The BWR Reactor Water Cleanup System Program takes exception to the "acceptance criteria" program element. As stated in the ALRA, the exception to this program element is that the program described in GALL AMP XI.M25 cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda for the "acceptance criteria" element. NMP1 uses the 1989 Edition with no addenda.

As documented in the Audit and Review Report, the staff requested that the applicant clarify the ASME edition that would be used for aging management during the extended period of operation. The applicant stated that the use of later code editions and addenda of ASME Section XI is determined according to 10 CFR 50.55a requirements 12 months before the start of each 120-month inspection interval subject to limitations and modifications by the staff and requires NRC approval. The staff found this response acceptable as the applicant clarified that the ASME XI Edition will have to be chosen according to applicable regulations and submitted for NRC approval. On this basis the staff found this exception acceptable.

Operating Experience. In ALRA Section B2.1.15, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to cracking in the reactor water cleanup system. Review of plant-specific operating experience for NMP1 identified that leaks were experienced in two welds outboard of the second isolation valve. Weld 33-FW-22 had undergone a localized repair during its original construction and consequently, became more sensitized. Weld 33-FW-23A is a one of a kind design configuration that promotes very high stresses due to the fact that it connects very large shells that have different thermal movement that cannot be accommodated by the short and stiff pipe. In addition, the pipe is subject to thermal cycling. Both welds were repaired by a full structural weld overlay.

As documented in the Audit and Review Report, the staff reviewed plant-specific experience documented in a CR and summarized in the RWCU program basis document. The CR addressed a leak in the RWCU system from a 7/16" axial crack (in a bimetallic weld where stainless steel piping was replaced with carbon steel). The mechanism was classified as IGSCC and the leak was repaired with a weld overlay. This type of leak was discussed in GL 88-01. To confirm that this weld failure was a unique incident the applicant performed additional UT exams on a sample of three other RWCU welds. The sample size was based on the planned sample expansion criteria used during outages for RWCU inspections performed to comply with GL 88-01.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's BWR Reactor Water Cleanup System Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.9 and A2.1.10, the applicant provided the respective UFSAR and USAR supplements for the BWR Reactor Water Cleanup System Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWR Reactor Water Cleanup System Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exception and the associated justifications, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.13 Fire Protection Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.16, the applicant described the Fire Protection Program, stating that this is an existing program that is consistent, with exceptions and enhancements, with GALL AMP XI.M26, "Fire Protection." The Fire Protection Program provides guidance for performance of periodic visual inspections to manage aging of the various materials comprising rated fire barriers. These include: (1) sealants in rated penetration seals (subject to shrinkage due to weathering); (2) concrete and steel in fire rated walls, ceilings, and floors (subject to loss of material due to flaking and abrasion; separation and concrete damage due to relative motion, vibration, and shrinkage); and (3) steel in rated fire doors (subject to loss of material due to corrosion and wear or mechanical damage). In addition, the program requires testing of the diesel-driven fire pump to verify that it is performing its intended function. This activity manages aging of the diesel engine's fuel oil supply line and exhaust system, which may experience loss of material due to corrosion. Inspection and testing is performed in accordance with the guidance of applicable standards.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exceptions and enhancements and the associated justifications to determine whether the AMP, with the exceptions and enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the Fire Protection Program for which the applicant claimed consistency with GALL AMP XI.M26 and found them consistent. The staff found the applicant's Fire Protection Program acceptable because it conforms to the recommended GALL AMP XI.M26 with exceptions and enhancements.

In the ALRA, the applicant stated that its Fire Protection Program is consistent with GALL AMP XI.M26 with exceptions. The Fire Protection Program takes exception to the GALL Report "detection of aging effects" program element where it requires bi-monthly inspection of hollow metal fire doors and monthly inspection of the halon/carbon dioxide suppression system valve lineup. Rather, NMP is consistent with Interim Staff Guidance (ISG-) 04, "Aging Management of Fire Protection Systems for License Renewal," on both issues.

In the ALRA, the applicant stated that the current fire doors inspection frequency will be changed to comply with a plant-specific engineering evaluation of inspection intervals. This change is consistent with ISG-04, as is states that fire doors are inspected visually on plant-specific intervals for integrity of door surfaces and for clearances. On this basis the staff found this exception acceptable.

In the ALRA, the applicant stated that consistent with ISG-04 and the latest regulatory guidance of GL-86-10 valve lineups on the carbon dioxide/halon suppression systems will not be credited for aging management in its Fire Protection Program. Because ISG-04 states that valve lineup inspection, charging pressure inspection, and an automatic mode of operation verification are operational activities pertaining to system or component configurations or properties that may change and are not related to aging management the staff found this exception acceptable.

In the ALRA, the applicant further stated that its Fire Protection Program is consistent with GALL AMP XI.M26 with enhancements to the GALL Report "scope of program," "parameters monitored/inspected," "detection of aging effects," and "acceptance criteria" program elements.

As part of the proposed enhancement the applicant will revise procedures to address the following elements:

- Incorporate periodic visual inspections of piping and fittings in a non-water environment (e.g., halon) and carbon dioxide fire suppression systems components to detect evidence of corrosion and any system mechanical damage that could affect its intended function (NMP1 Commitment 19, NMP2 Commitment 17).
- Expand the scope of periodic function tests of the diesel-driven fire pump to include inspection of engine exhaust system components to verify that loss of material is managed (NMP1 Commitment 19, NMP2 Commitment 17).
- Perform an engineering evaluation to determine the plant-specific inspection frequency of fire doors (NMP1 Commitment 19, NMP2 Commitment 17).

The staff found Commitment 19 of Appendix A1.4 for NMP1 and Commitment 17 of Appendix A2.4 for NMP2 consistent with ISG-04 which provides a specific frequency for both inspections and function tests. The staff found that the enhancement adequately manages the aging effects of piping and fittings in halon and carbon dioxide fire suppression systems components.

As part of these commitments the scope of periodic functional tests of the diesel-driven fire pump will be expanded to include inspection of engine exhaust system components. The staff found that the enhancement adequately manages to maintain the functional reliability of the diesel-driven fire pump.

As part of these commitments engineering evaluations will determine the plant-specific inspection frequency of fire doors. The staff determined that though is not consistent with the GALL Report this enhancement is consistent with ISG-04, which states that hollow metal fire doors should be inspected on a plant-specific interval and that this interval should be determined by an engineering evaluation. On this basis the staff found this enhancement acceptable.

In its letter dated November 17, 2005, the applicant stated that an enhancement to meet the GALL Report "detection of aging effects" program element revised procedures to address the following elements:

Halon and carbon dioxide functional test frequencies will be changed to semi-annual in the Fire Protection Program procedures as an addition to NMP1 Commitment 19 and NMP2 Commitment 17. The staff reviewed this enhancement and found it consistent with the GALL Report and acceptable.

Operating Experience. In ALRA Section B2.1.16, the applicant explained that it has evaluated applicable industry operating experience. Applicable guidelines and requirements have been incorporated into Fire Protection Program implementing procedures. Minor degradation has been identified while performing Fire Protection Program activities (e.g., fire barrier penetration seals found damaged or cracked, fire dampers failed surveillance testing, and fire door inspections not satisfactory) and corrective actions taken. No significant age-related problems have been reported for NMP fire protection systems and components managed by the Fire Protection Program.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's Fire Protection Program, NMP AMP B2.1.16, will manage adequately the aging effects identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.17 and A2.1.17, the applicant provided the respective UFSAR and USAR supplements for the Fire Protection Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Fire Protection Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.14 Fire Water System Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.17, the applicant described the Fire Water System Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M27, "Fire Water System." The Fire Water System Program manages aging of water-based fire protection systems due to loss of material and biofouling. Program activities include periodic maintenance, testing, and inspection of system piping and components containing water (e.g., sprinklers, nozzles, fittings, valves, hydrants, hose stations, standpipes). Inspection and testing is performed in accordance with the guidance of applicable National Fire Protection Association (NFPA) Codes and Standards and the Nuclear Electric Insurance Limited Members' Manual.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, is adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the Fire Water System Program for which the applicant claimed consistency with GALL AMP XI.M27 and found them consistent. The staff found the applicant's Fire Water System Program acceptable because it conforms to the recommended GALL AMP XI.M27 with enhancements.

In the ALRA and in its letter dated November 17, 2005, the applicant stated that its Fire Water System Program is consistent with GALL AMP XI.M27 with enhancements to meet the GALL Report "scope of program" program element and program description. The enhancement includes revising procedures to address the following elements:

- Incorporate into existing periodic test procedures inspections to detect and manage loss of material due to corrosion (NMP1 Commitment 20, NMP2 Commitment 18).
- Incorporate into sprinkler head replacements or inspections procedures and preventive maintenance tasks to meet NFPA 25, "Inspection, Testing, and Maintenance of Water-based Fire Protection System," Section 5.3.1 (2003 Edition) requirements (NMP1 Commitment 20, NMP2 Commitment 18).

This enhancement is stated in Commitment 20 of ALRA Section A1.4 for NMP1 and Commitment 18 of Section A2.4 for NMP2. The GALL Report recommends that portions of the fire protection suppression piping located above ground and exposed to water be disassembled and internally inspected visually once every refueling outage. ISG-04, "Aging Management of Fire Protection Systems for License Renewal," recommends the use of non-intrusive testing of the piping system. The incorporation of new inspection and NFPA 25 requirements into existing procedures will satisfy ISG-04. The staff found this enhancement acceptable.

In addition the applicant stated in its letter dated November 17, 2005, that as an addition to Commitment 20 of ALRA Section A1.4 and Commitment 18 of ALRA Section A2.4 new procedures and preventive maintenance tasks for sprinkler head replacements or inspections to meet NFPA 25 will be added to its Fire Water System Program. The staff reviewed this enhancement and found it consistent with the GALL Report and acceptable.

In its letter dated November 17, 2005, the applicant also stated that an enhancement in meeting the GALL Report "preventive actions" program element revises procedures to address the following element:

- Specify periodic component inspections to verify management of loss of material (NMP1 Commitment 20, NMP2 Commitment 18).

In the ALRA, the applicant stated that an enhancement to increase the frequency of inspection of components will be added to the scope of its Fire Water System Program to ensure further that loss of material is managed. This improvement of procedures consistent with ISG-04 and with the GALL Report is stated in NMP1 Commitment 20 and NMP2 Commitment 18. The staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA and in its letter dated November 17, 2005, the applicant further stated an enhancement to meet the GALL Report "parameters monitored/inspected" program element to revise procedures to address the following:

- Add procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling (NMP1 Commitment 20, NMP2 Commitment 18).

In the ALRA, the applicant stated in Commitment 20 of ALRA Section A1.4 and Commitment 18 of Section A2.4 that an enhancement will be made to add procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling for fire protection piping systems. The applicant also stated in its letter dated November 17, 2005, that the Fire Water System Program will be enhanced by adding the requirements for procedures and preventive maintenance tasks to implement sprinkler head replacement or inspections to meet NFPA 25. The staff reviewed this enhancement and concludes that it will make the applicant's Fire Water System Program consistent with ISG-04 and NFPA 25 for non-intrusive inspections. ISG-04 states that disassembly of piping may not be the most effective method to detect aging effects. Each opening of the system introduces oxygen which accelerates the potential for general corrosion. ISG-04 recommends non-intrusive pipe wall thickness evaluations like volumetric inspection. ISG-04 also states that the plant maintenance process may include a visual inspection of the internal surface of the fire protection piping with routine or corrective maintenance.

In addition the applicant stated in its letter dated November 17, 2005, that new procedures and preventive maintenance tasks for sprinkler head replacements or inspections will be added to its Fire Water System Program to meet NFPA 25. On this basis, the staff found this enhancement sufficient to manage the aging effects of fire protection piping systems.

In the ALRA, the applicant also stated that an enhancement to meet the GALL Report "detection of aging effects" program element revises procedures to address the following:

- Add specifications to periodically check water-based fire protection systems for microbiological contamination (NMP1 Commitment 20, NMP2 Commitment 18).
- Measure fire protection system piping wall thickness using non-intrusive techniques (e.g., volumetric testing) to detect loss of material from corrosion (NMP1 Commitment 20, NMP2 Commitment 18).

In the ALRA, the applicant stated in Commitment 20 of ALRA Section A1.4 and Commitment 18 of ALRA Section A2.4 for NMP2 that requirements are to be added to check the water-based fire protection systems periodically for microbiological contamination. The staff reviewed this enhancement and found it consistent with the GALL Report and acceptable.

In the ALRA, the applicant stated in Commitment 20 of ALRA Section A1.4 for NMP1 and Commitment 18 of ALRA Section A2.4 for NMP2 that measurement of fire protection piping wall thicknesses using non-intrusive techniques (e.g., volumetric testing) will be implemented. The staff reviewed this enhancement and found it consistent with ISG-04. The staff found these enhancements acceptable. These changes to the applicant's program will provide assurance that the affects of aging will be adequately managed.

In addition in the ALRA the applicant stated that an enhancement in meeting the GALL Report "monitoring and trending" program element revises procedures to address the following elements:

- Establish an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testing. (NMP1 Commitment 20, NMP2 Commitment 18)

In the ALRA in Commitment 20 of ALRA Section A1.4 and Commitment 18 of ALRA Section A2.4 the applicant stated that an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testings will be added to existing procedures. The staff found this enhancement consistent with ISG-04. An appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections is consistent with the GALL Report and an appropriate means of recording, evaluating, reviewing, and trending the results of volumetric testing is consistent with the ISG-04. On this basis the staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Furthermore, in the ALRA the applicant stated in Commitment 20 of ALRA Section A1.4 and Commitment 18 of ALRA Section A2.4 that the enhancement in meeting the GALL Report "acceptance criteria" program element revises procedures to address the following element:

- Define acceptance criteria for visual inspections and volumetric testing (NMP1 Commitment 20, NMP2 Commitment 18).

The staff reviewed this enhancement and found it acceptable. The new acceptance criteria will provide in the inspection procedure parameters more specific than those listed in the GALL Report, which states that no unacceptable signs of degradation should be observed during visual assessment of internal system conditions under the program element "acceptance criteria." The GALL Report does not include volumetric testing; hence, it does not have acceptance criteria for volumetric testing. The staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Operating Experience. In ALRA Section B2.1.17, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Fire Water System Program. A review of the CAP shows that individual components have experienced various types of non-conformances (e.g., pinhole leaks, pipe wall thinning). Evaluations have demonstrated that no loss of system function would occur. CRs have been initiated to document conditions discovered while performing Fire Water System Program activities. Internal system leakage and failed surveillance tests were often traced to fouling of valve seating surfaces with sand or silt. Typical resolutions included adding sections of piping to specific flushing procedures or periodic disassembly and cleaning of components.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff, the staff concludes that there is reasonable assurance that the applicant's Fire Water System Program will manage adequately the aging effects identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.18 and A2.1.18, the applicant provided the respective UFSAR and USAR supplements for the Fire Water System Program. The staff reviewed these sections and determined that the information in the supplements provides adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Fire Water System Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.15 Fuel Oil Chemistry Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.18, the applicant described the Fuel Oil Chemistry Program, stating that this is an existing program that is consistent, with exceptions and enhancements, with GALL AMP XI.M30, "Fuel Oil Chemistry." The Fuel Oil Chemistry Program manages loss of material due to corrosion that may result from introduction of contaminants into the plant's fuel oil tanks. Program activities include: (1) sampling and chemical analysis of the fuel oil inventory at the plant; (2) sampling, testing, and analysis of new fuel oil as it is unloaded at the plant; and (3) cleaning and inspection of fuel oil tanks. The Fuel Oil Chemistry Program is based on maintaining fuel oil quality in accordance with the guidelines of American Society for Testing and Materials (ASTM) Standards D975, D1796, D2276, and D4057.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exceptions and enhancements and the associated justifications to determine whether the AMP, with the exceptions and enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the Fuel Oil Chemistry Program for which the applicant claimed consistency with GALL AMP XI.M30 and found them consistent. The staff found the applicant's Fuel Oil Chemistry Program acceptable because it conforms to the recommended GALL AMP XI.M30, "Fuel Oil Chemistry," with exceptions and enhancements.

In the ALRA, the applicant stated that its Fuel Oil Chemistry Program is consistent with GALL AMP XI.M30 with exceptions. The Fuel Oil Chemistry Program takes exceptions to the GALL

Report "parameters monitored/inspected" and "acceptance criteria" program elements. NMP1 and NMP2 take exception to using both ASTM D1796 and ASTM D2709, "Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge," to determine the concentration of water and sediment in the diesel fuel oil tanks. NMP1 and NMP2 use only the guidance given in ASTM D1796. These standards apply to fuel oils of different viscosities. The ASTM D1796 standard applies to the diesel fuel used at NMP1 and NMP2. NMP1 and NMP2 take exception to using the modified ASTM D2276 Method A, which specifies a pore size of 3.0 μm. NMP1 and NMP2 use a filter with a pore size of 0.8 μm as specified in ASTM D2276.

On the first exception the staff found that the applicant is using the standard recommended by the GALL Report and one that the applicant states is appropriate for the viscosity of the fuel oil in use at the site. As documented in the Audit and Review Report, the staff found the use of ASTM D1796 acceptable because it is the appropriate testing procedure for the fuel oil in use at NMP1 and NMP2. The staff determined the applicant's use of a filter pore size of 0.8 microns instead of the 3.0 micron pore size recommended by the modified ASTM D2276 Method A to be prudent for monitoring the presence of particulates in the fuel oil. The staff found this exception in selection of the pore filter size acceptable.

The applicant also stated, by letter dated December 1, 2005, that it will add an exception to the "preventive actions" program element of the GALL Report. NMP1 and NMP2 take exception to the addition of fuel oil additives (biocides, stabilizers, and corrosion inhibitors) in the fuel oil storage tanks. NMP2 monitors fuel quality, in part, through particulate contamination analysis. The applicant stated that if the results from the particulate analysis exceed acceptance criteria, then biocides, stabilizers, and/or corrosion inhibitors will be evaluated for addition. The particulate analysis acceptance criteria combined with the current program, periodic cleaning of the tanks and removal of water is used to mange the aging effects of concern. NMP1 plans to initiate the same evaluation, pending the incorporation of an identified enhancement. The staff found this exception acceptable and adequate for the aging management of the fuel oil storage tanks.

The applicant also stated in the ALRA that it takes exceptions to the GALL Report "detection of aging effects" program element. NMP1 and NMP2 take exception to multilevel sampling in the diesel fuel oil tanks. The physical configuration of the fuel oil tanks does not allow a representative fuel oil sample to be taken at multiple levels.

As documented in the Audit and Review Report, the applicant clarified that the measurements are taken at approximately six inches from the tank bottom. The tanks also are drained and cleaned periodically to reduce the build-up of water or sediment. Because the sample is taken from near the bottom where water and sediment would accumulate the staff found sampling at this location a conservative representation of the whole tank contents. On this basis the staff found this exception acceptable.

In its letter dated November 17, 2005, The applicant also stated that it will add an exception of the "detection of aging effects" program element of the GALL Report. NMP1 and NMP2 take exception to performing internal inspections of any fuel oil tank. The applicant stated that after enhancement, all such tanks will be routinely drained; thereby removing any contaminants from the tank that would provide an aging mechanism. The staff confirmed the enhancements for both units and found the exception acceptable.

The applicant further stated in the ALRA that it takes exception to the GALL Report "parameters monitored/inspected," "detection of aging effects," and "monitoring and trending" program elements. NMP1 and NMP2 take exception to periodic sampling of the diesel fuel oil day tanks. These small tanks have no provision for sampling. Per technical specification surveillance testing, the lower portion of the diesel fuel oil is drained quarterly in NMP1 and monthly in NMP2. Such an exception has been accepted in NUREG-1796, "Dresden and Quad Cities Safety Evaluation Report."

As documented in the Audit and Review Report, the applicant clarified that these are small tanks, the diesel fire pump day tank approximately 275 gallons and the emergency diesel fuel oil day tank approximately 400 gallons. In addition per technical specification surveillance testing the lower portion of the diesel fuel oil in these tanks is drained back to the larger storage tanks quarterly for NMP1 and monthly for NMP2. Any water in the fuel oil is detected during the surveillance of the bulk storage tanks. Based on its review of this information the staff concludes that as the oil in the diesel fuel oil day tanks is sampled periodically when drained back to the larger storage tank, this exception is acceptable.

In the ALRA, the applicant stated that its Fuel Oil Chemistry Program is consistent with GALL AMP XI.M30 with additional enhancements to meet the GALL Report "scope of program," "preventive actions," "parameters monitored/inspected," "detection of aging effects," and "monitoring and trending" by revising procedures to address the following:

- Incorporate periodic tests for microbiological organisms at NMP1.
- Provide guidelines for the appropriate use of biocides, corrosion inhibitors, or fuel stabilizers to maintain fuel oil quality (NMP1 Commitment 21, NMP2 Commitment 19).
- Add specifications to sample the NMP2 diesel fuel oil storage tanks for water and sediment at least quarterly per the ASTM standard (NMP2 Commitment 19)

In its letter dated November 17, 2005, the applicant deleted the first enhancement, "incorporate periodic tests for microbiological organisms at NMP1" because this test already is performed and the enhancement is not needed.

The staff found these enhancements consistent with the GALL Report recommendations and therefore acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In addition in the ALRA the applicant stated that an enhancement to meet the GALL Report "preventive actions" and "detection of aging effects" program elements revises applicable existing procedures to address the following:

- Add specifications to inspect the interior surfaces of the NMP1 emergency diesel fuel oil tanks and diesel fire pump fuel oil day tank and the NMP2 fuel oil tanks periodically for evidence of significant degradation, including a specific requirement that the tank bottom thickness be determined (NMP1 Commitment 21, NMP2 Commitment 19)

In its letter dated November 17, 2005, the applicant deleted the "diesel fire pump fuel oil day tank" from this enhancement. The staff found this enhancement consistent with the GALL

Report and therefore acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA, the applicant stated that an enhancement to meet the GALL Report "monitoring and trending" program element revises procedures to address the following:

- Add specifications for quarterly trending of particulate contamination analysis results (NMP1 Commitment 21, NMP2 Commitment 19).

In its letter dated November 17, 2005, the applicant added the following to the "monitoring and trending," "parameters monitored and inspected," "preventive actions," and "detection of aging effects" program elements to the program elements affected:

- An enhancement for quarterly trending of water and sediment ("monitoring and trending" and "parameters monitored and inspected," NMP1 Commitment 21 and NMP2 Commitment 19).
- An enhancement for periodic opening of the diesel fire pump fuel oil day tank drain ("preventive actions" and "detection of aging effects," NMP1 Commitment 21).
- An enhancement for removal of water if found ("preventive actions" and "detection of aging effects," NMP1 Commitment 21 and NMP2 Commitment 19).

The staff found these enhancements consistent with the GALL Report and therefore acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

The enhancement for periodic opening of the diesel fire pump fuel oil day tank drain (NMP1) supports the exception taken by the applicant from periodic sampling of the diesel fuel oil day tanks. The staff found the remaining two new enhancements consistent with the GALL Report and, therefore, acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

In the ALRA, the applicant also stated that an enhancement to meet the GALL Report "acceptance criteria" program element revises procedures to address the following:

- Ensure acceptance criteria are specified in the implementing procedures for indications of potential degradation. (NMP1 Commitment 21, NMP2 Commitment 19)

In the ALRA program description for the Fuel Oil Chemistry Program the applicant stated that this AMP is to maintain fuel oil quality according to ASTM Standards D975, D1796, D2276 and D4057. This enhancement is to specify acceptance criteria in the implementing procedures. The staff found this information consistent with the GALL Report and therefore acceptable On this basis, the staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that aging effects will be adequately managed.

Operating Experience. In ALRA Section B2.1.18, the applicant explained it has reviewed both industry and plant-specific operating experience relating to the Fuel Oil Chemistry Program. Review of plant-specific operating experience revealed several incidents where contaminants (e.g., water, particulate) were detected through Fuel Oil Chemistry Program examinations.

Corrective actions included contamination removal and system/component cleaning. However, there have been no instances of fuel oil system component failures at NMP attributed to contamination.

From review of the applicant's operating experience, the staff found evidence that the fuel oil is sampled periodically and that when acceptance limits are exceeded appropriate corrective actions have been taken. The staff found that the applicant's Fuel Oil Chemistry Program is effective in managing the aging effects and aging effects mechanisms of loss of material from the presence of contaminants.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical staff to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

During the initial audit and review (August 9-13, 2004), the staff requested that the applicant provide examples of the tank inspections to verify the effectiveness of the program and to indicate any aging effects and aging effects mechanisms that were identified. The applicant stated in response that the most recent emergency diesel generator (EDG) tank inspections returned normal results. The applicant concluded that initial ultrasound tests of NMP2 fuel oil tanks had found no undue degradation of the tank wall. Ultrasound tests of the NMP1 tank had not yet been implemented. The staff reviewed these reports and other documentation and concludes that no aging of the fuel tanks had been detected.

After review of industry and plant-specific operating experience and discussions with the applicant's technical staff the staff concludes that there is reasonable assurance that the applicant's Fuel Oil Chemistry Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. The applicant provided its UFSAR supplement for the Fuel Oil Chemistry Program in ALRA, Appendix A, Section A1.1.20 for NMP1 stating that the Fuel Oil Chemistry Program manages loss of material from corrosion that may result from introduction of contaminants into the plant's fuel oil tanks. Program activities include (1) sampling and chemical analysis of the fuel oil inventory at the plant, (2) sampling, testing, and analysis of new fuel oil unloaded at the plant, and (3) cleaning and inspection of fuel oil tanks. The staff reviewed the ALRA and information provided in supplemental letters and determined that the information provides adequate summary descriptions of the program as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Fuel Oil Chemistry Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that the supplement provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.16 Reactor Vessel Surveillance Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.19, the applicant described the Reactor Vessel Surveillance Program (RVSP), stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.M31, "Reactor Vessel Surveillance." The applicant indicated that enhancements to the RVSP encompass revisions to existing activities that are credited for license renewal to ensure the applicable aging effects are discovered and evaluated. The enhancements will be completed prior to the period of extended operation. The RVSP manages loss of fracture toughness due to neutron irradiation embrittlement in the reactor pressure vessel (RPV) beltline material. Program activities include: (1) periodic withdrawal and testing of surveillance capsules from each RPV; (2) use of test results and allowable stress loadings for the ferritic RPV materials to determine operating limits; and (3) comparison with a large industry data set to confirm validity of test results. Analysis and testing are based on the requirements of 10 CFR 50, Appendix H, and ASTM Standard E-185.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements to determine whether the AMP, with enhancements, remains adequate to manage the aging effects for which it is credited.

In ALRA Section B.2.1.19 the applicant described how this AMP will manage irradiation embrittlement of the RV through testing that monitors RV beltline materials. The ALRA states that the RVSP will be enhanced by making it consistent with the BWRVIP integrated surveillance program (ISP) for periods of extended operation (currently reviewed by the staff as BWRVIP-116) before NMPNS units enter their period of extended operation. The ALRA further states that the enhanced program will be consistent with GALL AMP XI.M31 described in the GALL Report. For this AMP the GALL Report recommends further evaluation. The staff also reviewed the UFSAR supplement to determine whether it provides an adequate description of the program.

The applicant has implemented the BWRVIP ISP (as documented in the BWRVIP-86-A Report, "BWR Vessel and Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan") for the period of the current NMPNS operating licenses. The staff concludes that the BWRVIP ISP in the BWRVIP-86-A Report is acceptable for BWR licensee implementation provided that all participating licensees use one or more compatible neutron fluence methodologies acceptable to the staff for determining surveillance capsule and RV neutron fluences. The staff acceptance of the BWRVIP ISP for the current term is documented in the staff SE dated February 1, 2002, from Bill Bateman of the NRC to Carl Terry, BWRVIP Chairman. The BWRVIP-116 report provides guidelines for an ISP to monitor neutron irradiation embrittlement of the RV beltline materials for all United States (US) BWR power plants for their original 40-year operating terms and their license renewal periods.

The staff's review of the original LRA Section B2.1.19 identified an area in which additional information was necessary to complete the review of the applicant's program elements. The applicant responded to the staff's RAI as discussed below.

In RAI B.2.1.19-1 by letter dated January 13, 2005, the staff requested that the applicant make a commitment to implement the BWRVIP-116 ISP currently under review by the staff or to submit a plant-specific surveillance program for each NMPNS unit two years before it enters the extended period of operation.

In its response by letter dated February 14, 2005, the applicant indicated that it will implement either BWRVIP-116 as approved by the staff or if the ISP is not approved two years prior to the NMPNS units' period of extended operation a plant-specific surveillance program will be submitted to the NRC. In this response the applicant also stated that it will revise the original LRA Sections A1.1.32, A2.1.32, and B2.1.19 as shown in the staff's evaluation of the USAR supplement. The staff noted that the applicant had made a formal commitment to incorporate either BWRVIP-116 as approved by the staff or a plant-specific surveillance program for each of the NMPNS units to satisfy the requirements of 10 CFR Part 50, Appendix H (NMP1 Commitment 22 and NMP2 Commitment 20).

The applicant stated that the future withdrawal and testing of the NMP1 and NMP2 surveillance capsules will be deferred permanently because NMP1 and NMP2 are not host reactors within the BWRVIP-116 ISP. The applicant further stated that through participation in the BWRVIP ISP the RVSP will be adjusted to account for industry experience and research and that as additional operating experience is obtained lessons learned will be used to adjust this program as needed. Therefore, the staff will require the following license condition:

> Implementation of the most recent staff-approved version of the Boiling Water Reactor Vessels and Internals Project (BWRVIP) Integrated Surveillance Program (ISP) as the method to demonstrate compliance with the requirements of 10 CFR Part 50, Appendix H. Any changes to the BWRVIP ISP capsule withdrawal schedule must be submitted for NRC staff review and approval. Any changes to the BWRVIP ISP capsule withdrawal schedule which affects the time of withdrawal of any surveillance capsules must be incorporated into the licensing basis. If any surveillance capsules are removed without the intent to test them, these capsules must be stored in manner which maintains them in a condition which would support re-insertion into the reactor pressure vessel, if necessary.

The staff found the applicant has demonstrated that the effects of aging from loss of fracture toughness of the RV beltline materials will be adequately managed with the enhancements so that the intended functions will be maintained consistently with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

Operating Experience. In ALRA Section B2.1.19, the applicant indicated that NMPNS has successfully implemented a plant-specific RVSP that is consistent with Regulatory Guide 1.99, Revision 2, 10 CFR 50, Appendix H, and ASTM Standard E-185. Three surveillance capsules that were originally installed in the NMP1 RV have been removed and tested with satisfactory results. One of the three surveillance capsules that were originally installed in the NMP2 RV has been removed and tested. Data from LaSalle, Units 1 and 2 and Columbia Generating Station have been used to supplement the NMP2 surveillance data.

The applicant stated that under the ISP, neither NMP1 or NMP2 is identified as a host plant; the representative materials for the limiting RV plate and weld materials, and their associated withdrawal schedules are identified in the BWRVIP-116 report. Thus, future withdrawal and testing of the NMP1 and NMP2 surveillance capsules will be permanently deferred.

The applicant also stated that through participation in the BWRVIP ISP, the RVSP will be adjusted to account for industry experience and research. The applicant stated that with additional operating experience lessons learned will be used to adjust this program as needed.

The applicant maintains that the RVSP has been effective in managing loss of fracture toughness in RV beltline materials.

UFSAR and USAR Supplements. In RAI B2.1.19-1 the staff further requested that the applicant state, in the UFSAR and USAR its commitment regarding the implementation of BWRVIP-116 and in its response to RAI B.2.1.19-1 by letter dated February 14, 2005, the applicant stated that it will revise the ALRA Sections A1.1.32 and A2.1.32, to include the following:

> The reactor vessel surveillance program is an existing program that manages loss of fracture toughness due to neutron irradiation embrittlement in the reactor pressure vessel beltline material. Program activities include (1) periodic withdrawal and testing of surveillance capsules from the RPV; (2) use of test results and allowable stress loadings from the ferritic RPV materials to determine operating limits; and (3) comparison with a large industry data set to confirm validity of test results. Analysis and testing are based on the requirements of 10 CFR 50, Appendix H, and ASTM Standard E-185. NMPNS commits to implement the Integrated Surveillance Program (ISP) described in BWRVIP-116 (if approved by the NRC staff). When the NRC issues a final safety evaluation for BWRVIP-116, NMPNS will address any open items and complete the SER Action Items. Should BWRVIP-116 not be approved by the NRC, a plant specific reactor vessel surveillance program will be submitted to the NRC two years prior to commencement of the period of extended operation.

Enhancements to the RVSP include the following revisions to existing activities credited for license renewal:

> Incorporate the requirements and elements of the ISP, as documented in BWRVIP-116 and approved by NRC, or an NRC-approved plant-specific program, into the reactor vessel surveillance program, and include a requirement that if NMPNS surveillance capsules are tested, the tested specimens will be stored in lieu of optional disposal. When the NRC issues a final safety evaluation report for BWRVIP-116, NMPNS will address any open items and complete the SER Action items. Should BWRVIP-116 not be approved by the NRC, a plant specific reactor vessel surveillance program will be submitted to the NRC two years prior to commencement of the period of extended operation.

Project analyses of upper shelf energy and pressure-temperature limits to 60 years using methods prescribed by Regulatory Guide 1.99, Revision 2, and include the applicable bounds of the data, such as operating and neutron fluence.

Enhancements will be completed prior to the period of extended operation.

This information has been incorporated into the ALRA. The staff reviewed the applicant's proposed revision to ALRA Sections A1.1.32 and A2.1.32 of the UFSAR and USAR supplements and determined that the applicant has committed to implement an approved plant-specific RPV surveillance program or the most recent staff-approved version of the BWRVIP ISP to comply with the requirements of 10 CFR Part 50, Appendix H. Therefore, the staff's concern described in RAI B.2.1.19-1 is resolved.

The staff reviewed the ALRA and information provided in supplemental letters and determined that the information provides adequate summary descriptions of the program as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's RVSP and RAI response, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.17 ASME Section XI Inservice Inspection (Subsection IWE) Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.23, the applicant described the ASME Section XI Inservice Inspection (Subsection IWE) Program, stating that this is an existing program that is consistent, with an exception and an enhancement, with GALL AMP XI.S1, "ASME Section XI, Subsection IWE." The ASME Section XI Inservice Inspection (Subsection IWE) Program (referred to herein as the IWE ISI Program) manages aging effects due to: (1) corrosion of carbon steel components comprising the NMP1 and NMP2 containment pressure boundaries and (2) degradation of NMP1 and NMP2 containment pressure-retaining polymers. Program activities include visual examination, with limited surface or volumetric examinations when augmented examination is required. The IWE ISI Program is based on the 1998 edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWE) for containment inservice inspection (ISI) with plant-specific exceptions approved by the staff.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancement and the associated justifications to determine whether the AMP, with the exceptions and enhancement, remains adequate to manage the aging effects for which it is credited.

As documented in the Audit and Review Report, the staff asked the applicant to explain why there is an identified enhancement in the ASME Section XI ISI (SubSection IWE) Program with no affected program elements listed. The applicant stated that the reason no elements are identified is that the enhancement shown is not required to ensure consistency with the GALL Report but adopted as a function of the applicant's response to a staff request early in the application review period. To avoid confusion with the specialized definition of "enhancement" consistent with the GALL Report changes will be incorporated into the ALRA.

In its supplemental letter dated December 1, 2005, the applicant stated that the first sentence in the second paragraph in ALRA Sections A1.1.2 and A2.1.2 changes the word "enhanced" to "improved" with the following sentence added at the end of this paragraph: "This improvement is not required for consistency with the GALL but is an activity NMP is adopting to ensure consistency with industry practice." The same change is made to ALRA Section. In the ASME Section XI ISI (Subsection IWE) Program under the enhancement paragraph a new first paragraph of "None" is added. The following sentence is added to the beginning of the second paragraph: "The following improvement is not required for consistency with the GALL Report but is an activity NMP is adopting to ensure consistency with industry practice." The last sentence of this paragraph is replaced with the following sentence: "This improvement will be implemented prior to entry into the period of extended operation." Also the phrase "and requires enhancements to be consistent with others" is deleted from the GALL Report consistency Section of the ASME Section XI ISI (Subsection IWE) Program.

The staff found the applicant's response acceptable. With the clarification statements made by the applicant no enhancement is required to make the applicant's ASME Section XI ISI (Subsection IWE) Program consistent with the GALL Report.

The staff reviewed those portions of the ASME Section XI ISI (Subsection IWE) Program for which the applicant claimed consistency with GALL AMP XI.S1 and found them consistent with this GALL Report AMP. The staff found the applicant's ASME Section XI ISI (Subsection IWE) Program acceptable because it conforms to the recommended GALL AMP XI.S1 with an exception.

In the ALRA, the applicant stated that its ASME Section XI ISI (Subsection IWE) Program is consistent with GALL AMP XI.S1 with exceptions. The ASME Section XI ISI (Subsection IWE) Program takes exceptions to the GALL Report "parameters monitored/inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements. The GALL Report program elements identify both the ASME 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as applicable to the NMP1 and NMP2 Application for Renewed Operating License Appendix B - Aging Management Program ASME SectionXI-IWE as approved in 10 CFR 50.55a. The NMP IWE ISI Program complies with the ASME Section XI 1998 Edition with no Addenda.

In the ALRA, the applicant further stated that the GALL Report program description for this AMP identifies both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as the applicable editions for the NMP1 and NMP2 ASME Section XI ISI (Subsection IWE) Program as approved in 10 CFR 50.55a. The applicant's IWE ISI Program complies with ASME Section XI 1998 Edition with no Addenda. Although differences exist between code editions the applicant's IWE ISI Program complies with an edition of Section XI approved by the staff for use at NMP. Implementation of guidance from this later code edition meets the recommendations of the GALL Report.

As documented in the Audit and Review Report, the staff noted that the staff previously found this exception acceptable because the NMP code of record is an ASME Code version later than that cited by the GALL Report. The use of the 1998 Edition of the ASME Code was found acceptable in a letter from the US Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated August 17, 2000, with the subject "Nine Mile Point Nuclear Station Unit Nos. 1 and 2 - Relief From the Requirements of 10 CFR 50.55a Related to Containment Inspection (TAC Nos. MA7116, MA7117, and MA7118)." The staff also noted that under the applicant's ASME Code of record for ASME Section XI ISI (Subsection IWE) a 10-year inspection interval is valid under the CLB. At present an ASME Section XI ISI (Subsection IWE) Program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the ASME Section XI ISI (Subsection IWE) Program for the specific intervals during the period of extended operation under 10 CFR 50.55a 12 months prior to each interval. Therefore, the staff determined that the ASME Section XI Code Edition as referenced in 10 CFR 50.55a, for which the applicant will request approval 12 months prior to each inspection interval, is acceptable for the period of extended operation and found this exception acceptable.

Operating Experience. In ALRA Section B2.1.23, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the IWE ISI Program. Review of plant-specific operating experience revealed few discrepancies and no age-related equipment failures. Deficiencies discovered by recent IWE ISI Program examinations included damage to the NMP1 torus equipment hatch, damage to the NMP1 drywell dome manway hatch sealing surface, minor corrosion on the NMP1 drywell dome sealing surface, and minor corrosion on the NMP2 drywell liner. These indications were corrected for NMP1 and NMP2.

As documented in the Audit and Review Report, the staff also reviewed the summary of specific operating experience for the applicant's ASME Section XI ISI (Subsection IWE) Program. The review indicated that the program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of the containment pressure boundaries and NMP1 and NMP2 containment pressure-retaining polymers.

During the initial audit and review (August 9-13, 2004) NMP1 plant maintenance records revealed that there have been only a few CRs written and no age-related component failures following IWE inspections since the inception of the program with deficiencies limited to damage to the torus equipment hatch, damage to the drywell dome manway hatch sealing surface, corrosion of the drywell liner, and minor damage or corrosion on the drywell dome sealing surface. None of these deficiencies resulted in loss of intended function from age-related degradation. These records provide assurance that containment pressure boundary degradation has not occurred since the inception of the program. Subsequent to the onsite audit and review of NMP ALRA, the staff also reviewed the applicant's Inservice Inspection Owner Activity Report, dated July 23, 2003. In this report, the applicant has stated that, for NMP1, corrosion was identified over the entire 360 degree circumference of the drywell interior surface of the liner plate at the 225 foot elevation. The applicant further stated in the report that (1) a subsequent detailed (D-VT) visual examination (VT-1) was performed and that (2) no unacceptable degradation in the visible areas of the drywell liner was found and that (3) no immediate corrective action was taken. The staff has asked the applicant to provide further discussion to address the staff concern regarding the loss of material due to corrosion of the NMP1 drywell. This was designated as Open Item (OI) 3.0.3.2.17-1.

On March 27, 2006, the applicant met with the staff to discuss the issue identified in OI 3.0.3.2.17-1, and by letter dated April 4, 2006, the applicant provided its response to OI 3.0.3.2.17-1. In its attachment to the letter, the applicant supplemented the following background information related to corrosion of NMP1 drywell.

During the 2003 NMP1 refueling outage, a general visual examination of 100 percent of the accessible portions of the interior surface of the drywell shell was performed. Six localized areas, coinciding with the area coolers, were observed to have significant corrosion. In accordance with ASME Section XI Subsection IWE, a detailed visual examination (VT-1) was performed of the six localized areas and characterized the corrosion as 'major' (i.e., greater than 5 percent of the base metal was judged to be lost). A condition report was generated in accordance with the corrective action program and a rigorous engineering evaluation was performed.

To ascertain the actual thickness of the drywell shell at these locations, the four most severe locations were chosen by the IWE responsible engineer to have volumetric (UT) examinations performed. Four individual UT measurements were taken by cleaning the corrosion from the base metal, conducting a continuous scan, and recording the lowest value. The results of the UT examinations ranged from 1.106" to 1.131". The IWE Responsible Engineer compared these results against the minimum design value of 1.049" and concluded that the drywell shell was acceptable for continued service.

Subsequent to the evaluations performed during the 2003 refueling outage, an engineering calculation was performed that projected the time necessary to reach minimum design thickness for the drywell shell. Using the volumetric results (min. 1.106") and minimum design value (1.049"), the available margin was determined to be 57 mils. Using the originally assumed corrosion allowance (62.5 mils over 40 years), it was calculated that it would take 36 years from 2003 to reach the minimum design thickness. This projects out to be the year 2039, which is 10 years beyond the end of the period of extended operation (2029).

Another method, using a newer approved corrosion rate, was also used to project the year that minimum wall thickness would be reached for the drywell shell. NMP uses a corrosion rate of 1.26 mils/yr in the Torus Corrosion Monitoring Program to evaluate volumetric examination results. This value is documented in a 1994 NRC safety evaluation report. The use of this corrosion rate is appropriate since the material of the drywell shell is essentially the same as the material for the torus shell for the purposes of corrosion resistance. The drywell shell is made of ASTM-212, Gr. B carbon steel whereas the torus shell is made of ASTM-201, Gr. B. The environment in the torus is also the same as, or more severe than, the drywell environment. The torus is approximately half full of demineralized water and the remainder is a nitrogen inerted atmosphere. The drywell is entirely a nitrogen inerted atmosphere. Therefore, since the materials are essentially the same and the environments are also, it is appropriate to use an approved corrosion rate for the torus for the drywell shell. Performing the calculation, 57 mils of margin divided by 1.26 mils/yr. corrosion rate, yields 45 years until the minimum design thickness of the drywell shell is reached (19 years beyond the end of the period of extended operation).

Based on the above, the applicant concluded that the NMP1 drywell shell could perform its intended function following the 2003 refueling outage and beyond the period of extended operation. However, the applicant had also concluded that continued monitoring, in addition to the ASME Section XI Subsection IWE Program, of the drywell shell was necessary. The applicant formalized the continuing monitoring program as "Drywell Supplemental Inspection Program." The following is the staff evaluation of the AMP program elements.

(1) Scope of Program - The scope of the NMP1 Drywell Supplemental Inspection Program includes the areas characterized as having major corrosion (rust) on the NMP1 drywell shell in the NMP Owner Activity Report dated July 23, 2003. These six areas are localized and located near and underneath the drywell area coolers on the 225' elevation. This program provides aging management activities to the six localized areas in addition to the activities required by the ASME Section XI Inservice Inspection (Subsection IWE) Program.

    Based on the information provided in the applicant's background information, the staff found the scope of the program, as described herein, acceptable.

(2) Preventive Actions - There are no predetermined preventive actions associated with this program. However, NMP engineering may require preventive actions in the future as part of the evaluation of examination results.

    If the future examinations dictate that preventive actions (e.g., appropriate coating), are needed, the applicant will consider such actions. The staff agrees with the applicant's assessment of this element.

(3) Parameters Monitored or Inspected - The six localized areas of the carbon steel drywell shell are examined for evidence of loss of material due to corrosion.

    In response to the staff's query about the examination of the shell at the junction of the concrete floor and the drywell shell, which has been found as a site for corrosion at other plants, the applicant asserted that the examination of this joint is part of the IWE Inspection Program (i.e. AMP B.2.1.33). The staff found the applicant's response and the program element as described in this supplementary AMP acceptable, as this program is only applicable to the corrosion degradation found during its 2003 inspection.

(4) Detection of Aging Effects - Loss of material will be detected by performing a volumetric (ultrasonic thickness measurement) examination. This exam will be conducted during the 2007 refueling outage. Future performances will be based on the results obtained, as described under the Corrective Actions attribute.

    The staff found the actions to be taken by the applicant, as shown in the table, commensurate with the as found corrosion rate, appropriate and acceptable.

(5) Monitoring and Trending - The condition of the localized area wall thickness of the drywell shell is monitored by virtue of the volumetric exam. Trending of the wall thickness results will be performed to determine a rate of material loss and to project the application of that rate to the drywell shell thickness value until the end of the period of extended operation.

The staff found the applicant's program regarding monitoring and trending of the as found corrosion appropriate and acceptable.

(6) Acceptance Criteria - The acceptance criteria will be based upon the calculated corrosion rate and the projected wall thickness at the end of the period of extended operation. The corrosion rate criteria are based on maintaining a wall thickness of greater than the minimum design value. The following table correlates corrosion rates, projected wall thickness at the end of the period of extended operation, and actions that will be taken above those actions required by the ASME Section XI Subsection IWE requirements. The values in the tables, except the corrosion rates, are calculated using the lowest wall thickness reading (1.106") obtained during the 2003 refueling outage. For wall thicknesses greater than 1.106" in 2003, these values are conservative.

Corrosion Rate (mils/year)	Wall Thickness @ End of PEO (inches)	Margin to Design (mils)	Years to Reach Minimum Design Thickness	Actions Beyond IWE Requirements
< 0.30	> 1.098	> 49	> 190	None
0.30 - 0.61	1.090- 1.098	41 - 49	93 - 190	Confirming UT every 10 years
0.62 - 1.25	1.074- 1.090	25-41	45 - 93	Confirming UT every 6 years
1.26 - 2.2	1.049 - 1.074	0 - 25	26 - 45	Confirming UT every 4 years and implement a .mitigative strategy
> 2.2	< 1.049	0	<2 6	Confirming UT every 2 years and implement a mitigative strategy

Based on the history of corrosion found in NMP1 torus in the late 1980s, the applicant had elicited a corrosion rate of 1.26 mils/year. In the drywell, at the time of detecting corrosion, i.e., in 2003, the applicant could not predict corrosion rates. The table above envelopes corrosion rates lesser than the torus corrosion rate, and the last row depicts the potential worst case. Therefore, the staff found actions required under various corrosion rates appropriate and acceptable.

(7) Corrective Actions - Actions to be implemented beyond those required by the ASME Section XI Subsection IWE Program are delineated in the table above. A mitigative strategy could include application of a protective coating, repair or replacement of affected sections, or other actions deemed appropriate by the NMP IWE responsible engineer. The Corrective Action Program meets the requirements of 10 CFR Part 50, Appendix B.

As indicated in the staff evaluation of element "Acceptance Criteria," the mitigative strategy, and possible remedial actions proposed in this element are appropriate and acceptable.

(8) Confirmation Process - When acceptance criteria are not met, corrective actions are determined in accordance with the Corrective Action Program. Confirmation that the corrective actions have been completed and are effective will be documented in accordance with the requirements of 10 CFR Part 50, Appendix B.

The element meets the requirement of 10 CFR Part 50, Appendix B.

(9) Administrative Controls - The above stated actions to manage the corrosion of six localized areas on the NMP1 drywell shell will be controlled and documented in the NMP ASME Section XI Subsection IWE Program Plan.

The method of keeping control of the activities performed under this AMP is appropriate and acceptable.

(10) Operating Experience - NMPNS has an existing effective program that continuously reviews internal and external operating experience to determine its applicability and adjusts inspection plans accordingly. The operating experience program will continue to be used to improve the NMP1 Drywell Supplemental Inspection Program.

The applicant's commitment to keep track of the external operating experience, and modifying the AMP, as necessary, is appropriate and acceptable.

Based on the review of the applicant's supplemental aging management program and the applicant's IWE Inspection Program (i.e., AMP B.2.1.33) for monitoring the NMP1 drywell corrosion, the staff concludes that there is reasonable assurance that is there is reasonable assurance that the NMP1 containment drywell integrity will be maintained during the period of extended operation. Therefore, Open OI 3.0.3.2.17-1 is now considered closed.

In addition during the initial audit and review NMP2 plant maintenance records revealed that there has been only one CR written and no age-related component failures following IWE inspections since the inception of the program. In 2000 minor corrosion was discovered and removed from the drywell liner with no loss of integrity. These records provided assurance that containment pressure boundary degradation had not occurred since the inception of the program.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff concludes that there is reasonable assurance that the applicant's ASME Section XI ISI (Subsection IWE) Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. The applicant provided its UFSAR supplement for the ASME Section XI Inservice Inspection (Subsection IWE) Program in ALRA Appendix A, Section A1.1.2 for NMP1 stating that the ASME Section XI Inservice Inspection (Subsection IWE) Program (referred to herein as the IWE Inservice Inspection Program) manages aging effects and aging effects mechanisms due to (1) corrosion of carbon steel components comprising the containment pressure boundary and (2) degradation of containment pressure-retaining polymers. Program activities include visual examinations with limited surface or volumetric examinations when augmented examination is required. The IWE Inservice Inspection Program is based on the 1998 Edition of the ASME Boiler and Pressure Vessel Code Section XI (Subsection IWE) for containment inservice inspection with plant-specific exceptions to the evaluation in the GALL Report (which covers ASME Section XI requirements from both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda) approved by the staff. The NMP1 ASME Section XI Inservice Inspection (Subsection IWE) Program will be enhanced to add an augmented VT-1 visual examination of the NMP1 containment penetration bellows. This inspection will be performed using enhanced techniques qualified for detecting SCC per NUREG-1611, "Aging Management of Nuclear Power Plant Containments for License Renewal," Table 2, Item 12.

In addition the applicant provided its USAR supplement for the ASME Section XI ISI (Subsection IWE) Program in ALRA Appendix A Section A2.1.2 for NMP2 stating that the program manages aging effects and aging effects mechanisms from (1) corrosion of carbon steel components comprising the containment pressure boundary and (2) degradation of containment pressure-retaining polymers. Program activities include visual examinations with limited surface or volumetric examinations when augmented examination is required. The IWE ISI Program is based on the 1998 Edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWE) for containment ISI with plant-specific exceptions to the evaluation in the GALL Report (which covers ASME Section XI requirements from both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda) approved by the staff. The NMP2 ASME Section XI ISI (Subsection IWE) Program will be enhanced to add an augmented VT-1 visual examination of the NMP2 containment penetration bellows. This inspection will be performed using enhanced techniques qualified for detecting SCC per NUREG-1611, Table 2, Item 12.

As documented in the Audit and Review Report, the staff asked the applicant to explain why there is an enhancement in ALRA Section B2.1.23 for its ASME Section XI ISI (Subsection IWE) Program with no affected program elements listed. The applicant stated that there are no elements identified because the enhancement shown is not required to ensure consistency with the GALL Report has been adopted in response to a staff request early in the application review period. To avoid confusion with the specialized definition of "enhancement" consistent with the GALL Report changes will be incorporated into the ALRA.

In its letter dated December 1, 2005, the applicant stated that the first sentence in the second paragraph in ALRA Section A1.1.2 changes the word "enhanced" to "improved" with the following sentence added at the end of this paragraph: "This improvement is not required for consistency with the GALL but is an activity NMP is adopting to ensure consistency with industry practice." The same change is made to ALRA Section A2.1.2.

The staff found the applicant's response acceptable. With the clarification made by the applicant there is no enhancement required to make the applicant's ASME Section XI ISI (Subsection IWE) Program consistent with the GALL Report.

The staff reviewed these sections and information In the ALRA and determined that the information in the supplements provide adequate summary descriptions of the program as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.18 ASME Section XI Inservice Inspection (Subsection IWL) Program (NMP2 Only)

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.24, the applicant described the ASME Section XI Inservice Inspection (Subsection IWL) Program for NMP2, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.S2, "ASME Section XI, Subsection IWL." The ASME Section XI Inservice Inspection (Subsection IWL) Program (referred to herein as the IWL ISI Program) manages aging of concrete in the NMP2 containment wall, base mat, and drywell floor. Program activities include general visual examination of all accessible concrete surface areas, with provisions for detailed visual examination when deterioration and distress of suspect areas is detected. The IWL ISI Program is based on the 1998 edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWL) for containment inservice inspection with plant-specific exceptions approved by the NRC. This program applies to concrete elements of BWR Mark II and III containment structures. NMP1 is a BWR Mark I containment, therefore, this program does not apply to NMP1.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justification to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

As documented in the Audit and Review Report, the staff asked the applicant to explain why in NMP AMP B2.1.24 under the consistency paragraph "IWE" is shown in the first sentence instead of "IWL." The applicant responded that this typographical error should have been "IWL," not "IWE." In its letter dated December 1, 2005, the applicant stated that in NMP AMP B2.1.24 under the consistency paragraph the typographical error "IWE" has been changed to "IWL."

The staff found the applicant's response acceptable. With the correction of "IWE" to "IWL" the sentence agrees with the NMP AMP described in the ASME Section XI Inservice Inspection (Subsection IWL) Program.

The staff reviewed those portions of the ASME Section XI ISI (Subsection IWL) Program (Unit 2 only) for which the applicant claimed consistency with GALL AMP XI.S2 and found them consistent. The staff found the applicant's ASME Section XI ISI (Subsection IWL) Program (Unit 2 only) acceptable because it conforms to the recommended GALL AMP XI.S2 with exception.

In the ALRA, the applicant stated that its ASME Section XI ISI (Subsection IWL) Program takes exception to the GALL Report "parameters monitored/inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements. The GALL Report program elements identify both the ASME 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as applicable editions for the NMP2 Application for Renewed Operating License Appendix B - Aging Management Program ASME Section XI-IWL as approved in 10 CFR 50.55a. The NMP IWL ISI Program complies with the ASME Section XI 1998 Edition with no addenda.

The applicant stated in the ALRA that the GALL Report program description for this AMP identifies both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as applicable editions for its ASME Section XI ISI (Subsection IWL) Program as approved in 10 CFR 50.55a. The applicant's IWL ISI Program complies with the ASME Section XI 1998 Edition with no addenda. Although differences exist between code editions the applicant's IWL ISI Program complies with an edition of Section XI approved by the NRC for use at NMP. Implementation according to this later code edition meets the recommendation of the GALL Report description.

As documented in the Audit and Review Report, the staff previously found this exception acceptable because the code of record for NMP2 is an ASME Code version later than that cited by the GALL Report. The use of the 1998 Edition of the ASME Code was found acceptable in a letter from the US Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated August 17, 2000, with the subject "Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 - Relief From the Requirements of 10 CFR 50.55a Related to Containment Inspection (TAC Nos. MA7116, MA7117, and MA7118)." The staff also noted that under the applicant's ASME code of record for ASME Section XI ISI (Subsection IWL) a 10-year inspection interval is valid under the CLB. At present an ASME Section XI ISI (Subsection IWL) program is approved for use on an ASME Code 10-year ISI interval-specific basis. However, the applicant will have to request approval to use the ASME Section XI ISI (Subsection IWL) program for the specific intervals during the period of extended operation under 10 CFR 50.55a 12 months prior to each interval. Therefore, the staff determined that the ASME Section XI Code Edition as referenced in 10 CFR 50.55a, for which the applicant will request approval 12 months prior to each inspection interval is acceptable for the period of extended operation and found this exception acceptable.

Operating Experience. In ALRA Section B2.1.24, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the IWL ISI Program. Review of plant-specific operating experience revealed no CRs written as a result of IWL ISI Program inspections since program inception.

During the initial audit and review, (August 9-13, 2004) the staff reviewed operating experience for the applicant's ASME Section XI ISI (Subsection IWL) Program (Unit 2 only). The review indicated that the applicant's program is effective in maintaining the integrity of the containment concrete with processes in place to identify age-related degradation and implement repairs.

As documented in the Audit and Review Report, the staff also reviewed the summary of specific operating experience for the applicant's ASME Section XI ISI (Subsection IWL) Program. The review indicated that there have been no CRs written following IWL inspections since the inception of the program and provided assurance that containment degradation has not occurred since the inception of the program.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff concludes that there is reasonable assurance that the applicant's ASME Section XI ISI (Subsection IWL) Program (Unit 2 Only) will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

USAR Supplement. In ALRA Section A2.1.4, the applicant provided the USAR supplement for the ASME Section XI Inservice Inspection (Subsection IWL) Program. The staff reviewed this section and determined that the information in the USAR supplement provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's ASME Section XI Inservice Inspection (Subsection IWL) Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition the staff reviewed the exception and the associated justification, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the USAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.19 ASME Section XI Inservice Inspection (Subsection IWF) Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.25, the applicant described the ASME Section XI Inservice Inspection (Subsection IWF) Program, stating that this is an existing program that is consistent, with exception, with GALL AMP XI.S3, "ASME Section XI, Subsection IWF." The ASME Section XI Inservice Inspection (Subsection IWF) Program (referred to herein as the IWF ISI Program) manages aging of carbon steel component and piping supports, including ASME Class MC supports, due to general corrosion and wear. Program activities include visual examination to determine the general mechanical and structural condition of components and their supports. The IWF Inservice Inspection Program is based on the 1989 edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWF) for inservice inspection of supports and implements the alternate examination requirements of ASME Code Case N-491-1.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exception and the associated justification to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the ASME Section XI ISI (Subsection IWF) Program for which the applicant claimed consistency with GALL AMP XI.S3 and found them consistent. The staff found the applicant's ASME Section XI ISI (Subsection IWF) Program acceptable because it conforms to the recommended GALL AMP XI.S3 with exception.

In the ALRA, the applicant stated that its ASME Section XI ISI (Subsection IWF) Program is consistent with GALL AMP XI.S3 with exception to the GALL Report "scope of program," "parameters monitored/inspected," and "acceptance criteria" program elements. The GALL Report program elements identify the ASME 1989 Edition through the 1995 Edition and Addenda through the 1996 Addenda as applicable to the NMP1 and NMP2 Application for Renewed Operating License Appendix B - Aging Management Program ASME Section XI-IWF as approved in 10 CFR 50.55a. The NMP IWF ISI Program complies with the ASME Section XI 1989 Edition with no addenda.

In the ALRA, the applicant stated that the NRC previously found this exception acceptable because the code of record for NMP IWF inspections is the 1989 version of the ASME Code found acceptable in two letters from the US Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000 and March 3, 2000. The subject of the October 5, 2000, letter was "Nine Mile Point Nuclear Station, Unit No. 1 - Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129)." The subject of the March 3, 2000, letter was "Nine Mile Point Nuclear Station, Unit No. 2 - Reliefs for the Second 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA6273)." The staff also noted that under the applicant's ASME code of record for ASME Section XI ISI (Subsection IWF) a 10-year inspection interval is valid under the CLB. At present an ASME Section XI ISI (Subsection IWF) Program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the ASME Section XI ISI (Subsection IWF) Program for the specific intervals during the period of extended operation under 10 CFR 50.55a 12 months prior to each interval. Therefore, the staff determined that the ASME Section XI Code Edition as referenced in 10 CFR 50.55a, for which the applicant will request approval 12 months prior to each inspection interval is acceptable for the period of extended operation and found this exception acceptable.

As documented in the Audit and Review Report, the staff noted that the GALL Report AMP program identifies the ASME 1989 Edition through the 1995 Edition and addenda through the 1996 Addenda as applicable to applicant's ASME Section XI ISI (Subsection IWF) Program as approved in 10 CFR 50.55a. The applicant's IWF ISI Program complies with the ASME Section XI 1989 Edition with no addenda. Although differences exist between code editions the applicant's IWF ISI Program complies with an edition of Section XI approved by the staff for use at NMP. Implementation according to this code edition meets the recommendation of the GALL Report description.

Operating Experience. In ALRA Section B2.1.25, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the IWF Inservice Inspection Program. Review of plant-specific operating experience revealed no age-related failures of any supports within the scope of the IWF Inservice Inspection Program.

As documented in the Audit and Review Report, the staff also reviewed the summary of specific operating experience for its ASME Section XI ISI (Subsection IWF) Program. Review of the summary indicated that the applicant did not identify any age-related ASME Code Class 1, 2, 3, and MC component support failures. During the initial audit and review (August 9-13, 2004) NMP1 plant maintenance records revealed that there have been no age-related failures of any supports in the program and internal audits have revealed only administrative deficiencies that did not affect the ability of any support to perform its intended function. One CR which demonstrated the effectiveness of inspection techniques in use at NMP1 reported a support that may have lost a degree of freedom from the improper application of paint. Further investigation revealed the support maintained its intended function with no age-related degradation. Other CRs documented deficiencies discovered and corrected through site quality assurance and CAPs. No improperly managed age-related degradation was discovered, thus providing assurance that support degradation had not occurred since the inception of the program.

During the initial audit and review (August 9-13, 2004) NMP2 plant maintenance records also revealed that there have been no age-related failures of any supports in the program, and internal audits have revealed only administrative deficiencies that did not affect the ability of any support to perform its intended function. One CR demonstrating effective inspection techniques in use at NMP2 reported a support with a gap between the inner nut and clamp. The pipe clamp bolts were tightened to their original design specification and the support was found to be operable so there was no loss of intended function. Other CRs documented deficiencies discovered and corrected through site quality assurance and CAPs. No improperly managed age-related degradation was discovered, thus providing assurance that support degradation had not occurred since the inception of the program.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience reveals no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff concludes that the applicant's ASME Section XI ISI (Subsection IWF) Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.3 and A2.1.3, the applicant provided the respective UFSAR and USAR supplements for the ASME Section XI Inservice Inspection (Subsection IWF) Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's ASME Section XI Inservice Inspection (Subsection IWF) Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition the staff reviewed the exception and the associated justifications, and determined that the AMP, with the exception, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.20 Masonry Wall Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.27, the applicant described the Masonry Wall Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.S5, "Masonry Wall Program." The Masonry Wall Program manages aging effects so that the evaluation basis established for each masonry wall within the scope of license renewal remains valid through the period of extended operation. The Masonry Wall Program is based on the structures monitoring requirements of 10 CFR 50.65. Implementation of the Masonry Wall Program is discussed in the program description for the Structures Monitoring Program.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

Because the applicant chose to implement its Masonry Wall Program through its Structures Monitoring Program the staff evaluations are combined with the evaluations of the Structures Monitoring Program in SER Section 3.0.3.2.21.

Operating Experience. Refer to SER Section 3.0.3.2.21.

UFSAR and USAR Supplements. In ALRA Sections A1.1.23 and A2.1.23, the applicant provided the respective UFSAR and USAR supplements for the Masonry Wall Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Masonry Wall Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.21 Structures Monitoring Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.28, the applicant described the Structures Monitoring Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.S6, "Structures Monitoring Program." The Structures Monitoring Program manages aging of structures, structural components, and structural supports within the scope of license renewal. The program provides for periodic visual inspections, surveys, and examination of all safety related buildings (including the primary containment and substructures within the primary containment) and various other buildings within the scope of license renewal. Program activities identify degradation of materials of construction, which include structural steel, concrete, masonry block, and sealing materials. While not credited for mitigation of aging, protective coatings are also inspected under this program. The Structures Monitoring Program, which was initially developed to meet the regulatory requirements of 10 CFR 50.65, implements guidance provided in RG 1.160, NUMARC 93-01, and NEI 96-03.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

During the initial audit and review (August 9-13, 2004) the staff asked the applicant to explain the design of the foundations for its structures within license renewal and whether any have porous concrete subfoundations. In addition the staff requested the applicant to explain if any license renewal structures have settlement issues and if there is a site de-watering system.

As documented in the Audit and Review Report, the applicant stated in response to the staff's questions that the foundations for the structures within the scope of license renewal are reinforced concrete on bedrock. Porous concrete sub-foundation construction was not used at NMP. The applicant also responded that settlement is not an aging effect or aging effect mechanism at NMP and that there is no site de-watering system.

GALL AMP XI.S5 under the "detection of aging effects" program element states that the frequency of inspection is selected to ensure no loss of intended function between inspections. The inspection frequency may vary from wall to wall depending on the significance of cracking in the evaluation basis. Unreinforced masonry walls not contained by bracing warrant the most frequent inspection because cracks may invalidate the existing evaluation basis. The applicant stated in its Masonry Wall Program basis document that the inspection frequency of six years for the unreinforced walls is consistent with the GALL Report. However, this inspection frequency is the same as that for reinforced masonry walls as discussed in the applicant's program basis document.

In addition as documented in the Audit and Review Report, the staff asked the applicant to explain how the same inspection frequency for all reinforced, unreinforced, and braced masonry walls within the scope of license renewal is consistent with the GALL Report. The applicant responded that it will require as part of its Masonry Wall Program (as managed by its Structures Monitoring Program) that unreinforced masonry walls without bracing be inspected for cracking more frequently than reinforced or braced masonry walls.

In its letter dated December 1, 2005, the applicant added to the ALRA a commitment to enhance its Masonry Wall Program (as managed by its Structures Monitoring Program) based on the GALL Report text in the program element, "detection of aging effects." The program enhancement will provide guidance for inspecting NMP1 unreinforced or unbraced masonry walls within the scope of license renewal more frequently than reinforced masonry walls. The ALRA sections affected are A1.1.34, A1.4, and B2.1.28 (NMP1 Commitment 39).

The staff found the applicant's response acceptable. With the commitment to inspect unreinforced masonry walls more frequently the applicant's Structural Monitoring Program is now consistent with the "detection of aging effects" program element of GALL AMP XI.S5.

As further documented in the Audit and Review Report, the staff noted that the applicant's Structures Monitoring Program basis document lists wood in air as one of the NMP1 component/commodity groups managed by the program. The staff requested the applicant to explain why wood was not listed under the program description in ALRA Section A1.1.34 and NMP AMP B2.1.28 as one of the construction materials inspected for degradation by the program. The applicant responded that it would add wood to the list of materials for NMP1 in the program description of ALRA Sections B2.1.28 and A1.1.34.

In its letter dated December 1, 2005, the applicant stated that ALRA Section A1.1.34 had been revised to add NMP1 wooden structure to the list of construction materials in the first paragraph and that ALRA Section B2.1.28 had been revised by adding NMP1 wooden structure to the list of construction materials in the first paragraph under the program description.

The staff found the applicant's response acceptable. With the addition of wood to ALRA Sections A1.1.34 and B2.1.28 the applicant's Structures Monitoring Program in the ALRA is now in agreement with the program basis document.

The staff reviewed those portions of the Structures Monitoring Program for which the applicant claimed consistency with GALL AMP XI.S5 and GALL AMP XI.S6, and found them consistent. The staff found the applicant's Structures Monitoring Program acceptable because it conforms to the recommended GALL AMP XI.S5, "Masonry Wall Program," and GALL AMP XI.S6, "Structures Monitoring Program," with enhancements.

In the ALRA, the applicant stated that its Structures Monitoring Program is consistent with GALL AMP XI.S6 with an enhancement. As stated In the ALRA, the enhancement in meeting the GALL Report program elements is to expand scope and make revisions to activities (i.e., procedures) credited for license renewal to ensure that aging effects and aging effects mechanisms are discovered and evaluated (NMP1 Commitment 26, NMP2 Commitment 24).

In the ALRA, the applicant stated that its Structures Monitoring Program will be expanded to include within the scope of license renewal the following listed activities or components not currently within the scope of 10 CFR 50.65:

(a) NMP2 fire-rated assemblies and watertight penetration visual inspections,

(b) NMP2 masonry walls in the turbine building and service water tunnel serving a fire barrier function, and

(c) the steel electrical transmission towers required for the station blackout (SBO) and recovery paths for NMP1 and NMP2.

Also parameters monitored during structural inspections will be expanded to include those relevant to aging effects and aging effects mechanisms for structural bolting. This enhancement affects the "parameters monitored/inspected," "detection of aging effects," and acceptance criteria" program elements of the GALL Report. In addition regularly scheduled ground water monitoring will ensure that a benign environment is maintained, this enhancement affects the "parameters monitored/inspected" and "detection of aging effects" program elements of the GALL Report.

The staff determined that with these additional inspections of SCs the applicant's Structures Monitoring Program will meet the recommendation of GALL AMP XI.S6. The applicant identified commitments to the NRC with these enhancements relative to GALL AMP XI.S6. Because inspection of these additional structural components will make the applicant's program consistent with GALL AMP XI.S6 the staff found these enhancements acceptable. These changes to the applicant's program will provide assurance that the effects of aging will be adequately managed.

Operating Experience. In ALRA Section B2.1.28, the applicant explained it has reviewed both industry and plant-specific operating experience relating to the Structures Monitoring Program. Since implementation of inspections under the Structures Monitoring Program, minor cracking has been identified in various concrete structures and slight (but stable) ground water leaks have occurred in some tunnels. However, a review of plant-specific operating experience revealed no cases of structural failure caused by unidentified degradation. Similarly, no structural deficiencies have been identified in flood control structures.

As documented in the Audit and Review Report, the staff also reviewed the summary of specific operating experience for the applicant's Structures Monitoring Program. The review indicated that the applicant's Structures Monitoring Program is effective in identifying structural degradation, implementing corrective actions, and trending parameters for NMP structures within the scope of license renewal. When degradation has been identified corrective actions have been implemented to ensure that the integrity of the affected structure is maintained without loss of intended function.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

As stated in the Audit and Review Report, NMP1 and NMP2 plant maintenance/ inspection records revealed that since implementation the applicant's Structures Monitoring Program has been effective identifying structural degradation before a loss of intended function occurs.

Several CRs have identified minor cracking in concrete structures including the service water pipe tunnel. Because the service water pipe tunnel is susceptible to small wall cracks allowing leakage of ground water the staff requested the applicant to discuss the results of the latest inspections of the tunnel and how often these inspections were done. The applicant stated in response that the repaired areas referenced in the service water pipe tunnel CR had been inspected recently and that there continued to be no entry of ground water in the areas repaired. The frequency of inspections following the repairs has varied. Initially repair inspections were monthly, then quarterly, then annually. Inspections of the tunnel are now scheduled for every refueling outage.

In addition during the initial audit and review the staff asked the applicant to explain if there is any rust staining in the tunnel, indicating corrosion of rebar in the concrete, the reason for not performing any external waterproofing repairs to the tunnel. The applicant responded that inspections of accessible areas adjacent to inaccessible areas can indicate the condition of the inaccessible areas. Rust stains have not been identified on the internal surface of the concrete adjacent to the areas of leakage through the tunnel concrete walls. Therefore, it is reasonable to conclude that degradation of the reinforcing steel is not occurring. Waterproof coating of the exterior surface of the structure is not required due to successful repairs to water penetration paths from the inside the structure.

Furthermore, during the initial audit and review the staff asked the applicant to explain how the design of the service water pipe tunnel keep the flood depth under three inches if ground water entered again and the sump pumps failed as reported in the CR. The applicant stated that the tunnel is sectioned by various curbs and elevations. If the sumps failed in the tunnel water would flow over the curb and into another sump.

The applicant was also asked at the time to discuss results of the latest inspections for the normal switchgear building, service water tunnels, and the radwaste building for below grade exterior walls where groundwater also has entered. The applicant stated that the latest inspections have not identified significant water entry for the structures within the scope of license renewal.

Based on the initial audit and review that the applicant's Structures Monitoring Program procedures provide for buried structures that when inaccessible areas are excavated or exposed if practical an inspection of these structures will be performed and findings included in the program's database.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff concludes that there is reasonable assurance that the applicant's Structures Monitoring Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.34 and A2.1.34, the applicant provided the respective UFSAR and USAR supplements for the Structures Monitoring Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Structures Monitoring Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the

GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.22 Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.30, the applicant described the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits." The Non-EQ Electrical Cables Used in Instrumentation Circuits Program manages aging of cables and connections exposed to adverse localized temperature and radiation environments that could result in loss of insulation resistance. It applies to accessible and inaccessible electrical cables that are not in the EQ Program and are used in circuits with sensitive, high-voltage, low-level signals such as radiation monitoring, nuclear instrumentation, and other such cables subject to AMR that are sensitive to a reduction in insulation resistance. Activities include routine calibration tests of instrumentation loops or direct testing of the cable system in those cases where cable testing is conducted as an alternate to surveillance testing, and in either case are implemented through the Surveillance Testing and Preventive Maintenance Programs. Testing is based on requirements of the particular calibrations, surveillances, or testing performed on the specific instrumentation circuit or cable and is implemented through the NMP work control system. Where cable testing is conducted as an alternate to surveillance testing the acceptance criteria for each test will be defined by the specific type of test performed and the specific cable tested.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justification to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed nuclear engineering reports (NERs) for NMP1 and NMP2. The staff found inconsistency between NMP1 and NMP2 non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program scopes. For example, the scope for NMP1 includes power range monitoring (PRM) and intermediate range monitoring (IRM) circuitry. However, the AMP scope for NMP2 includes only the IRM circuit. As documented in the Audit and Review Report, the staff requested that the applicant review the NERs and clarify the differences between the scoping of the two units. The applicant clarified differences between the scoping of NMP1 and NMP2. The applicant indicated that some cables are not within the scope of the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program because these cables are in the EQ Program and therefore not within the scope of Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program. The applicant also informed the staff that as a result of responding to the staff's request it reviewed the NERs and found a discrepancy in the safety classification between NMP1 and NMP2. The applicant informed the staff that it would initiate a CR to document the discrepancy between NMP1 and NMP2 and revise the NMP1 and NMP2 NERs and the program basis document. The staff found the applicant's response acceptable. The staff reviewed the applicant's revised program basis document and NERs and concludes that the scope of cables in the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program is acceptable.

As documented in the Audit and Review Report, the staff also requested that the applicant verify tests performed by procedures including the entire loop (cables and connections) credited in the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program basis document. The applicant responded that the credited procedure steps listed in its program basis document (GALL Report program element "acceptance criteria") were reviewed to ensure that all cables and connections of the system were tested. The applicant verified for each procedure credited that all cables and connections within the scope of GALL AMP XI.E2 are tested. The staff found the applicant's response acceptable.

The staff reviewed those portions of the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program for which the applicant claimed consistency with GALL AMP XI.E2 and found them consistent. The staff found the applicant's Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program acceptable because it conforms to the recommended GALL AMP XI.E2 with enhancements.

In the ALRA, the applicant stated that its Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program is consistent with GALL AMP XI.E2 with enhancements to the GALL Report "detection of aging effects" program element by reviews of calibration or surveillance data for indications of aging degradation affecting instrument circuit performance. The first reviews will be completed prior to the period of extended operation and every ten years thereafter. A review of the calibration and surveillance results can indicate aging effects and aging effects mechanisms by monitoring key parameters and providing instrumentation circuit performance data reviewed at the time of the calibrations and surveillances, thereby providing reasonable assurance that severe aging degradation will be detected prior to loss of the cables' intended function. Where a calibration or surveillance program does not include the cabling system in the testing circuit alternatives like insulation resistance tests or other testing effective in determining cable insulation condition or deterioration of the insulation system will be performed. The first test will be completed prior to the period of extended operation. Test frequency will be based on engineering evaluation but will be at least once every 10 years (NMP1 Commitment 28, NMP2 Commitment 26).

As documented in the Audit and Review Report, the staff concludes that these enhancements will not impact adversely the ability of this AMP to manage the effects of aging as either of the two methods is acceptable to detect aging degradation. Calibration results or surveillance testing program findings are evaluated to detect cable aging degradation. Direct testing of the cable system will be effective in determining the condition of cable insulation. On this basis, the staff found this enhancement acceptable because changes to the applicant's program will provide assurance that the effects of aging will be adequately managed.

Operating Experience. In ALRA Section B2.1.30, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the Non-EQ Electrical Cables Used in Instrumentation Circuits Program. Review of plant-specific operating experience revealed documentation of cable degradation identified through routine calibration testing that is similar to the industry operating experience (e.g., degraded cables for temperature instruments, degraded shielding for drywell instrument cables).

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff concludes that there is reasonable assurance that the applicant's Non-EQ Electrical Cables Used in Instrumentation Circuits Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.25 and A2.1.25, the applicant provided the respective UFSAR and USAR supplements for the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.23 Bolting Integrity Program

Summary of Technical Information in the Application. In ALRA Section B2.1.36, and as supplemented by letter dated November 17, 2005, the applicant described the Bolting Integrity Program, stating that this is an existing program that is consistent with enhancements and an exception to GALL AMP XI.M18, "Bolting Integrity." The Bolting Integrity Program manages aging effects due to loss of preload, cracking and loss of material from bolting within the scope of license renewal including SR bolting, bolting for NSSS component supports, bolting for other pressure-retaining components, and structural bolting. Program activities include periodic inspections of bolting for indication of loss of preload, cracking and loss of material due to corrosion, etc. This program is based on the guidelines delineated in NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," and the guidance contained in EPRI NP-5769, "Degradation and Failure of Bolting in Nuclear Power Plants," with exceptions noted in NUREG-1339 for safety-related bolting and EPRI TR-104213, "Bolted Joint Maintenance and Applications Guide," for other bolting. The Bolting Integrity Program is implemented through the ASME Section XI ISI (Subsection IWB, IWC, IWD) Program, ASME Section XI Inservice Inspection (Subsection IWE) Program, ASME Section XI

Inservice Inspection (Subsection IWF) Program, Structures Monitoring Program, Preventive Maintenance Program, and Systems Walkdown Program.

Staff Evaluation. In ALRA Section B.2.1.36, "Bolting Integrity Program," and by letter dated November 17, 2005, the applicant described its AMP to manage effects of aging in bolting. The applicant states that this AMP when enhanced will be consistent with GALL AMP XI.M18 with an exception.

As stated in ALRA Section B2.1.36, enhancements to the Bolting Integrity Program include establishing an augmented inspection program for high-strength bolts in nuclear steam supply system (NSSS) supports and revisions to activities credited for license renewal.

> Program Elements Affected - Documents will be prepared or revised to address the following elements:
>
> Scope of Program - The Structures Monitoring, Preventive Maintenance, and Systems Walkdown Programs will be enhanced to include requirements to inspect bolting for loss of preload, cracking, and loss of material, as applicable. References to the bolting integrity program and industry guidance will be included in NMP administrative and implementing program documents.
>
> Detection of Aging Effects - An augmented inspection program for high-strength (actual yield strength $\geq$ 150 ksi) bolts will be established to prescribe the examination requirements of Tables IWB-2500-1 and IWC-2500-1 of ASME Section XI for high-strength bolts in the Class 1 and Class 2 component supports, respectively.

The applicant stated that the enhancements will be completed prior to the period of extended operation (NMP1 Commitment 33 and NMP2 Commitment 31).

As stated in the applicant's letter dated November 17, 2005, an exception to GALL Report Section XI.M18, "Bolting Integrity," was added for its reference to the 1995 Edition-1996 Addenda of the ASME Code.

The program described in GALL AMP XI.M18 under "detection of aging effects" cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda. The code of record for NMP1 and NMP2 is the 1989 Code with no addenda; this is an exception to the GALL Report.

For SR bolting the applicant relies on the NRC recommendations and guidelines of NUREG-1339 and industry's technical basis for material selection and testing, bolting preload control, ISI, plant operation and maintenance, and evaluation of structural integrity of bolted joints outlined in EPRI NP-5769 with the exceptions noted in NUREG-1339. This guidance is consistent with GALL AMP XI.M18 and the staff found it acceptable.

With regard to other bolting the applicant states that it will comply with the aging management attributes of EPRI TR-104213. The staff found that for other bolting the applicant's Bolting Integrity Program will be consistent with the recommendations in the GALL Report and will meet the standards of EPRI TR-104213 with the inclusion of enhancements.

The first enhancement to the Bolting Integrity Program is that the applicant will establish an augmented inspection program for high-strength (actual yield strength $\geq$ 150 ksi) bolts. The staff noted that this augmented program will prescribe the examination requirements of Tables IWB-2500-1 and IWC-2500-1 of ASME Section XI for high-strength bolts in the Class 1 and Class 2 component supports, respectively. The second enhancement is that the Structures Monitoring, Preventive Maintenance and Systems Walkdown Programs will be enhanced to include requirements to inspect bolting for loss of preload, cracking, and loss of material. The last enhancement is that references to the Bolting Integrity Program and industry guidance will be included in NMPNS program documents. The staff noted that the existing Bolting Integrity Program with these enhancements will be consistent with GALL AMP X1.M18.

Previously the staff has accepted the use of periodic ISI of closure bolting as an acceptable AMP for loss of mechanical closure integrity as failure of the mechanical joint indicated by leakage can be attributed to loss of material, cracking of bolting materials, or loss of preload. The staff determined that periodic ASME Section XI ISI and plant preventive maintenance programs as described in NUREG-1339 and EPRI NP-5769 can be relied upon effectively to detect loss of closure integrity for bolted assemblies. Therefore, the applicant's program for loss of mechanical closure integrity is adequate for managing aging effects of loss of material cracking and loss of preload. The staff finds that the applicant with its enhancements to the Bolting Integrity Program has demonstrated its compliance with all the attributes of GALL AMP XI.M18 for bolting within the scope of license renewal including safety-related bolting, bolting for NSSS component supports, and bolting for other pressure-retaining components.

The applicant in its letter dated November 17, 2005, indicated that an exception had been added to the Bolting Integrity Program. The exception was with respect to the reference to the 1995 Edition-1996 Addenda of the ASME Code in GALL Report Section XI.M18. However, the Code of record for NMP1 and NMP2 is the 1989 Code with no addenda, an exception to the GALL Report. The staff compared the examination requirements of Tables IWB-2500-1 and IWC-2500-1 in the 1995 Edition through the 1996 Addenda against those of the 1989 Edition and found them to be consistent with the exception of the examination requirement for the RV closure head nuts. The staff noted that the examination requirement in the 1989 Code Edition for the RV closure head nuts is more conservative than that required in the 1995 Edition through the 1996 Addenda. Furthermore, the staff noted that the RV closure head nuts will be managed by the applicant's Reactor Head Closure Studs Program (ALRA Section B2.1.3), which is assessed in SER Section 3.0.3.2.3. Therefore, the staff finds the applicant's Bolting Integrity Program with the enhancements and exception acceptable. The staff concludes that by implementing the Bolting Integrity Program, which is consistent with the GALL Report with an exception, the aging effects on the bolting within the scope of license renewal including SR bolting, bolting for NSSS component supports, and bolting for other pressure-retaining components, will be adequately managed for the extended period of operation.

Operating Experience. In ALRA Section B2.1.36, the applicant indicated that it has reviewed both industry and plant-specific operating experience related to the Bolting Integrity Program and is aware of the types of bolting issues that have been reported and documented in the industry. The applicant also indicated that the lessons learned from industry experiences have been incorporated into the NMPNS bolting practices such that this program has adequately detected bolting integrity issues and has been effective in correcting issues prior to the loss of intended function. This program is adjusted continually to account for industry experience and research. The applicant also indicated that with additional operating experience lessons learned will be used to adjust the Bolting Integrity Program as needed.

The applicant stated that the Bolting Integrity Program has been effective in managing the aging effects of bolting within the scope of license renewal including SR bolting, bolting for NSSS component supports, and bolting for other pressure-retaining components.

UFSAR and USAR Supplements. In ALRA Sections A1.1.38 and A2.1.37, the applicant provided the respective UFSAR and USAR supplements for the Bolting Integrity Program. The staff reviewed the following UFSAR and USAR supplement summary description for the Bolting Integrity Program:

> The Bolting Integrity Program manages aging effects due to loss of preload, cracking and loss of material of bolting within the scope of license renewal including safety-related bolting, bolting for NSSS component supports, bolting for other pressure retaining components, and structural bolting. Program activities include periodic inspections of bolting for indication of loss of preload, cracking and loss of material due to corrosion, rust, etc.

This program is based on the guidelines of NUREG-1339 and the guidance of EPRI NP-5769 with exceptions noted in NUREG-1339 for safety-related bolting and EPRI TR-104213 for other bolting.

> The Bolting Integrity Program is implemented through the ASME Section XI inservice Inspection (Subsections IWB, IWC, IWD) Program, ASME Section XI Inservice Inspection (Subsection IWE) Program, ASME Section XI Inservice Inspection (Subsection IWF) Program, Structures Monitoring Program, Preventive Maintenance Program, and Systems Walkdown Program.

Enhancements to the Bolting Integrity Program include:

> Establish an augmented inspection program for high-strength (actual yield strength $\geq$ 150 ksi) bolts. This augmented program will prescribe the examination requirements of Tables IWB-2500-1 and IWC-2500-1 of ASME Section XI for high-strength bolts in the Class 1 and Class 2 component supports, respectively.
>
> The Structures Monitoring, Preventive Maintenance and Systems Walkdown Programs will be enhanced to include requirements to inspect bolting for indication of loss of preload, cracking and loss of material, as applicable.
>
> Include in NMP administrative and implementing program documents references to the Bolting Integrity Program and industry guidance.
>
> Enhancements will be completed prior to the period of extended operation.

The applicant stated that the exception to the NMP1 and NMP2 Bolting Integrity Program includes:

> Add an exception to GALL Report Program XI.M18 for its reference to the 95-96 Addenda of the ASME Code.

The applicant's UFSAR and USAR supplement summary descriptions for the Bolting Integrity Program appropriately describe the implementation of relevant programs that would enable the applicant to manage effectively the aging effect due to loss of material, cracking, and loss of preload of the bolts at the NMPNS units for the extended period of operation.

Conclusion. On the basis of its review and audit of the applicant's Bolting Integrity Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.24 BWR Control Rod Drive Return Line (CRDRL) Nozzle Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.37, the applicant described the BWR Control Rod Drive Return Line (CRDRL) Nozzle Program, stating that this is an existing program that is consistent, with exceptions, with GALL AMP XI.M6, "BWR Control Rod Drive Return Line Nozzle." The NMP1 CRDRL Nozzle is examined according to ASME Code, Section XI, program which satisfies the requirements in GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD." This program is updated in accordance with 10 CFR 50.55(a). Augmented examinations incorporated into the ISI program plan that implemented the requirements of NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," November 1980, have been superseded by ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems" (1995 Edition with the 1996 Addenda). NMP2 cut and capped the CRD return nozzle prior to commercial operation. The capped NMP2 CRD return nozzle was therefore not subject to the augmented examination requirements described in NUREG-0619. The NMP2 CRDRL Nozzle Program is implemented through ASME Section XI, Subsection IWB, Table IWB 2500-1 (1989 edition no addenda) and ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems" (1995 Edition with the 1996 Addenda).

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exceptions and the associated justifications to determine whether the AMP, with the exceptions, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the BWR CRDRL Nozzle Program for which the applicant claimed consistency with GALL AMP XI.M6 and found them consistent. The staff found the applicant's BWR CRDRL Program acceptable because it conforms to the recommended GALL AMP XI.M6 with exceptions.

In the ALRA, the applicant stated that its BWR CRDRL Nozzle Program is consistent with GALL AMP XI.M6 with an exception to the Program Description in GALL AMP XI.M6 involving the ASME Code edition used as the basis for the Section XI requirements. GALL AMP XI.M6 identifies the 1995 Edition (including the 1996 Addenda) of ASME Section XI as the basis for the GALL CRDRL Nozzle Program. The NMP ISI Program will not comply with the edition and addenda of ASME Section XI cited in the GALL Report because the program is updated to the latest edition and addenda of ASME Section XI as mandated by 10 CFR 50.55a prior to the start of each inspection interval. The acceptability of the NMP1 CRDRL Nozzle Program in meeting the augmented inspection requirements established in NUREG-0619 is documented in NRC Safety Evaluation Report dated February 5, 1999.

In the ALRA, the applicant stated that the exceptions were found acceptable in the February 5, 1999, NRC Safety Evaluation Report. As mandated by 10 CFR 50.55a, UT examinations are performed according to the ASME Section XI Appendix VIII 1995 Edition with the 1996 Addenda. As documented in the Audit and Review Report, the staff also noted that the applicant's ASME code of record for ASME Section XI ISI (Subsections IWB, IWC, and IWD) is valid for a 10-year inspection interval under the CLB. At present an ASME Section XI ISI (Subsection IWB, IWC, and IWD) program is approved for use on an ASME Code 10-year ISI interval-specific basis. However, the applicant will have to request 12 months prior to each interval approval to use the ASME Section XI ISI (Subsection IWB, IWC, and IWD) Program for the specific intervals during the period of extended operation under 10 CFR 50.55a,. Therefore, the staff determined that the ASME Section XI Code Edition as referenced in 10 CFR 50.55a in effect 12 months prior to each inspection interval is acceptable for the period of extended operation and the staff found this exception acceptable.

In addition in the ALRA, the applicant stated that it takes exceptions to the GALL Report "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements. The three exceptions to GALL AMP XI.M6 are (1) the NMP ISI Program does not comply with the specified edition and addenda of ASME Section XI cited in the GALL Report because the program is updated to the latest edition and addenda of ASME Section XI as mandated by 10 CFR 50.55a prior to the start of each inspection interval, (2) the NMP program uses enhanced UT inspection techniques instead of PT inspections to satisfy the recommendations of NUREG-0619 (now superseded by Appendix VIII to ASME Section XI, Division 1, 1995 Edition with the 1996 Addenda), and (3) the NMP program uses an inspection frequency of every 10 years versus every sixth refueling outage or 90 startup/shutdown cycles specified in NUREG-0619.

In the ALRA, the applicant stated that it has evaluated each of these exceptions and determined that its CRDRL Nozzle Program adequately manages the effects of aging on the CRDRL. The applicant evaluated each of these exceptions and determined that its CRDRL Nozzle Program is consistent with GALL AMP XI.M6. After review of operating experience for the applicant's BWR CRDRL Nozzle Program, the staff found this exception acceptable.

Operating Experience. In ALRA Section B2.1.37, the applicant explained that UT examinations of the Unit 1 CRDRL nozzle performed during refueling outages using automated test equipment qualified according to Appendix VIII to ASME Section XI, Division 1, 1995 Edition with the 1996 Addenda, found no indications. The UT examination using automated test equipment has been demonstrated to be capable of reliably detecting flaws greater than or equal to a 0.25 inch depth. No industry experience was identified that indicates that existing programs and practices will not be effective in the timely identification of CRDRL nozzle cracking.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel, the staff concludes that there is reasonable assurance that the applicant's BWR CRDRL Nozzle Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR Supplement. In ALRA Section A1.1.39, the applicant provided the UFSAR supplement for the BWR CRDRL Nozzle Program. The staff reviewed this section and determined that the information in the supplement provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's BWR CRDRL Nozzle Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.25 Protective Coating Monitoring and Maintenance Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.38, the applicant described the Protective Coating Monitoring and Maintenance Program, stating that this is an existing program that is consistent, with exceptions and enhancements, with GALL AMP XI.S8, "Protective Coating Monitoring and Maintenance Program." The Protective Coating Monitoring and Maintenance Program is described in the NMP1 and NMP2 responses to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-Of-Coolant Accident because of Construction and Protective Coating Deficiencies and Foreign Material in Containment." The program was developed according to ANSI N101.4-1972 referenced in RG 1.54, June 1973, along with ANSI/ASME NQA-1-1983. The NMP program is a "comparable program" as described in GALL, Chapter XI, Program XI.S8, Protective Coating Monitoring and Maintenance Program, which is an acceptable AMP for license renewal. The program applies to Service Level 1 protective coatings inside the NMP1 primary containment and items within the torus [outside surface of the vent (ring) header and downcomer, inside surface of the vent piping, ring header, vent header junctions, and downcomers] and the NMP2 primary containment. The NMP2 suppression pool (wetwell) is not included because it is primarily stainless steel and does not have Service Level 1 coatings. Coating conditions monitored by this program include blistering, cracking, peeling, loose rust, and physical/mechanical damage. When localized degradation of a coating is identified, the affected area is evaluated by engineering and is scheduled for repair, replacement, or removal, as needed. The condition assessments and resulting repair, replacement, or removal activities ensure that the amount of coatings subject to detachment from the substrate during a loss of coolant accident (LOCA) is minimized to ensure post-accident operability of the emergency core cooling system (ECCS) suction strainers.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the exceptions and enhancements and the associated justifications to determine whether the AMP, with the exceptions and enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the Protective Coating Monitoring and Maintenance Program for which the applicant claimed consistency with GALL AMP XI.S8 and found them consistent. The staff found the applicant's Protective Coating Monitoring and Maintenance Program acceptable because it conforms to the recommended GALL AMP XI.S8, "Protective Coating Monitoring and Maintenance Program," with exceptions and enhancements.

In the ALRA, the applicant stated that its Protective Coating Monitoring and Maintenance Program is consistent with GALL AMP XI.S8 with an exception to the GALL Report "preventive actions" and "operating experience" program elements. The Protective Coating Monitoring and Maintenance Program is not credited in the ALRA for the prevention of corrosion of carbon steel components in the containment; however, the program monitors for rust not intact as a potential debris source for ECCS suction strainers. Therefore, as documented in the Audit and Review Report, the applicant stated that operating experience pertaining to only the degradation of coatings and their potential clogging of the ECCS strainers is relevant to license renewal.

The staff found this exception acceptable because the applicant's Protective Coating Monitoring and Maintenance Program indeed is not credited in the amended license renewal application for the prevention of corrosion of carbon steel components in the NMP1 or NMP2 containment. Other NMP AMPs are credited in the ALRA for the detection of loss of material by corrosion of carbon steel components in the NMP1 or NMP2 containment. The applicant's Protective Coating Monitoring and Maintenance Program is credited in the ALRA only for ensuring that the amount of coatings subject to detachment from the substrate during a LOCA is minimized for post-accident operability of the ECCS suction strainers.

The applicant also stated in the ALRA that it takes exceptions to the GALL Report "parameters monitored/inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements. The Protective Coating Monitoring and Maintenance Program will be enhanced following the guidance within ASTM D 5163-05a, "Standard Guide for Establishing

Procedures to Monitor the Performance of Coating Service Level 1 Coatings Systems in an Operating Nuclear Power Plant," instead of ASTM D 5163-96 as specified in GALL AMP XI.S8.

In the ALRA, the applicant stated that the use of the guidance from ASTM D 5163-05a instead of ASTM D 5163-96 is acceptable because ASTM D 5163-05a is the most recently issued standard and incorporates the latest industry guidance on protective coatings. In addition, as documented in the Audit and Review Report, the applicant stated that ASTM D 5163-05a will be utilized because this consensus standard was revised to correct previous errors embedded within the qualification standards. The newer standard provides guidance on the qualification of the individual(s) performing the actual coatings condition assessment while the GALL Report-referenced standard is silent on that qualification. The older standard recommends that inspectors and inspection coordinators be Level II Coatings Inspectors. This is an inappropriate recommendation for the inspection coordinator since the Level II inspector qualification requirement is invoked only for those enforcing compliance with 10 CFR 50 Appendix B Criterion IX (Special Processes) by coating film thickness readings (required when performing qualitative follow-up inspections) and inspections while restoring a coating system but not by condition assessments which the coordinator facilitates.

The staff found this exception acceptable because other than the improvement changes between ASTM D 5163-05a and ASTM D 5163-96 discussed by the applicant the documents are essentially the same. A terminology paragraph has been added to ASTM D 5163-05a which shifts the paragraph numbering scheme by one. The element referenced in GALL AMP XI.S8 to the paragraph numbers in ASTM D 5163-96 would have a different paragraph number referenced in ASTM D 5163-05a but there is little or no change to the content of the ASTM standard.

The applicant also stated In the ALRA that it takes exception to the GALL Report "acceptance criteria" program element. The Protective Coating Monitoring and Maintenance Program will vary the guidance of ASTM D 5163-05a paragraphs 10.2.2 and 10.2.3 on the measurement of cracks and peeling coating. Rather, the applicant will use visual methods to estimate the size of any defective areas. Once an area with cracks, peeling, or delaminated coating has been detected visual estimation will quantify the surface area. Conservative estimates will be made using known structural dimensions. This technique is acceptable for the purposes of quantifying the total amount of degraded coatings.

The staff found the applicant's explanation for the exceptions acceptable in that taking definitive measurements of cracking, peeling, or delaminated coatings in the NMP1 and NMP2 containments is an unnecessary burden which adds no value. Once a coatings area has been identified as degraded an experienced coatings person can use visual estimation techniques to quantify the square footage. Conservative estimates of the size of these areas will result in a conservative total amount of degraded coatings that then can be compared to the total amount of permitted degraded coatings to ensure post-accident operability of the ECCS suction strainers. Conservative estimates of the amount of degraded coatings ensure actual margin for ECCS suction strainer operability. Should the conservative estimate of degraded coatings exceed the permitted amount more definitive measurements then could be taken or coating repairs immediately undertaken.

No credit for coatings is taken in the prevention of corrosion; therefore, ASTM D 5163-96 is used instead of ASTM D 5163-05a because of improvement changes, and visual estimation techniques are conservative. The staff's review of operating experience for the applicant's Protective Coating Monitoring and Maintenance Program found these exceptions to be acceptable.

In the ALRA, the applicant stated that its Protective Coating Monitoring and Maintenance Program is consistent with GALL AMP XI.S8 with an enhancement to meet the GALL Report "parameters monitored/inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements. Program administrative controls will be enhanced to incorporate specific details consistent with requirements in ASTM D 5163-05a (NMP1 Commitment 34, NMP2 Commitment 32).

In the ALRA, the applicant stated that its Protective Coating Monitoring and Maintenance Program administrative controls will be enhanced to specify the visual examination of coated surfaces for any visible defects including blistering, cracking, flaking, peeling, and physical or mechanical damage. Also program administrative controls will be enhanced to (1) inspect coatings every refueling outage versus every 24 months, (2) set minimum qualifications for inspection personnel, inspection coordinators, and inspection results evaluators, (3) perform thorough visual inspections in areas noted as deficient concurrently with general visual inspections, and (4) specify the types of instruments and equipment that may be used for inspections. In addition program administrative controls will be enhanced to require (1) reviews of the previous two monitoring reports before the condition assessment and (2) guidelines for prioritization of repair areas to be monitored until they are repaired. Finally, program administrative controls will be enhanced to require inspection results evaluators to determine which areas are unacceptable and to initiate corrective action.

The staff determined that enhancement of the administrative controls for the applicant's Protective Coating Monitoring and Maintenance Program is consistent with the specific GALL Report referenced recommendations of ASTM D 5163-96 (now ASTM D 5163-05a after exception) and will ensure the amount of Service Level 1 coatings inside the NMP1 primary containment and on surfaces within the torus (outside surface of the vent (ring) header and downcomer, inside surface of the vent piping, ring header, vent header junctions, and downcomers) and inside the NMP2 primary containment subject to detachment from the substrate during a LOCA is minimized for post-accident operability of the ECCS suction strainers. In addition the staff determined that by revising the program administrative controls for these specific items the program will be consistent with the recommendations in GALL AMP XI.S8 considering the exception to the use of the 1996 Edition of ASTM D 5163. Because adding these specific administrative controls will make the applicant's program consistent with GALL AMP XI.S8 the staff found this enhancement acceptable. These changes to the applicant's program will provide assurance that the effects of aging will be adequately managed.

Operating Experience. In ALRA Section B2.1.38, the applicant explained that the Protective Coating Monitoring and Maintenance Program is not credited in the ALRA for prevention of corrosion of carbon steel. NMP has implemented a Protective Coating Monitoring and Maintenance Program consistent with the response to GL 98-04. The response to GL 98-04 described program attributes, including design and licensing basis, procurement, control of coating application, quality assurance, monitoring, and maintenance of Service Level 1 coatings. Industry operating experience events pertaining to Service Level 1 coatings are evaluated for applicability to NMP. If determined to be applicable, these events are entered into the site CAP for determining any required corrective or preventive actions.

As documented in the Audit and Review Report, the staff also reviewed the summary of specific operating experience. The staff determined that the applicant's Protective Coating Monitoring and Maintenance Program has been effective in detecting degraded coatings at various areas within the NMP1 and NMP2 primary containments during refueling outages. To find some areas of degraded coatings in containments during refueling outages is typical of industry experience. Once the degraded coating areas were detected the applicant's CAP then either removed the degraded coatings, repaired the degraded coatings, or deferred repair while maintaining the total below the permitted amount subject to detachment from the substrate during a LOCA to ensure post-accident operability of the ECCS suction strainers.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff concludes that there is reasonable assurance that the applicant's Protective Coating Monitoring and Maintenance Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

<u>UFSAR and USAR Supplements</u>. In ALRA Sections A1.1.40 and A2.1.38, the applicant provided the respective UFSAR and USAR supplements for the Protective Coating Monitoring and Maintenance Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

<u>Conclusion</u>. On the basis of its review and audit of the applicant's Protective Coating Monitoring and Maintenance Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition the staff reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions, is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.26 Fatigue Monitoring Program

<u>Summary of Technical Information in the Amended Application</u>. In ALRA Section B3.2, the applicant described the Fatigue Monitoring Program, stating that this is an existing program that is consistent, with enhancements, with GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary." The Fatigue Monitoring Program (FMP) manages the fatigue life of reactor

coolant pressure boundary components by tracking and evaluating key plant events. Events were selected based upon plant-specific evaluations of the most fatigue-limited locations for critical components, including those discussed in NUREG/CR-6260. The FMP monitors operating transients to-date, calculates cumulative usage factors to-date, and directs performance of engineering evaluations to develop preventive and mitigative measures in order not to exceed the design limit on fatigue usage. The effects of reactor coolant environment will be considered through the evaluation of, as a minimum, those components selected in NUREG/CR-6260 using the appropriate environmental fatigue factors. The FMP provides an analytical basis for confirming that the number of cycles established by the analysis of record will not be exceeded before the end of the period of extended operation. In order to determine cumulative usage factors (CUFs) more accurately, the FMP will implement FatiguePro fatigue monitoring software.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the Audit and Review Report. The staff reviewed the enhancements and the associated justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed those portions of the FMP for which the applicant claimed consistency with GALL AMP X.M1 and found them consistent. The staff found the applicant's Fatigue Monitoring Program acceptable because it conforms to the recommended GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary," with enhancements.

In the ALRA, the applicant stated that FMP is consistent with GALL AMP X.M1 with enhancements. As stated In the ALRA, the enhancement in meeting the GALL Report "preventive actions" program element revises applicable existing procedures to ensure that the procedures address the following:

> The FMP will be enhanced with guidance for the use of the FatiguePro software package and updated methodology for environmental fatigue factors in establishing updated fatigue life calculations for components.
> ((NMP1 Commitment 5, NMP2 Commitment 4)

In the ALRA, the applicant stated that the FMP will provide guidance for the use of FatiguePro and methodology for calculation of environmental fatigue factors.

As documented in the Audit and Review Report, the staff evaluated the applicant's existing FMP and noted that it had identified correctly the need for more sophisticated methods to determine adequate margin to fatigue limits. Improved calculation of environmental fatigue factors is also necessary. The staff determined that the use of FatiguePro is an appropriate method to improve monitoring and, taken together with improved methodology for calculation of environmental fatigue factors, will provide assurance that fatigue damage will be adequately managed and found this enhancement acceptable. These changes to the applicant's program will provide assurance that the effects of aging will be adequately managed.

In addition in the ALRA, the applicant stated that enhancements in meeting the GALL Report "parameters monitored/inspected" program element revises procedures to address the following:

Safety relief valve actuations will be added to the list of key plant events (transients) that are monitored for NMP1 (NMP1 Commitment 11).

For the critical reactor vessel component locations, shown in Table 4.3-3 (NMP1) and Table 4.3-4 (NMP2) of the ALRA, additional usage will be added to the baseline CUF using one of the methods described in ALRA Section 4.3. (NMP Commitment 6 and NMP2 Commitment 5)

Transients contributing to fatigue usage of the feedwater system nozzles will be tracked by the FMP with additional usage added to the baseline CUF using the stress based fatigue described in ALRA Section 4.3. (NMP Commitment 7 and NMP2 Commitment 7)

Develop a baseline CUF for the specified portions of the following systems: (1) feedwater/high pressure coolant injection, (2) core spray, (3) reactor water cleanup (piping inside the reactor coolant pressure boundary), and (4) reactor recirculation (and associated shutdown cooling systems lines). If the baseline CUF for a specified portion of a system exceeds 0.4, the limiting locations may require additional monitoring to demonstrate compliance over the period of extended operation. (NMP Commitment 8)

Assess the impact of the reactor coolant environment on a sample of critical component locations, including locations equivalent to those identified in NUREG/CR-6260, as part of the FMP. These locations will be evaluated by applying environmental correction factors to existing and future fatigue analyses. (NMP1 Commitment 9 and NMP2 Commitment 10)

The FMP will track transients specific to the emergency cooling system with additional usage added to the baseline CUF for the emergency condensers as described in ALRA 4.3 (NMP1 Commitment 10)

Enhance the FMP to (1) ensure that fatigue usage of the torus attached piping and other torus locations does not exceed the design limits, add electromatic relief valve lifts as a transient to be counted by the FMP and (2) add the two highest usage torus attached piping locations, the 12-inch core spray suction line fo core spray pump 111 that enters the torus at penetration XS-337 and the 3-inch containment spray line that enters the torus at penetration XS-326 as fatigue monitoring locations. (NMP1 Commitment 11)

For the bounding locations for ASME Class 1 systems, transients contributing to fatigue usage will be tracked by the FMP with additional usage added to the baseline CUF using the design cycle based fatigue method described in ALRA Section 4.3. If a bounding location with a current CUF value less than or equal to 0.1 could have its CUR value exceed 0.1 before the end of the period of extended operation, then the impact on the original break postulation calculations will be assessed. (NMP2 Commitment 6)

If fatigue monitoring of ASME Class 1 piping (described in ALRA Section 4.3.2) indicates higher fatigue usage than expected, non-ASME Class piping will be evaluated for possible fatigue concerns. (NMP2 Commitment 8)

Revise or evaluate the CUF evaluations for the shroud, core support plate and studs, and jet pumps to remove conservatism and/or encompass the period of extended operation (e.g., a more extensive fatigue analysis of the jet pumps will be performed). (NMP2 Commitment 9)

For penetrations listed in ALRA Table 4.6-4, transients contributing to fatigue usage will be tracked by the FMP with additional usage added to the baseline CUF using the cycle based fatigue method described in ALRA Section 4.3. (NMP2 Commitment 11)

In the ALRA, the applicant stated that safety relief valve actuations will be added to the list of key plant events monitored for NMP1. (Such actuations are already monitored for NMP2). The acceptability of this enhancement is discussed by the staff in SER Section 4 in the evaluation of RAI 4.6.2-1.

The staff reviewed the rest of enhancements to the "parameters monitored/inspected" program elements of the GALL Report. Based on the review, the staff found that the additional enhancements adequately monitors all plant transients that cause cyclic strains, which could contribute to the fatigue usage factor. Therefore, the staff found these enhancements acceptable.

Operating Experience. In ALRA Section B3.2, the applicant explained that it has reviewed both industry and plant-specific operating experience relating to the FMP. In instances where the potential existed to exceed CUFs before the end of plant life, the engineering analyses showed that actual margins were larger than initially estimated. A result of these fatigue evaluations was the recognition that the FMP could benefit from the use of analytical fatigue software such as FatiguePro. CRs written in 2003 identified opportunities for programmatic improvement. This led to the establishment of a comprehensive FMP document, additional reviews of cycle records with an emphasis on NMP1, and a proposal for the implementation of fatigue analysis software.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel. At NMP there are components at or near the limit of the allowed cycle count established under the original TLAA. Evaluations confirm that for all locations, even the most limiting, significant margin remains below a CUF=1.0 and the proposed program will enable the applicant to keep within that limit.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel, the staff concludes that there is reasonable assurance that the applicant's Fatigue Monitoring Program will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

UFSAR and USAR Supplements. In ALRA Sections A1.1.16 and A2.1.16, the applicant provided the respective UFSAR and USAR supplements for the Fatigue Monitoring Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Fatigue Monitoring Program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.27 Non-EQ Inaccessible Medium Voltage Cables Program (NMP2 Only)

Summary of Technical Information in the Amended Application: In the NMP ALRA Appendix B, the applicant deleted Section B2.1.31, "Non-EQ Inaccessible Medium Voltage Cables Program," which was submitted in the original LRA. In ALRA Table 3.6.1, "Summary of Aging Management Program for the Electrical and I&C Systems Components Evaluated In Chapter VI of NUREG-1801," the applicant stated that NMP1 has no inaccessible medium-voltage cables within scope of license renewal. It also stated that NMP2 has no inaccessible medium-voltage cables within the scope of license renewal, meeting the GALL Report program criteria requiring aging management.

Staff Evaluation: During its AMP and AM audits (weeks of September 19 and October 24, 2005) at NMPNS the staff reviewed engineering report NER-2E-032, "Identification of NMP2 Non-EQ Inaccessible Medium Voltage Cables in the Scope of the License Renewal Program," and found at least one underground cable within the scope of license renewal requiring an AMP. Upon this finding the staff requested the applicant whether there are other medium voltage cables (e.g., 2kV to 35 kV) within the scope of license renewal for both NMP1 and NMP2 energized greater than 25 percent of the time and located underground. The staff also requested that the applicant specifically address in its response such cable installed for plant service water systems. In its letter dated December 1, 2005, the applicant stated that NMP1 has no inaccessible medium-voltage cables within the scope of license renewal exposed to significant moisture simultaneously with significant voltage. The only medium-voltage cables at NMP1 installed underground and energized greater 25 percent of the time are used to power systems not within the scope of license renewal or to power equipment not related to any plant systems. The applicant stated that the normal service water system pump motors are powered via medium-voltage cables routed in cable trays, wall sleeves, or conduit installed inside the NMP1 turbine building and screen house, not underground. The emergency service water system pump motors are powered via low-voltage (<2kV) cables and, therefore, these cables are not within the scope of the GALL XI.E3 program.

For NMP2 the applicant stated that it has inaccessible medium-voltage cables within the scope of license renewal as these cables are exposed to significant moisture simultaneously with significant voltage when energized. The applicant identified 18 NMP2 cables (including service water pump cables) within the scope of license renewal and thus requiring an AMP to manage aging effects. The service water system pump motors are powered via medium-voltage cables from the safety-related 4.16 kV switchgears. These cables are routed underground in duct lines. Because these cables are installed underground and the service water system pump motors are energized greater than 25 percent of the time these cables require aging management and thus are in the scope of the GALL XI.E3 program. In this letter the applicant also stated that it will revise NER-2E-032 to identify medium-voltage cables requiring aging management, develop an AMP and the plant-specific database for the GALL AMP XI.E3, and revise the ALRA to incorporate GALL AMP XI.E3. The staff found the applicant's response acceptable.

The applicant further stated in its letter dated December 1, 2005, that the Non-EQ Inaccessible Medium Voltage Cables Program is credited with managing aging effects through periodic maintenance activities that minimize or prevent the exposure of in-scope cables to significant moisture or standing water. An adverse variation in environment would be significant if it could increase the rate of aging of a component appreciably or have an immediate adverse effect on operability. In this aging management program, periodic actions such as inspecting for water collection in cable manholes, are taken to prevent cables from being exposed to significant moisture. Additionally, in-scope medium-voltage cables exposed to significant moisture and significant voltage are tested for the condition of the conductor insulation. The specific type of test would be power factor, partial discharge, or other testing both state of the art and consistent with the latest industry guidance for detecting deterioration of the insulation system due to wetting as described in EPRI TR-103834-P1-2. This program considers the technical information and guidance of NUREG/CR-5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619.

In the ALRA Section B2.1.30 the applicant stated that the Non-EQ Inaccessible Medium-Voltage Cables Program will be consistent with GALL AMP XI.E3 and the most recent industry and regulatory precedence after enhancements are incorporated.

The specific testing for the in-scope medium-voltage cables associated with motors was detailed in procedure S-EPM-MPM-V080. Currently credited methods include polarization index and hi-pot testing. The specific testing associated with the cables supplying the auxiliary transformers will be detailed in an enhancement to procedure S-EPM-GEN-700. The staff reviewed procedure S-EPM-MPM-V080 and in discussion with the applicant the staff expressed a concern that hi-pot testing may affect the life of medium-voltage cables adversely. In response to the staff's concern in the letter dated December 1, 2005, the applicant stated that it will develop a new testing procedure specific to those cables requiring aging management under this program. The specific type of test will be a proven test for detecting deterioration of the insulation system as described in EPRI TR-103834-P1-2, power factor, partial discharge, or other testing state of the art and consistent with the latest industry guidance at the time the test is performed.

The applicant also made the following commitment:

NMP2 Commitment 38:

Enhance the Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program as follows: (1) Expand the scope of the existing procedure to provide for manhole inspections and water removal, (2) develop a new testing procedure specific to those cables requiring aging management under this program. The specific type of test performed will be a proven test for detecting deterioration of the insulation system due to wetting as described in EPRI TR-103834-P1-2, such as power factor, partial discharge, or other testing that is both state of the art and consistent with the latest industry guidance at the time the test is performed, (3) establish requirement to test cables subject to aging management prior to, and every 10 years during the period of extended operation, and (4) establish maintenance requirement to inspect and remove water, as necessary, from manholes serving cables subject to aging management. The inspection frequency will be based upon actual plant experience with water accumulation in the manhole, but in any event, will be at least once every two years. The first inspection will be completed prior to the period of extended operation.

The staff found the applicant's response and commitment acceptable because the testing methods, preventive actions taken, and the testing frequency are consistent with the updated GALL AMP XI.E3.

For the program elements of the Non-EQ Inaccessible Medium-Voltage Cables Program stated by the applicant to be consistent with GALL AMP XI.E3 the staff determined that these conform to the corresponding GALL AMP XI.E3 program elements and acceptance criteria.

The applicant stated in December 1, 2005, letter that four enhancements to GALL Report AMP XI.E3 program description, "parameters monitored/inspected," "preventive actions," and "detection of aging effects" program elements will be implemented: Expand the scope of the existing manhole inspection procedure to include cables within the scope of the program. Develop a new testing procedure specific to cables requiring aging management under this program. The specific type of test performed will be power factor, partial discharge, or other testing state of the art at the time the test is performed and consistent with the latest industry guidance for detecting deterioration of the insulation system as described in EPRI TR-103834-P1-2. Establish maintenance requirements to test cables subject to aging management prior to and every 10 years during the period of extended operation. Establish a maintenance requirement to inspect for and remove water as necessary from manholes serving cables subject to aging management. The inspection frequency will be based on actual plant experience with water accumulation in the manhole but in any event will be at least once every two years. The first inspection will be completed prior to period of extended operation.

The staff found the enhancements stated by the applicant acceptable because they will not adversely impact the ability of this AMP to manage the affects of aging. Periodic actions as inspecting for water collection in cable manholes and draining water as needed are taken to prevent cable exposure to significant moisture. These preventive actions are not sufficient to assure that water is not trapped elsewhere in the raceways. In addition in-scope, medium voltage cables exposed to significant moisture and significant voltage are tested for the condition of the conductor insulation. The specific type of test will be power factor, partial discharge, and polarization index as described in EPRI TR-103834-P1-2, or other state of the art proven test for detecting deterioration of the insulation system due to wetting. For these reasons the staff found the enhancements acceptable.

Operating Experience. The applicant stated in ALRA Section B2.1.31 that NMPNS has reviewed both industry and plant-specific operating experience relating to the Non-EQ Inaccessible Medium Voltage Cables Program. Although infrequent there have been some failures of medium voltage cables at other plants due to moisture intrusion. There have been no such events at NMP2 but industry studies suggest that a regular cable testing program can detect degradation of non-EQ inaccessible medium voltage cables before there is an insulation failure.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of the above operating experience and on discussions with the applicant's technical personnel the staff concludes that there is reasonable assurance that the applicant's Non-EQ

Inaccessible Medium-Voltage Cables Program adequately manage the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

USAR Supplement. In its letter dated December 1, 2005, the applicant proposed its USAR supplement for the non-EQ inaccessible medium voltage cables program in ALRA Section A2.1.26 for NMP2. The applicant stated that the Non-EQ Inaccessible Medium Voltage Cables Program provides reasonable assurance that the intended function of inaccessible medium-voltage cables not subject to 10 CFR 50.49 environmental qualification requirements and exposed to adverse localized environments caused by moisture while energized will be maintained consistent with the CLB through the period of extended operation. An adverse local environment is a condition in a limited plant area significantly more severe than the specified service environment for the cable. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability. In this aging management program such periodic actions as inspecting for water collection in cable manholes and draining water as needed are taken to prevent cable exposure to significant moisture. Additionally, in-scope medium-voltage cables exposed to significant moisture and significant voltage are tested for the condition of the conductor insulation. The specific type of test performed will be power factor, partial discharge as described in EPRI TR-103834-P1-2, or other state of the art testing at the time the test is performed proven for detecting deterioration of the insulation system due to wetting. The program considered the technical information and guidance provided in applicable industry publications.

Enhancements to the non-EQ inaccessible medium voltage cables program include:

- Expand the scope of the existing procedures to manhole inspection and water removal.
- Develop new testing procedures specific to those cables requiring aging management under this program. The specific type of test will be power factor, partial discharge, or other testing both state of the art and consistent with the latest industry guidance at the time the test is performed proven for detecting deterioration of the insulation system due to wetting as described in EPRI-TR-103834-P1-2.
- Establish maintenance to test cables subject to aging management prior to and every 10 years during the period of extended operation.
- Establish maintenance requirement to inspect for and remove water as necessary from manholes serving cables subject to aging management. The inspection frequency will be based on actual plant experience with water accumulation in the manhole but in any event will be at least once every two years. The first inspection will be completed prior to the period or extended operation.

Enhancements will be implemented prior to entering the period of extended operation.

The staff reviewed these USAR supplements and confirmed that they provide an adequate summary description of the program as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

Conclusion. On the basis of its audit and review of the applicant's Non-EQ Inaccessible Medium-Voltage Cables program the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are indeed consistent. In addition the staff reviewed the enhancements to the GALL Report and confirmed that the implementation of enhancements prior to the period of extended operation would make the AMP consistent with the GALL Report AMP to which it was compared.The staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistently with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3). The staff also reviewed the proposed USAR supplements for this AMP and concludes that they provide an adequate summary description of the program as required by 10 CFR 54.21(d).

3.0.3.3 AMPs That Are Not Consistent with or Not Addressed in the GALL Report

In ALRA Appendix B, the applicant identified that the following AMPs were plant-specific:

- Preventive Maintenance Program
- Systems Walkdown Program
- Non-Segregated Bus Inspection Program
- Fuse Holder Inspection Program
- Non-EQ Electrical Cable Metallic Connections Inspection Program
- Wooden Power Pole Inspection Program (NMP2 Only)
- Torus Corrosion Monitoring Program (NMP1 Only)

For AMPs that are not consistent with or not addressed by the GALL Report, the staff performed a complete review of the AMPs to determine if they were adequate to monitor or manage aging. The staff's review of these plant-specific AMPs is documented in the following sections of this SER.

3.0.3.3.1 Preventive Maintenance Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.32, the applicant described the Preventive Maintenance Program, stating that this is an existing, plant-specific program. The Preventive Maintenance Program consists of the appropriate ten elements described in SRP-LR Appendix A. The Preventive Maintenance Program manages aging effects for SSCs within the scope of licence renewal. The program provides for performance of various maintenance activities on a specified frequency based on vendor recommendation and operating experience.

The key elements of aging management activities in the Preventive Maintenance Program are described. The applicant's evaluations of each key element against the appropriate ten elements defined in SRP-LR Appendix A also are provided.

The Preventive Maintenance Program manages aging effects of SSCs within the scope of license renewal not managed by other AMPs. The scope of the program includes but is not limited to valve bodies, heat exchangers, expansion joints, tanks, ductwork, fan/blower housings, dampers, and pump casings.

Additional details of the program scope are addressed in the basis document for the Preventive Maintenance Program kept onsite. With regard to the "preventive actions" element of the program the applicant stated that although routine maintenance is largely preventive only the condition monitoring aspects of Preventive Maintenance Program activities are credited for license renewal. For example, when a piping system is opened to conduct preventive maintenance on a valve a visual inspection of the valve body or piping may be specified. Such activities do not prevent aging effects but detect degraded conditions that affect the ability of the component to perform its intended function. Consequently, there are no specific preventive actions associated with this program.

The applicant states that aging effects of concern will be detected by visual inspection and examination of component surfaces for evidence of defects and age-related degradation.

With regard to acceptance criteria the applicant states that the Preventive Maintenance Program establishes specific acceptance criteria for each component inspected. The acceptance criteria are related to the aging effects requiring management and are dependent on each individual inspection or examination of the aging effect managed.

The program documentation has specific requirements for CRs in the CAP. The NMPNS Quality Assurance Program Topical Report documents a commitment to the corrective action criteria of 10 CFR Part 50. The CAP includes the detection and correction of conditions adverse to quality and the detection, cause determination, correction, and prevention of recurrence of conditions significantly adverse to quality.

The Quality Assurance Program Topical Report documents the confirmation process for NMPNS under the corrective action criterion. At NMPNS the confirmation process is implemented through corrective action effectiveness reviews and is performed for conditions significantly adverse to quality and selected hardware-related conditions adverse to quality. The CAP includes but is not limited to SR, NSR, and fire protection SSCs. Therefore, those SSCs within the scope of license renewal are addressed as part of the current CAP.

The applicant states that NMPNS has reviewed both industry and plant-specific operating experience relating to the Preventive Maintenance Program as part of a process to optimize maintenance practices. Review of plan-specific operating experience revealed CRs initiated after Preventive Maintenance Program examinations. In cases where age-related degradation was detected the reported conditions (e.g., corrosion of motor-operated valves, piping, heat exchanger internals) were resolved through implementation of the work order process prior to loss of an intended function.

The Preventive Maintenance Program is adjusted continually to account for industry experience and research. As additional operating experience is obtained lessons learned are used to adjust this program as needed.

The applicant states that there are no exceptions to the SRP-LR and that the enhancements to the Preventive Maintenance Program encompass revisions to existing activities credited for license renewal to ensure that aging effects are discovered and evaluated. These enhancements expand the scope of the Preventive Maintenance Program to encompass activities for certain additional components requiring aging management and explicitly define the aging management attributes including systems and the component types and commodities.

Other elements are: (1) preventive actions which would be revised to list activities credited for aging management, (2) the element "parameters monitored/inspected" would be revised to specifically list parameters monitored, (3) the element "detection of aging effects" would be reviewed to specifically list the aging effects, (4) the element "monitoring and trending" would establish a requirement that inspection data be monitored, and (5) the element "acceptance criteria" would be revised to establish detailed specific acceptance criteria.

According to the applicant the enhancements would be completed prior to the period of extended operation. The applicant stated that the Preventive Maintenance Program has been effective in maintaining the intended functions of long-lived passive SSCs. The effectiveness of the Preventive Maintenance Program is also reflected in the level of system/equipment availability documented by maintenance rule periodic assessments.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B2.1.32, regarding the applicant's demonstration of the Preventive Maintenance Program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

The staff reviewed the Preventive Maintenance Program against the AMP elements found in SRP-LR Section A.1.2.3 and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are parts of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is addressed in SER Section 3.0.4. The remaining seven elements are discussed below.

(1) Scope of Program - The applicant stated in ALRA Section B2.1.32 that the Preventive Maintenance Program manages aging effects of many SSCs within the scope of license renewal not managed by other AMPs. The scope of the program includes but is not limited to valve bodies, heat exchangers, expansion joints, tanks, ductwork, fan/blower housings, dampers, and pump casings.

Additional details of the program scope are discussed in the basis document for the Preventive Maintenance Program. The applicant states that there are no exceptions to the SRP-LR and the enhancements to the Preventive Maintenance Program revise activities credited for license renewal to ensure detection and evaluation of aging effects. These enhancements would expand the Preventive Maintenance Program to activities for certain additional components requiring aging management and define the aging management attributes of systems and the component types and commodities included in the program.

The staff confirmed that this element satisfies the criterion of SRP-LR Section A.1.2.3.1. The staff concludes that this program attribute is acceptable.

(2) Preventive Actions - The applicant stated in ALRA Section B2.1.32 that although routine maintenance is largely preventive in nature only the condition monitoring aspects of Preventive Maintenance Program activities are credited for license renewal. For example, when a piping system is opened to conduct preventive maintenance on a valve a visual inspection of the valve body or piping may be specified. Such activities do not prevent aging effects but will detect degraded conditions affecting the ability of the component to perform its intended function. Consequently, there are no specific preventive actions for this program. Enhancements to this element would specifically list those activities credited for aging management. Additional details of this element are discussed in the basis document for the Preventive Maintenance Program.

    The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.2. The staff concludes that this program attribute is acceptable.

In RAI B2.1.32-1 dated November 17, 2004, the staff stated that the descriptions of several elements in the Preventive Maintenance Program were too brief and general for the staff to review the program's effectiveness and adequacy. Therefore, the staff requested that the applicant provide more specific detailed information for the following four elements of the AMP according to the guidelines of SRP-LR Appendix A.

(1) Element (3) - Parameters Monitored/Inspected
(2) Element (4) - Detection of Aging Effects
(3) Element (5) - Monitoring and Trending (specified schedule)
(4) Element (6) - Acceptance Criteria

In addition the staff requested the applicant to provide specific information related to these four listed elements of the Preventive Maintenance Program for the management of aging effects of two specific components, (1) piping and fittings in the NMP2 Control Building HVAC System (original LRA Table 3.3.2.B-9) and (2) valves in the NMP1 Radioactive Waste System (original LRA Table 3.3.2.A-14), to demonstrate the effectiveness and adequacy of this Preventive Maintenance Program.

The applicant provided its response by letter dated December 21, 2004, and the staff's evaluation of elements (3) through (6) is as follows.

(3) Parameters Monitored/Inspected - In the original LRA Section B2.1.32, the applicant stated that inspection and testing activities monitor various parameters, including surface condition, for evidence of defects and age-related degradation.

    In its response to the staff RAI B2.1.32-1 dated November 17, 2004, with regard to this element, the applicant stated that there are no prevention, mitigation, or performance monitoring activities in the Preventive Maintenance Program credited for license renewal. Rather, condition monitoring activities inspect for visual signs of degradation or test for leaks. Surface conditions of components are monitored through visual inspection and examination for evidence of defects and age-related degradation. Components in selected portions of systems are monitored through visual inspection. The inspections detect aging effects which if left unmanaged would lead to degradation of the components' intended functions. Examples of components, inspections, and parameters monitored under the Preventive Maintenance Program are as follow:

Unit	Component(s)	Inspection Type/Parameter	Parameter	Procedure
1	Fuel Pool heat exchanger tubes and tube sheets	Visual/ Condition	Evidence of various forms of corrosions	N1-MM-0054-405
1	Various carbon steel valve internals and externals	Visual/ Condition	Evidence of Various forms of internal and/or external corrosion	N1-MM-GEN-200
1	Reactor Building and Dry Well Sump Pump	Visual/ Condition	Evidence of various forms of internal corrosion	N1-MM-GEN-005
1	RX Building Emergency Ventilation and Control Room Emergency Ventilation Fan	Visual/ Condition	Evidence of corrosion of carbon steel; cracking, hardening shrinkage and loss of strength of polymers	N1-MM-GEN-551
1	Unit 1 Reactor Building Charcoal Filter Housing	Visual/ Condition	Evidence of general corrosion of housing internals	N1-TSP-202-001
1	13.8 & 4.16KV Motors	Visual/ Condition	Presence of motor cooler fouling	S-EMP-GEN-081
2	Ventilation Heaters	Visual/ Condition	Presence of general corrosion on heater internals	N2-EPM-GEN-V786
2	Condition and various forms of corrosion2Motor Operated Actuators and Dampers	Visual/ Condition	Internal inspection for general corrosion of damper and actuator	N2-EPM-GEN-V786
2	Air Handling Unit Cooling Cools	Visual/ Condition & Test/Refrigerant Leakage	Inspection of signs of fouling, and testing for leakage	NS-MPM-GEN-SA562 & N2-MPM-HVC-V554

Most Preventive Maintenance Program implementing procedures require enhancement to include/annotate parameters credited for aging management.

The applicant also provided the specific inspection methods for detection of aging effects related to two specific components, (1) piping and fittings in the NMP2 Control Building HVAC System (original LRA Table 3.3.2.B-9) and (2) valves in the NMP1 Radioactive Waste System (original LRA Table 3.3.2.A-14), to demonstrate the effectiveness and adequacy of this Preventive Maintenance Program.

The staff confirmed that after completion of the enhancements this program element will satisfy the criterion of SRP-LR Section A.1.2.3.3. The staff concludes that this program attribute is acceptable.

(4) Detection of Aging Effects - In the original LRA Section B2.1.32 the applicant stated that the aging effects of concern will be detected by visual inspection and examination of component surfaces for evidence of defects and age-related degradation.

In response to RAI B2.1.32-1 on this element the applicant stated that:

> The aging effects requiring management for the components within the scope of the Preventive Maintenance Program are detected by visual inspection and examination of surfaces of components for evidence of defects and age-related degradation. The activities that are performed to detect aging effects requiring management are identified in the specific PM procedures that perform the PM. The procedures are developed based on vendor recommendations and operating experience that forms the basis for the inspections performed and the frequency of the inspections such that aging effects are detected prior to a loss of the components' intended functions. NMPNS administrative procedures provide for overall control of the Preventive Maintenance Program and identification of how PMs are to be established, documented, scheduled, and optimized for the benefit of equipment and system reliability. Most Preventive Maintenance Program procedures will require an enhancement to include/annotate the aging effect being detected.

The applicant also provided the specific inspection methods for detection of the aging effects related to two specific components, (1) piping and fittings in the NMP2 Control Building HVAC System (original LRA Table 3.3.2.B-9) and (2) valves in the NMP1 Radioactive Waste System (original LRA Table 3.3.2.A-14), to demonstrate the effectiveness and adequacy of this Preventive Maintenance Program.

The staff confirmed that after completion of the enhancements this program element will satisfy the criterion of SRP-LR Section A.1.2.3.4. The staff concludes that this program attribute is acceptable.

(5) Monitoring and Trending - In original LRA Section B2.1.32 the applicant stated that the Preventive Maintenance Program is condition-monitoring performed on a specified schedule. After inspection results are documented they are reviewed and evaluated.

In response to RAI B2.1.32-1 on this element the applicant stated:

> The Preventive Maintenance Program is a condition-monitoring program executed on a specified schedule. Results of the tasks performed are documented in the corresponding implementing procedures. These procedures include a review and evaluation of the results. The Preventive Maintenance Program requires an enhancement to specifically include monitoring and trending, as appropriate, for age-related degradation.

The applicant also provided the specific monitoring and trending attributes for the management of aging effects related to the two specific components, (1) piping and fittings in the NMP2 Control Building HVAC System (original LRA Table 3.3.2.B-9) and

(2) valves in the NMP1 Radioactive Waste System (original LRA Table 3.3.2.A-14), to demonstrate the effectiveness and adequacy of this Preventive Maintenance Program.

The staff confirmed that after completion of the enhancements this program element will satisfy the criteria of SRP-LR Section A.1.2.3.5. The staff concludes that this program attribute is acceptable.

(6) Acceptance Criteria - In the original LRA Section B2.1.32 the applicant stated that the Preventive Maintenance Program establishes specific acceptance criteria for each component inspected. The acceptance criteria are related to the aging effects requiring management and dependent on each individual inspection and examination of the aging effect managed.

In its response to RAI B2.1.32-1, dated December 21. 2004, the applicant stated:

> Acceptance criteria for visual inspection and examination of components are provided in the Preventive Maintenance Program implementing procedures. The acceptance criteria are related to the aging effects requiring management and are dependent on each individual inspection and examination considering the aging effect being managed. Implementing procedures will be enhanced to include more specific and detailed acceptance criteria, as appropriate. This program attribute will be consistent with the generic attribute description in Appendix A of NUREG-1800 upon program enhancements.

The applicant also provided the acceptance criteria for the management of aging effects related to the two specific components, (1) piping and fittings in the NMP2 Control Building HVAC System (original LRA Table 3.3.2.B-9) and (2) valves in the NMP1 Radioactive Waste System (original LRA Table 3.3.2.A-14), to demonstrate the effectiveness and adequacy of this Preventive Maintenance Program.

The staff confirmed that after completion of the enhancements this program element will satisfy the criteria of SRP-LR Section A.1.2.3.6. This information has been incorporated in the ALRA. The staff concludes that this program attribute is acceptable.

(10) Operating Experience - The applicant stated in ALRA Section B2.1.32 that it has reviewed both industry and plant-specific operating experience relating to the Preventive Maintenance Program as part of a process to optimize maintenance practices. Review of plan-specific operating experience revealed CRs initiated after Preventive Maintenance Program examinations. Where age-related degradation was detected the reported conditions (e.g., corrosion of motor-operated valves, piping, heat exchanger internals) were resolved through implementation of the work order process prior to loss of an intended function.

The Preventive Maintenance Program is adjusted continually to account for industry experience and research. With additional operating experience lessons learned will be used to adjust this program as needed.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.10. The staff concludes that this program attribute is acceptable.

The applicant stated that enhancements to the Preventive Maintenance Program will be made to revise existing procedures. These enhancements would provide the level of detail and specificity needed for staff review of the Preventive Maintenance Program. They would affect the main program elements including "scope of program," "preventive actions," "parameters monitored," "detection of aging effects," "monitoring and trending," and "acceptance criteria." These enhancements are scheduled to be completed prior to the period of extended operation. The staff views these as major enhancements which would require review and approval prior to implementation of the Preventive Maintenance Program.

In RAI B2.1.32-2, dated November 17, 2004, the staff requested that the applicant provide a commitment that these enhancements would be completed on a schedule of sufficient time for staff review and approval prior to the period of extended operation.

In its response, by letter dated December 21, 2004, the applicant stated that this staff concern also was raised during the review of the AMPs by the audit team and the audit question was documented as AMP Issue 30 of the Audit and Review Report. The applicant provided the response that was given to Issue 30 as follows:

> As with any commitment NMPNS makes to the NRC, the resolution and/or implementation are subject to review by the NRC. Specifically for new aging management programs (AMP), the NRC can utilize Inspection Procedure 71003 Post-Approval Site Inspection for License Renewal, to verify that outstanding commitments have been met. This procedure also includes specific wording whereby the assistance of NRR/DRIP/RLEP can be utilized to ensure the licensee commitments have been met. Currently there is no specific notification to the NRC required when a commitment has been satisfied. Consistent with the industry, NMP would prefer that any review of new AMPs be conducted as part of the inspection process.

The applicant further stated that:

> The commitment to enhance appropriate maintenance procedures that exist within the Preventive Maintenance Program is made commensurate with the inclusion of statements to that effect within Appendices A and B of the [original] LRA. Enhancements will be reviewed and approved using approved NMPNS administrative procedures. Once made, all maintenance activity enhancements will be readily available for review by the NRC prior to the period of extended operation.

The staff reviewed the applicant's response and found that the applicant has provided adequate assurance for the completion as well as review and approval of the enhancements prior to the period of extended operation. Enhancements to the Preventive Maintenance Program are NMP1 Commitment 29 and NMP2 Commitment 27. Based on the review and information provided in the ALRA the staff concern in RAI B2.1.32-2 is resolved.

UFSAR and USAR Supplements. In ALRA Sections A1.1.30 and A2.1.30, the applicant provided the respective UFSAR and USAR supplements for the Preventive Maintenance Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Preventive Maintenance Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.2 Systems Walkdown Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.33, the applicant described the Systems Walkdown Program, stating that this is an existing, plant-specific program. The Systems Walkdown Program manages aging effects for accessible external surfaces of systems and components within the scope of license renewal. The aging effects of concern are material degradation and loss of material from external surfaces of pumps, valves, piping, bolts, heat exchangers, tanks, HVAC components, and other components. The program also identifies adverse conditions that can lead to aggressive environments for systems or components within the scope of license renewal. Program activities include system engineer walkdowns (i.e., field evaluations of system components to assess material condition), documentation and evaluation of inspection results, and appropriate corrective actions.

In the ALRA, the applicant stated that the key elements of aging management activities used in the Systems Walkdown Program are the results of an evaluation of each key element against the appropriate ten elements described in SRP-LR Appendix A with enhancements that include revisions to existing activities credited for license renewal to ensure the applicable aging effects are detected and evaluated. Enhancements are scheduled for completion prior to the period of extended operation.

The applicant stated that recording and reporting visually detectable degradation have been parts of good engineering practice at NMPNS for many years and will continue under the Systems Walkdown Program, which has been effective in maintaining the intended functions of long-lived passive SSCs. The applicant stated that the Systems Walkdown Program has been enhanced since its inception and further improvements will be implemented prior to the period of extended operation.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B2.1.33, regarding the applicant's demonstration of the Systems Walkdown Program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

In RAI B2.1.33-1 dated November 17, 2004, the staff noted that the applicant stated in the original LRA that this System Walkdown Program manages aging effects for accessible external surfaces of selected SSCs within the scope of license renewal. It was not clear to the staff whether all carbon steel components listed in the program or just the samples are covered by this AMP. Therefore, the staff requested that the applicant clarify the reference to "selected SSCs" within the scope of license renewal. Furthermore, with respect to the program description paragraph of Section B2.1.33, the staff requested that the applicant clarify the phrase "other carbon steel components" and explain why "mechanical penetrations" are excluded from components listed in the program description.

In its response by letter dated December 17, 2004, the applicant listed NMP1 and NMP2 systems which include components within the scope of license renewal and which credit the Systems Walkdown Program for managing the aging of external surfaces. The applicant stated that because not all components in a system may be in-scope the term "selected" is used to differentiate between those in-scope and those out-of-scope. For each of the systems listed the determination of which component types are "selected" is shown in the applicable original LRA aging management review section. The applicant also stated that there are no structures within the scope of license renewal that credit the Systems Walkdown Program for managing aging effects.

The applicant stated that the "Program Description" paragraph of the original LRA Section B2.1.33 includes the statement, "The specific aging effect of concern is loss of material from external surfaces of... other carbon steel components." This phrase is intended to capture generically system components or subcomponents not specifically listed. Examples of "other carbon steel components" are flanges, tees, reducers, and pipe caps. Mechanical penetrations at NMP1 and NMP2 are managed under the Structures Monitoring Program and the ASME Section XI ISI (Subsections IWE and IWL) Programs rather than by the Systems Walkdown Program.

The applicant noted that for the NMP1 Reactor Vessel Instrumentation System although the Systems Walkdown Program is credited correctly in original LRA Section 3.1.2.A.3 it was omitted inadvertently from original LRA Table 3.1.2.A-3 (page 3.1-54 of the revised Section 3.1 submitted by NMPNS letter NMP1L 1892 dated December 6, 2004). The correction to Table 3.1.2.A-3 is provided in the applicant's December 17, 2004, submittal. The staff found the applicant's response acceptable. Therefore, the staff's concern described in RAI B2.1.33-1 is resolved.

The staff evaluated key elements of aging management activities of the Systems Walkdown Program against the appropriate ten elements described in SRP-LR Appendix A, including the enhancements to the existing activities. The staff reviewed the Systems Walkdown Program against the AMP elements found in SRP-LR Section A.1.2.3, and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (*i.e.*, "program scope," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," "corrective actions," "confirmation process," "operating experience," and "operating experience").

The applicant indicated that the "corrective actions," "confirmation process," "and "administrative controls," are parts of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is addressed in SER Section 3.0.4. The remaining seven elements are addressed here.

(1) Scope of Program - In the original LRA Section B2.1.32, the applicant stated that the scope of the Systems Walkdown Program is accessible external surfaces of structures and components within the scope of license renewal and subject to AMR. The inspections will look for loss of material, material degradation, and leakage.

In RAI B2.1.33-1 dated November 17, 2004, the staff requested that the applicant identify the systems and structures within the scope of license renewal to which this AMP applies at NMPNS.

In its December 17, 2004, response to RAI B2.1.33-1 the applicant listed NMP1 and NMP2 systems as follow:

NMP1 Systems

- Compressed Air System
- Control Room Heating, Ventilating, and Air Conditioning (HVAC)
- Control Rod Drive
- Core Spray System
- Condensate System
- Containment System
- Containment Spray
- City Water System
- Reactor Water Cleanup
- Emergency Diesel Generator
- Emergency Cooling
- Fire Detection and Protection
- Spent Fuel Pool Filtering and Cooling
- Feedwater/high Pressure Coolant Injection
- Hydrogen Water Chemistry
- Main Generator and Auxiliary System
- Main Steam
- Miscellaneous Non-contaminated Vents and Drains
- Neutron Monitoring
- Reactor Building HVAC
- Reactor Building Closed Loop Cooling
- Radwaste Building Hvac
- Radwaste System
- Reactor Vessel Instrumentation
- Shutdown Cooling
- Sampling System
- Service Water
- Turbine Building Hvac
- Turbine Building Closed Loop Cooling Water

NMP2 Systems

- Alternate Decay Heat Removal System
- Compressed Air System
- Reactor Building Closed-loop Cooling Water

- Containment Atmosphere Monitoring
- Condensate System
- Main Condenser Air Removal
- Primary Containment Purge
- High-pressure Core Spray
- Low-pressure Core Spray
- Domestic Water System
- Air Startup - Standby Diesel Generator
- Standby Diesel Generator Fuel Oil Storage and Transfer
- Generator Standby Lube Oil System
- Standby Diesel Generator Protection (Generator) System
- Floor and Equipment Drains
- Engine-driven Fire Pump - Fuel Oil
- Fire Protection Halon
- Cardox Fire Protection - Low Pressure $C0^2$
- Fire Protection - Water
- Feedwater System
- Standby Gas Treatment
- Design Basis Accident (DBA) Hydrogen Recombiner
- Control Building Air-conditioning
- Glycol Heating
- Hot Water Heating
- Auxiliary Service Building Air-conditioning
- Control Building Chilled Water
- Chilled Water - Ventilation
- Diesel Generator Building Ventilation
- Reactor Building Ventilation
- Yard Structure Ventilation
- Reactor Core Isolation Cooling
- Reactor Vessel Instrumentation
- Main Steam
- Moisture Separator and Reheater System
- Makeup Water System
- Reactor Recirculation System
- Residual Heat Removal
- Reactor Pressure Vessel
- Spent Fuel Pool Cooling and Cleanup
- Process Sampling System
- Service Water
- Seal Water System
- Reactor Water Cleanup

For the enhancement of this AMP the applicant stated in the original LRA that it will state the aging management attributes explicitly, including the systems and component types/commodities included in the program.

In the updated response to RAI B2.1.33-1 dated August 12, 2005, the applicant pointed out that portions in its previous response had been superseded by responses dated July 14, 2005, to staff RAIs 2.1-4, 2.2-3 and 3.1.2.C.4-1 dated February 23, 2005. The complete revised list of NMP1 and NMP2 systems that credit the System Walkdown Program for aging management is provided here and also has been incorporated in the ALRA section number (*italics* indicate added systems).

NMP1 System:	ALRA Section
• Circulating Water	3.3.2.A.1
• *City Water*	*3.3.2.A.2*
• Compressed Air	3.3.2.A.3
• Condensate and Condensate Transfer	3.4.2.A.1
• Condenser Air Removal and Off-gas	3.4.2.A.5
• Containment Spray	3.2.2.A.1
• Containment System	3.3.2.A.4
• Control Rod Drive	3.1.2.A.5
• Control Room HVAC	3.3.2.A.5
• Core Spray	3.2.2.A.2
• *Diesel Generator Building Ventilation*	*3.3.2.A.6*
• *Electric Steam Boiler*	*3.3.2.A.24*
• Emergency Cooling	3.2.2.A.3
• Emergency Diesel Generator	3.3.2.A.7
• Feedwater/high Pressure Coolant Injection	3.4.2.A.2
• Fire Detection and Protection	3.3.2.A.8
• (Hydrogen Water Chemistry - deleted from list)	
• *Liquid Poison*	*3.3.2.A.10*
• Main Generator and Auxiliary	3.4.2.A.3
• Main Steam	3.4.2.A.4
• *Main Turbine and Auxiliary*	*3.4.2.A.6*
• Misc Non-contaminated Vents & Drains	3.3.2.A.11
• *Moisture Separator Reheater Steam*	*3.4.2.A.7*
• Neutron Monitoring	3.3.2.A.12
• Radwaste Building HVAC	3.3.2.A.13
• Radwaste System	3.3.2.A.14
• Reactor Building Closed Loop Cooling	3.3.2.A.15
• Reactor Building HVAC	3.3.2.A.16
• Reactor Vessel Instrumentation	3.1.2.A.3
• *Reactor Recirculation System*	*3.1.2.A.4*
• Reactor Water Cleanup	3.3.2.A.17
• Sampling System	3.3.2.A.18
• Service Water	3.3.2.A.19
• Shutdown Cooling	3.3.2.A.20
• Spent Fuel Pool Filtering and Cooling	3.3.2.A.21
• Turbine Building Closed Loop Cooling	3.3.2.A.22
• Turbine Building HVAC	3.3.2.A.23

NMP2 Systems:	ALRA Section
• Air Startup – Standby Diesel Generator	3.3.2.B.1
• Alternate Decay Heat Removal	3.3.2.B.2
• *Auxiliary Boiler*	*3.3.2.B.33*

• Auxiliary Service Building Hvac	3.3.2.B.3
• *Circulating Water*	*3.3.2.B.34*
• (Chilled Water Ventilation - deleted from list)	
• Compressed Air	3.3.2.B.5
• Condensate System	3.4.2.B.2
• (Containment Atmosphere Monitoring - deleted from list)	
• Control Building Chilled Water	3.3.2.B.8
• Control Building HVAC	3.3.2.B.9
• *Control Rod Drive*	*3.1.2.B.5*
• Diesel Generator Building Ventilation	3.3.2.B.10
• Domestic Water	3.3.2.B.11
• Engine-driven Fire Pump Fuel Oil	3.3.2.B.12
• *Extraction Steam & Feedwater Heater Drains*	*3.4.2.B.6*
• Feedwater	3.4.2.B.3
• Fire Detection and Protection	3.3.2.B.13
• Floor and Equipment Drains	3.3.2.B.14
• Generator Standby Lube Oil	3.3.2.B.15
• (Glycol Heating - deleted from list)	
• High Pressure Core Spray	3.2.2.B.2
• Hot Water Heating	3.3.2.B.17
• Hydrogen Recombiner System	3.2.2.B.1
• Low Pressure Core Spray	3.2.2.B.3
• Main Condenser Air Removal	3.4.2.B.1
• Main Steam	3.4.2.B.4
• Makeup Water	3.3.2.B.18
• Moisture Separator and Reheater	3.4.2.B.5
• Primary Containment Purge	3.3.2.B.20
• (Process Sampling - deleted from list)	
• *Radioactive Liquid Waste Management*	*3.3.2.B.36*
• Reactor Building Closed Loop Cooling	3.3.2.B.22
• Reactor Building HVAC	3.3.2.B.23
• Reactor Core Isolation Cooling	3.2.2.B.4
• (Reactor Pressure Vessel - deleted from list)	
• Reactor Pressure Vessel Instrumentation	3.1.2.B.3
• (Reactor Recirculation - deleted from list)	
• Reactor Water Cleanup	3.3.2.B.24
• Residual Heat Removal	3.2.2.B.5
• *Roof Drainage System*	*3.3.2.B.37*
• *Sanitary Plumbing and Drains*	*3.3.2.B.38*
• (Seal Water - deleted from list)	
• Service Water	3.3.2.B.26
• Spent Fuel Pool Cooling and Cleanup	3.3.2.B.27
• Standby Diesel Generator Fuel Oil	3.3.2.B.28
• Standby Diesel Generator Protection	3.3.2.B.29
• Standby Gas Treatment	3.2.2.B.6
• *Turbine Building Closed Loop Cooling*	*3.3.2.B.40*
• *Turbine Main System*	*3.4.2.B.7*
• *Water Treatment*	*3.3.2.B.35*
• Yard Structures Ventilation	3.3.2.B.31

The staff reviewed the amended information in the ALRA and considers the scope of the program to be defined clearly and acceptable. Therefore, the staff's concern described in RAI B2.1.33-1 is resolved.

The staff confirmed that this element satisfies the criterion of SRP-LR Section A.1.2.3.1. The staff concludes that this program attribute is acceptable.

(2) Preventive Actions - In the original LRA Section B2.1.33 the applicant stated that the Systems Walkdown Program mitigates degradation through regular inspection of in-scope components and detection of degraded conditions that could affect the ability of components to perform intended functions. There are no specific preventive actions associated with this program other than the detection of the aging effects of concern before damage to a component or pressure boundary occurs. The staff concurred that no preventive actions are required for this condition monitoring program.

The staff also reviewed ALRA and confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.2. The staff concludes that this program attribute is acceptable.

(3) Parameters Monitored/Inspected - In original LRA Section B2.1.33 the applicant stated that system engineers conduct visual inspections of assigned SSCs and document the presence of corrosion and other signs of deterioration.

In RAI B2.1.33-2 dated November 17, 2004, the staff stated that in the "parameters monitored/inspected" program element "other signs of deterioration" was not clear. Therefore, the staff requested that the applicant describe those other aging effects and explain how they can be detected.

In its December 17, 2004, response to RAI B2.1.33-2 the applicant stated that the phrase "other signs of deterioration" is intended to encompass the condition of coatings (material degradation), leakage and indications of leakage as stated under the "Enhancements" heading of original LRA Section B2.1.33, as well as cracking, elastomer degradation, and weathering. The applicant stated that in incorporating this enhancement into the implementing procedure it intends to utilize the guidance of EPRI reports on identification of aging as part of the training of system engineers. These industry guidelines provide the basis for the identification of aging effects and will provide the system engineers with the necessary knowledge to identify "other signs of deterioration." (EPRI reports 1007932, "Identification and Detection of Aging Issues," 1007933, "Aging Assessment Field Guide," and 1009743, "Aging Identification and Assessment Checklist - Mechanical Components.")

In the updated response to RAI B2.1.33-2 dated August 12, 2005, the applicant pointed out that no change to RAI response is required. Thus AMP B2.1.33, Systems Walkdown Program, was modified after RAI response and Section B2.1.33 under the "parameters monitored/inspected" heading of the ALRA has been reworded to state:

> System engineers conduct visual inspections of accessible portions of credited systems and components WSLR. Visible degradation,

anomalous indications, or adverse conditions are documented and evaluated. Adverse conditions that can lead to aggressive environments for in scope components, such as evidence of leakage, wetted insulation, or degraded non-safety related or out of scope piping or anchor points attached to in-scope portions, are also monitored.

The applicant stated that although the paragraph has been reworded for clarification the response to RAI B2.1.33-2 dated December 17, 2004, remains valid.

The staff found the parameters considered in the program implementation to be according to general industry practice and acceptable. Therefore, the staff's concern described in RAI B2.1.33-2 is resolved.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.3 and concludes that this program attribute is acceptable.

(4) Detection of Aging Effects - In original LRA Section B2.1.33 the applicant stated that the aging effects of concern will be detected and documented through visual inspections during system walkdowns. The frequency of inspections is at least once per refuel cycle for each structure and system. This frequency is sufficient since the aging effects typically are caused by long-term degradation. The staff considers this approach to detection of aging effects for accessible external surfaces of selected SSCs within the scope of license renewal at NMPNS acceptable.

In RAI B2.1.33-4 dated November 17, 2004, the staff requested that the applicant discuss the basic approaches and programs used to manage aging effects for inaccessible external surfaces of SSCs within the scope of license renewal.

In its response by letter dated December 17, 2004, the applicant stated that the Systems Walkdown Program relies on visual inspections of accessible external surfaces to detect aging effects. The evidence of aging, however, may apply to both accessible and inaccessible component surfaces depending on the material of the component and the environment to which it is exposed. Personnel performing inspections will be trained in this program element to ensure that age related degradation is properly identified. The applicant further indicated that any evidence of aging on accessible external surfaces generally indicates the condition of inaccessible external surfaces and is considered an effective indicator for managing inaccessible surfaces. As part of the enhancement to the "parameters monitored/inspected" attribute described in original LRA Section B2.1.33 to "provide guidance for assessment of identified deterioration" the applicant confirmed that it will include direction to evaluate potentially susceptible inaccessible areas when evidence of aging is detected. The staff agreed with this enhancement procedure.

In the updated response to RAI B2.1.33-4 dated August 12, 2005, the applicant pointed out that no change to the RAI response was required because the Systems Walkdown Program was modified and incorporated into the ALRA after the RAI response with no change in intent. ALRA Section B2.1.33 under the program description heading has been reworded to state:

> The Systems Walkdown Program is an existing plant-specific program that consists of the ten elements described in Appendix A of NUREG-1800 (Reference 1). The Systems Walkdown Program manages aging effects for accessible external surfaces of systems and components WSLR at NMPNS. The aging effects of concern are material degradation and loss of material from external surfaces of pumps, valves, piping, bolts, heat exchangers, tanks, HVAC components, and other components. The program also identifies adverse conditions that can lead to aggressive environments for systems or components within the scope of LR. Program activities include system engineer walkdowns (i.e., field evaluations of system components to assess material condition), documentation and evaluation of inspection results, and appropriate corrective actions.

The applicant stated that although the paragraph has been reworded to provide clarification the response to RAI B2.1.33-4 dated December 17, 2004, remains valid.

The staff reviewed information in the ALRA and found the applicant's approaches to detecting and managing aging effects for accessible and inaccessible surfaces of SSCs within the scope of license renewal reasonable and acceptable. Therefore, the staff's concern described in RAI B2.1.33-4 is resolved.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.4 and concludes that this program attribute is acceptable.

(5) Monitoring and Trending - In the original LRA Section B2.1.33 the applicant stated that the Systems Walkdown Program describes the monitoring and assessment of SSCs but has no requirements for monitoring and trending of applicable parameters. The staff agreed that system engineers will document the aging effects of the assigned SSCs and that trending is not required.

The staff confirmed that this program element satisfies the criteria of the GALL Report and SRP-LR Section A.1.2.3.5 and concludes that this program attribute is acceptable.

(6) Acceptance Criteria - In original LRA Section B2.1.33 the applicant stated that the Systems Walkdown Program includes specific acceptance criteria for applicable parameters. A list of walkdown attributes is available to system engineers for use in developing walkdown checklists.

In RAI B2.1.33-3 dated November 17, 2004, the staff requested that the applicant provide more detailed information according to the guidelines delineated in SRP-LR Appendix A to describe the acceptance criteria for the program.

In its December 17, 2004, response to RAI B2.1.33-3 the applicant stated that the "acceptance criteria" program element in original LRA Section B2.1.33 states that, "A list of walkdown attributes is available to system engineers for use in developing walkdown checklists." This statement acknowledged that system engineers conduct walkdowns for a variety of reasons (i.e., maintenance rule assessments, system readiness reviews, pre-outage reviews, license renewal, et cetera). The system engineer adapts the general checklist to focus on attributes applicable to the walkdown. The applicant stated that the license renewal walkdown focuses on attributes applicable to aging. The applicant further stated that the current program administrative procedure (S-TDP-REL-0101, Systems Walkdown Program) states that "evidence of aging shall be documented on a CR and recorded on the System Walkdown Report" (CR is the NMPNS document for entering issues into the CAP). The applicant stated that as part of the enhancement to the "acceptance criteria" attribute of original LRA Section B2.1.33 it intends to use EPRI reports on detection of aging issues to train system engineers to recognize evidence of (acceptance criteria for) various aging effects. These EPRI reports are listed above under "parameters monitored/inspected" (NMP1 Commitment 30, NMP2 Commitment 28). The staff found the applicant's approach to detection of evidence of aging and implementation of corrective measures reasonable.

In the updated response to RAI B2.1.33-3 dated August 12, 2005, the applicant stated that the original response to this RAI remains valid and unchanged by the ALRA reworded to state that incorporation of acceptance criteria into the program procedures is an enhancement and that the updated RAI response provides additional information for use.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.6 and concludes that this program attribute is acceptable. Therefore, the staff's concern described in RAI B2.1.33-3 is resolved.

(10) Operating Experience - In ALRA Section B2.1.33, the applicant explained that the Systems Walkdown Program has relied upon system health reports to document the overall material condition of various plant systems. As such, operating experience has been incorporated into the system health reports and not directly into the Systems Walkdown Program. Enhancements will be made to this program to include previous operating experience and to ensure future operating experience is properly incorporated. A review of the corrective action history related to material condition demonstrates the past usefulness of walkdowns in identifying visually detectable age-related degradation (e.g., general corrosion of bolting, supports, and component surfaces). As additional operating experience is obtained, lessons learned will be used to adjust the System Walkdown Program as needed.

The staff confirmed that this program element satisfies the criteria of the GALL Report and SRP-LR Section A.1.2.3.10 and concludes that this program attribute is acceptable.

UFSAR and USAR Supplements. In ALRA Sections A1.1.35 and A2.1.35, the applicant provided the respective UFSAR and USAR supplements for the Systems Walkdown Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Systems Walkdown Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.3 Non-Segregated Bus Inspection Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.34, the applicant described the Non-Segregated Bus Inspection Program, stating that this is an existing, plant-specific program. The Non-Segregated Bus Inspection Program inspects components and materials internal to the non-segregated bus ducts that connect the reserve auxiliary transformers to the 4160V buses required for the recovery of offsite power to both units following an SBO event. Based upon the most recent industry and regulatory license renewal precedence, this program also includes bus ducts associated with power boards feeding components within the scope of license renewal. They are normally energized, and therefore, the bus duct insulation material will experience temperature rise due to energization, which may cause age-related degradation during the extended period of operation.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B2.1.34, regarding the applicant's demonstration of the Non-Segregated Bus Inspection Program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

The staff reviewed the Non-Segregated Bus Inspection Program against the AMP elements of SRP-LR Section A.1.2.3 and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (*i.e.*, "program scope," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," "corrective actions," "confirmation process," "administrative controls," "and operating experience").

(1) Scope of Program - In ALRA Section B2.1.34, the applicant stated that this program applies to the bus ducts within the scope of license renewal, i.e., nonsegregated bus ducts that connect the reserve auxiliary transformers to the 4160V buses required for the recovery of offsite power to both units following an SBO event as well those associated with power board feeding components within the scope of license renewal.

    The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.1 and concludes that this program attribute is acceptable.

(2) Preventive Actions - In ALRA Section B2.1.34 the applicant stated that in this inspection program and no actions are taken to prevent or mitigate aging degradation.

    The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.2 and concludes that this program attribute is acceptable.

(3) Parameters Monitored/Inspected - In ALRA Section B2.1.34 the applicant stated that a sample of accessible bolted connections (bus joints and ending devices) for proper torque or the resistance of bolted joints will be checked using a micro-ohm meter of sufficient current capacity suitable for checking bus bar connections. This program also inspects the internal portions of accessible bus ducts for cracks, corrosion, foreign debris, dust buildup, and water intrusion. The bus insulation system is inspected for signs of embrittlement, cracking, melting, swelling, or discoloration which may indicate

overheating or age-related degradation. The internal bus supports (insulators) will be inspected for structural integrity and cracking.

Generally vendors do not recommend re-torque of bolted connections unless the joint requires service or the bolted connections are clearly loose. The torque required to turn the fastener in the tightening directions (restart torque) is not a good indicator of the preload once the fastener is in service. After relaxation of the parts of the joint the final loads are likely to be lower than the installed loads and thus, as documented in the Audit and Review Report, the staff asked the applicant to justify technically how re-torquing of bolted connections indicates preload once the fastener is in service.

In response to this request the applicant informed the staff that it will revise ALRA Sections A1.1.27, A2.1.27, and B2.1.34 to delete the torque test/torque checks and include as an alternative to thermography or connection resistance measurement of bolted connection a visual inspection for the accessible bolted connections covered with heat sink tape, sleeving, insulating boots, etc. (NMP1 Commitment 31, NMP2 Commitment 29). The staff found the applicant's response acceptable because thermography, resistance checks, or visual inspections of bolted connections covered with heat sink tape, sleeving, or insulating boots will provide reasonable assurance that bolted connections are not loosened by ohmic heating. The staff also determined that the six-year inspection frequency is adequate to prevent bus duct failures as industry experience shows that aging degradation is a slow process. In its letter dated December 1, 2005, the applicant stated that it will revise the ALRA to incorporate the changes.

The staff confirmed that this program element satisfies the criterion of GALL Report and SRP-LR Section A.1.2.3.3 and concludes that this program attribute is acceptable.

(4) Detection of Aging Effects - In ALRA Section B2.1.34 the applicant stated that visual inspections of internal portions of bus ducts detect cracks, corrosion, debris, dust, and evidence of water intrusion and that visual inspections of the bus insulating system detect embrittlement, cracking, melting, swelling, and discoloration. Visual inspections of bus supports (insulators) detect cracking and lack of structural integrity. Internal portions of bus ducts, the bus insulation system, and the bus supports (insulators) are inspected visually approximately every six years. Thermography or connection resistance measurment of the bus ducts or a torque test of a sample of accessible bolted connections will be performed approximately every six years. An initial inspection will be completed before the end of the initial 40-year license term. This period is adequate to identify failures of the bus ducts as experience shows that aging degradation is a slow process. A six-year inspection frequency will provide during a 20-year period up to three data points which can be used to characterize the degradation rate. If unacceptable degradation is found as indicated by either increased resistance or visual anomalies the inspections will be expanded to determine the extent of the condition.

As documented in the Audit and Review Report dated January 18, 2006, the applicant agreed to address the staff's concern and remove the torque test/torque check options as reported in Element 3. The applicant will determine sample size by accepted industry practice or vendor recommendation.

The staff determined that this program element satisfies the criteria of Appendix A.1.2.3.4 of the SRP-LR. Visual inspection of the bus insulating system will detect embrittlement, cracking, melting, swelling, and discoloration which are aging effects and aging effects mechanisms of insulation materials from heating. Thermography or connection resistance measurement of bolted connections will detect bolting loosening from thermal cycling. The staff also determined that the proposed frequency is acceptable because the expected aging degradation is a slow process.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.4 and concludes that this program attribute is acceptable.

(5) Monitoring and Trending - In ALRA Section B2.1.34 the applicant stated that monitoring and trending are not included as part of this program because the ability to trend inspection results is limited by available data; however, inspection results will be used to characterize degradation rates. This exception is consistent with latest industry and regulatory license renewal precedence. Existing inspection procedures will be enhanced to expand visual inspections of the bus duct support and insulation systems. Also, new provisions will be made for either periodic low-range resistance checks of the bus ducts or torque of a statistical sample of accessible bolted connections. The staff found that the absence of trending for testing is acceptable as the test is performed every six years and the staff saw no need for such activities.

The staff confirmed that this program element satisfies the criteria of the GALL Report and SRP-LR Section A.1.2.3.5 and concludes that this program attribute is acceptable.

(6) Acceptance Criteria - In ALRA Section B2.1.34 the applicant stated that bolted connections must meet the manufacturer's minimum torque specifications or the low-resistance value of the bus ducts must be appropriate for the application. Bus ducts are to be free from unacceptable visual indications of surface anomalies that suggest conductor insulation degradation. Additional acceptance criteria include no indication of unacceptable corrosion, cracking, foreign debris, excessive dust buildup, or moisture intrusion. Any condition or situation that if not corrected could lead to a loss of intended function is considered unacceptable.

As documented in the Audit and Review Report, the staff expressed its concern during the staff audit about re-torquing of the bolted connections. The applicant informed the staff that it will revise the acceptance criteria to delete the torque test/torque check option and include as an alternative to thermography or connection resistance measurement of bolted connections a visual inspection of the accessible bolted connections covered with heat shrink tape, sleeving insulating, boots, etc. (NMP1 Commitment 31, NMP2 Commitment 29). In its letter dated November 17, 2005, , the applicant stated that it has added an enhancement for program document to define acceptance criteria for inspection of the bus duct, their support and insulation system, the low range ohmic checks of connections. This revision resolved the staff's concern.

The staff reviewed this program element to determine whether it satisfies the criteria of SRP-LR Appendix A.1.2.3.6. The staff found the acceptance criteria acceptable as the low resistance value of the bus ducts must be appropriate for the application. Bus ducts are to be free from unacceptable visual indications of surface anomalies that suggest conductor insulation degradation. Additional acceptance criteria include no indication of unacceptable corrosion, cracking, foreign debris, excessive dust buildup, or moisture intrusion.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.6 and concludes that this program attribute is acceptable.

(7) Corrective Actions - The staff's review of the adequacy of the applicant's 10 CFR 50 Appendix B Program associated with this program element is addressed in SER Section 3.0.4.

The staff reviewed other aspects of this program element to determine whether it satisfies the criteria of Appendix A.1.2.3.7 of the SRP-LR. The applicant stated that corrective actions are documented using the CR process. The Quality Assurance Program Topical Report (Appendix B to "Nine Mile Point Nuclear Station Unit 1 Final Safety Analysis Report (Updated)" and Appendix B to "Nine Mile Point Nuclear Station Unit 2 Updated Safety Analysis Report") documents the applicant's commitment to the corrective action criteria of 10 CFR 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The applicant's CAP includes the detection and correction of conditions adverse to quality and the identification, cause determination, correction, prevention of recurrence of conditions significantly adverse to quality. GALL AMP XI.E4, which incorporated ISG-17, "Proposed Aging Management Program (AMP) XI.E4, 'Periodic Inspection of Bus Ducts,'" under corrective actions, states that further investigation and evaluation are performed when acceptance criteria are not met. Corrective actions may include but are not limited to cleaning, drying, increasing inspection frequency, replacing, or repairing the affected metal-enclosed bus components. If an unacceptable condition or situation is detected a determination is made whether the same condition or situation applies to other accessible or inaccessible areas. The applicant's CAP does not address the specific requirement of GALL AMP XI.E4. As documented in the Audit and Review Report the staff requested that the applicant revise NMP AMP B2.1.34 to add specific requirements or justify why these corrective actions are not necessary. The applicant informed the staff that it will revise NMP AMP B2.1.34 by adding the following to the "corrective actions" program element:

> Further investigation and evaluation are performed when the acceptance criteria are not met. Corrective actions may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or repair of the affected bus duct components. If an unacceptable condition or situation is identified, a determination is made to whether the same condition or situation is applicable to other accessible or inaccessible bus duct/components.

The staff found the applicant's response acceptable because it is consistent with the corrective actions in GALL AMP XI.E4. In its letter dated December 1, 2005, the applicant stated that it will revise the ALRA to incorporate the changes and on this basis the staff found this program element acceptable.

(8) Confirmation Process - The staff's review of the adequacy of the applicant's 10 CFR 50 Appendix B Program associated with this program element is addressed in SER Section 3.0.4.

The staff reviewed other aspects of this program element to determine whether it satisfies the criteria of Appendix A.1.2.3.8 of the SRP-LR. The staff found the applicant's confirmation process meets the requirements of 10 CFR Part 50 Appendix B.

(9) Administrative Controls - The staff's review of the adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is addressed in SER Section 3.0.4.

The staff reviewed other aspects of this program element to determine whether it satisfies the criteria of Appendix A.1.2.3.9 of the SRP-LR. The staff found the applicant's administrative controls meet the requirements of 10 CFR Part 50 Appendix B.

(10) Operating Experience - In ALRA Section B2.1.34 the applicant explained that inspections of the bus ducts within the scope of license renewal have not revealed any age-related degradation that could cause a loss of intended function.

The staff reviewed the operating experience stated in the ALRA and interviewed the applicant's technical personnel to confirm that the plant-specific operating experience revealed no degradation not bounded by industry experience.

After review of industry and plant-specific operating experience and discussions with the applicant's technical personnel the staff confirmed that the operating experience program element satisfies the criteria defined SRP-LR Section A.1.2.3.10 and concludes that this program attribute is acceptable.

UFSAR and USAR Supplements. The applicant provided its UFSAR and USAR supplements for the Non-Segregated Bus Inspection Program in ALRA Appendix A Section A1.1.27 for NMP1 and A2.1.27 for NMP2 stating that its Non-Segregated Bus Inspection Program manages aging effects and aging effects mechanisms for components and materials internal to the nonsegregated bus ducts that connect the reserve auxiliary transformer to the 4160V buses required for the recovery of offsite power following an SBO event. Based upon the most recent industry and regulatory license renewal precedence, this program also includes normally energized bus ducts associated with board-feeding components within the scope of license renewal. These normally-energized components are not subject to the environmental qualification requirements of 10 CFR 50.49 but can be affected by elevated temperatures prior to the end of the period of extended operation. Program activities include visual inspections of internal portions of the bus ducts to detect cracks, corrosion, debris, dust, and moisture; visual inspections of the bus insulating system to detect embrittlement, cracking, melting, swelling, and discoloration; visual inspections of bus supports (insulators) to detect cracking and lack of structural integrity; and a torque test or a resistance test of a sample of accessible bolted connections. The program incorporates applicable technical information and guidance from industry. Analytical trending is not included in this activity because the ability to trend inspection results is limited. This omission is an exception to the "monitoring and trending" element in Appendix A.1.2.3.5 of the SPR-LR. Enhancements to the applicant's Non-Segregated Bus Inspection Program include expanded visual inspections of the bus ducts, their supports, and insulation systems as well as low range resistance checks of the bus ducts or torque checks from a statistical sample of accessible bolted connections. Enhancements will be implemented prior to the period of extended operations.

Generally vendors do not recommend re-torque of bolted connections unless the joint requires service or the bolted connections are clearly loose. The torque required to turn the fastener in the tightening directions (restart torque) is not a good indicator of preload once the fastener is in service. After relaxation of the parts of the joint the final loads are likely to be lower than the installed loads. As documented in the Audit and Review Report, the staff requested that the applicant justify technically how re-torquing of bolted connections indicates preload once the fastener is in service. In response to this request the applicant informed the staff that it will revise ALRA Sections A1.1.27, A2.1.27, and B2.1.34 to delete the torque test/torque checks and include as an alternative to thermography or connection resistance measurement of bolted connections visual inspection of the accessible bolted connections covered with heat sink tape, sleeving, insulating boots, etc. (NMP1 Commitment 31, NMP2 Commitment 29). The staff found the applicant's response acceptable because thermography, resistance check, or visual inspection of bolted connections covered with heat sink tape, sleeving, or insulating boots will provide reasonable assurance that bolted connections are not loose from ohmic heating. In its letter dated December 1, 2005, the applicant stated that it had revised the ALRA to incorporate such changes.

Conclusion. On the basis of its review and audit of the applicant's Non-Segregated Bus Inspection Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.4 Fuse Holder Inspection Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.35, the applicant described the Fuse Holder Inspection Program, stating that this is a new, plant-specific program. Fuse holders/blocks are classified as a specialized type of terminal block because of the similarity in design and construction. The fuse holders are typically constructed of blocks of rigid insulating material, such as phenolic resins. Metallic clamps are attached to the blocks to hold each end of the fuse. The clamps can be spring-loaded clips that allow the fuse ferrules or blades to slip in, or they can be bolt lugs, to which the fuse ends are bolted. The clamps are typically made of copper. The aging of the fuse holder insulation material will be managed under the program for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The Fuse Holder Inspection Program includes the following aging stressors: moisture, fatigue, ohmic heating, mechanical stress, vibration, thermal cycling, electrical transients, chemical contamination, oxidation, and corrosion. In-scope fuse holders are tested to provide a direct indication of the condition of the metallic clamps. Fuses may be tested using either thermography or contact resistance.

In the ALRA, the applicant states that only fuse holders located outside active devices and not part of larger assemblies are included in the program. The applicant also stated that the fuse holders are typically constructed of blocks of rigid insulating material like phenolic resins. Metallic clamps are attached to the blocks to hold each end of the fuse. The clamps can be spring-loaded clips that allow the fuse ferrules or blades to slip in or they can be lugs to which the fuse ends are bolted. The clamps are made typically of copper. In ALRA Table 3.6.2.C-1 the applicant categorized the fuse holder components into insulator materials and copper alloy clamps in the Material column. The applicant stated that the aging of the fuse holder insulation material will be managed under Non-EQ Electrical Cables and Connection Program (ALRA Section B2.1.29), which was evaluated in SER Section 3.6.2.1. The metallic clamps of the fuse holders are evaluated in this section. The applicant stated in Table 3.6.2.C-1 that the metallic clamps of the fuse holders are subject to the Fuse Holder Inspection Program. The applicant further identified in ALRA Table 3.6.2.C-1 loss of electrical continuity as the AERM.

The applicant stated that the aging of the fuse holder copper alloy clamps will be managed under a new program called Fuse Holder Inspection Program as addressed in this SER section 3.0.3.3.4

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B2.1.35, regarding the applicant's demonstration of the Fuse Holder Inspection Program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation. Details of staff evaluation AMP B2.1.35 are as follows:

The staff reviewed the Fuse Holder Inspection Program against the AMP elements found in SRP-LR Section A.1.2.3 and SRP-LR Table A.1-1 focusing on how the program manages aging effects through the effective incorporation of 10 elements (i.e., "program scope," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," "corrective actions," "confirmation process," "administrative controls," "and "operating experience").

The applicant indicated that corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is addressed in SER Section 3.0.4. The remaining seven elements are addressed here:

(1) Scope of Program - In ALRA Section B2.1.35 the applicant stated that this program applies to metallic clamps of fuse holders located outside active devices that have aging effects requiring aging management. This application is acceptable to the staff because it is consistent with the GALL Report and complements the information provided by the applicant for insulator material.

    The staff confirmed that this element satisfies the criterion of SRP-LR Section A.1.2.3.1 and concludes that this program attribute is acceptable.

(2) Preventive Actions - In ALRA Section B2.1.35 the applicant stated that the Fuse Holder Inspection Program monitors conditions and requires regular inspection of the in-scope components and identification of degraded conditions that would affect the ability of the components to perform intended functions. Consequently, no specific preventive actions are associated with this program other than identification of the aging effects of concern before a loss of intended function occurs. The staff did not identify the need for any preventive action except condition monitoring including thermography or contact resistance checks.

The staff confirmed that the "preventive actions" program element satisfies the criterion of SRP-LR Section A.1.2.3.2 and concludes that this program attribute is acceptable.

(3) Parameters Monitored/Inspected - In ALRA Section B2.1.35 the applicant stated that monitored parameters will include high resistance of the metallic clamp (or clip) portion of the fuse holder to detect fatigue caused by ohmic heating, thermal cycling, electrical transients, mechanical stress, chemical contamination, corrosion, and oxidation. The staff agreed that testing clamp resistance using thermography or contact resistance effectively ensures that the fuse holder clamps will perform their intended function for the extended period of operation.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.3 and concludes that this program attribute is acceptable.

(4) Detection of Aging Effects - In ALRA Section B2.1.35 the applicant stated that the fuse holders will be tested at least every 10 years by thermography, contact resistance, or other appropriate testing methods. The initial inspection will be prior to the period of extended operation and thereafter a 10-year inspection frequency will be used to provide at least two data points during the 20-year period of extended operation. The staff agreed that the aging degradation of fuse holder clamps is a slow process and that a 10-year inspection frequency is adequate to prevent failures of fuse holder clamps.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.4 and concludes that this program attribute is acceptable.

(5) Monitoring and Trending - In ALRA Section B2.1.35 the applicant stated that monitoring and trending are not included in this program because the parameters monitored may vary depending upon the test method used. The staff concurred with this policy because thermography or connection resistance test will be performed at 10-year intervals, appropriate methods can be used for subsequent tests, and so long the test results confirm no loosening of the fuse holder clamps there is no need for monitoring and trending the test results.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.5 and concludes that this program attribute is acceptable.

(6) Acceptance Criteria - In ALRA Section B2.1.35 the applicant stated that the acceptance criteria for each fuse holder clamp will depend on the specific test performed and the specific fuse holder clamp tested. As explained in the "monitoring and trending" program element, the staff concurred that acceptance criteria should depend on the type of test and the type of clamp.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.6 and concludes that this program attribute is acceptable.

(10) Operating Experience - In ALRA Section B2.1.35 the applicant stated that the Fuse Holder Inspection Program is a new program at NMPNS and, therefore, no programmatic operating experience is available. However, the applicant stated that operating experienced lessons learned will be used to adjust this program as needed.

The applicant committed to develop the Fuse Holder Inspection Program with specifications stated in ALRA Section B2.1.35 (NMP1 Commitment 32 and NMP2 Commitment 30). The staff agreed that the proposed program will provide reasonable assurance of detection of loosening of fuse holder clamps prior to significant degradation.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.10 and concludes that this program attribute is acceptable.

UFSAR and USAR Supplements. In ALRA Sections A1.1.21 and A2.1.21, the applicant provided the respective UFSAR and USAR supplements for the Fuse Holder Inspection Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Fuse Holder Inspection Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.5 Non-EQ Electrical Cable Metallic Connections Inspection Program

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.39, the applicant described the Non-EQ Electrical Cable Metallic Connections Inspection Program, stating that this is a new, plant-specific program. Most electrical connections involve insulating material and metallic parts. This program will address the aging effects of the metallic parts used to connect cable conductors to other cables or electrical devices. The Non-EQ Electrical Cables and Connections Program will address the aging effects of the cable insulation material. The electrical connections used in nuclear power plants include: splices (butt or bolted), crimp-type ring lugs, and terminal blocks. The aging stressors to these connections addressed by this program include: thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation. The specific mechanism for each of these aging stressors is described in the most recent industry and regulatory license renewal precedence. The specific test performed will be determined prior to the initial test, and will be a proven test for detecting loose connections, such as thermography, contact resistance testing, or other appropriate testing. The applicant indicated that this program will be implemented prior to the period of extended operation (NMP1 Commitment 35, NMP2 Commitment 33).

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B2.1.39, regarding the applicant's demonstration of the Non-EQ Electrical Cable Metallic Connections Inspection Program against the AMP elements of SRP-LR Section A.1.2.3 and SRP-LR Table A.1-1 focusing on how the program manages aging effects through the effective incorporation of 10 elements (i.e., "program scope," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," "corrective actions," "confirmation process," "administrative controls," "and "operating experience").

The applicant indicated that corrective actions, confirmation process, and administrative controls are parts of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is addressed in SER Section 3.0.4. The remaining seven elements are addressed here.

(1) Scope of Program - In ALRA Section B2.1.39 the applicant stated that this program applies to the metallic portion of non-EQ electrical cable connections. The staff found the "scope of the program" acceptable as consistent with the GALL Report and complementary to the information provided by the applicant for conductor insulation for electrical cables and connectors.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.1 and concludes that this program attribute is acceptable.

(2) Preventive Actions - In ALRA Section B2.1.39, the applicant stated that the Non-EQ Electrical Cable Metallic Connections Inspection Program requires regular inspection of in-scope components and detection of degraded conditions that would affect the ability of components to perform intended functions. No specific preventive actions are associated with this program except identification of the aging effects of concern before a loss of intended function occurs. The staff did not identify the need for any preventive action except the condition monitoring program.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.2 and concludes that this program attribute is acceptable.

(3) Parameters Monitored/Inspected - In ALRA Section B2.1.39 the applicant stated that monitored parameters will include testing representative samples for loosening of bolted connections. The sample will be assessed on application voltage (high, medium, and low voltage systems), circuit loading, and location (high temperature, high humidity, vibration, etc.). The staff agreed that testing of representative samples using thermography or contact resistance effectively ensures performance of conductor connector intended function for the extended period of operation.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.3 and concludes that this program attribute is acceptable.

(4) Detection of Aging Effects - In ALRA Section B2.1.39 the applicant stated that loosening of the electrical connections can be caused by one or more aging stressors, namely, thermal cycling, ohmic heating, electrical transients, vibrations, chemical contamination, corrosion, and oxidation. The applicant stated that one or more of the proven tests, thermography, contact resistence, or other appropriate testing, will be performed case by case.

The applicant stated that the initial inspection of this program will be performed prior to the period of the extended operation and that thereafter a 10-year inspection frequency will be used to provide at least two data points during the 20-year period of extended operation. The applicant stated that for the slow degradation of the Non-EQ electrical cable connections the 10-year test frequency for this program is adequate. The staff agreed that industry experience shows that aging degradation of cable connections is a slow process and 10-year inspection frequency is adequate to prevent failures of cable connections. The staff also agreed that thermography or connection resistance measurement is effective in detecting connection degradation.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.4 and concludes that this program attribute is acceptable.

(5) Monitoring and Trending - In ALRA Section B2.1.39 the applicant stated that monitoring and trending are not included in this program because the parameters monitored may vary depending upon the test method. The staff concurred with this because the thermography or connection resistance tests will be performed at 10-year intervals, different methods can be used for subsequent tests, and so long as the test results confirm no loosening of bolted connections there is no need for monitoring and trending the test results.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.5 and concludes that this program attribute is acceptable.

(6) Acceptance Criteria - In ALRA Section B2.1.39 the applicant stated that the acceptance criteria for each conductor connector will depend on the specific test used and the specific conductor connector tested. The staff concurred that acceptance criteria should depend on the type of test and the type of the conductor connector.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.6 and concludes that this program attribute is acceptable.

(10) Operating Experience - In ALRA Section B2.1.39 the applicant stated that the Non-EQ Electrical Cable Metallic Connections Inspection Program is new at NMP; therefore, no programmatic operating experience is available. As operating experience is obtained lessons learned will be used to adjust this program as needed.

The staff confirmed that this program element satisfies the criteria of the GALL Report and SRP-LR Section A.1.2.3.10 and concludes that this program attribute is acceptable.

UFSAR and USAR Supplements. In ALRA Sections A1.1.41 and A2.1.39, the applicant provided the respective UFSAR and USAR supplements for the Non-EQ Electrical Cable Metallic Connections Inspection Program. The staff reviewed these sections and determined that the information in the supplements provide adequate summary descriptions of the program, as required by 10 CFR 54.21(d).

Conclusion. After review of the applicant's Non-EQ Electrical Cable Metallic Connections Inspection Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR and USAR supplements for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.6 Wooden Power Pole Inspection Program (NMP2 Only)

Summary of Technical Information in the Amended Application. In ALRA Section B2.1.40, the applicant described the Wooden Power Pole Inspection Program for NMP2, stating that this is a new, plant-specific program. The Wooden Power Pole Inspection Program manages the aging of wooden power poles that are within the scope for license renewal because they provide structural support for the transmission lines in the recovery path for station blackout. Qualified personnel perform inspections, conducted prior to the period of extended operation and every 10 years thereafter, that manage material loss, degradation, and physical damage. Activities include visual inspections of the entire structure, including cross members and hardware, pole soundings, circumferential measurements, and below grade inspections. If necessary, core boring, application of preservatives, and pesticide treatments are performed if soundings suggest degradation has occurred. Corrective actions may include pole reinforcement or replacement. The program inspection activities ensure that in-scope electrical support structures retain their intended functions between inspection cycles.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B2.1.40, regarding the applicant's demonstration of the Wooden Power Pole Inspection Program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

The applicant stated that the new plant-specific Wooden Power Pole Inspection Program (NMP2 Commitment 34) that will manage the aging of wooden power poles within the scope of license renewal because they provide structural support for the transmission lines in the SBO recovery path.

The staff understands that the applicant's Wooden Power Pole Inspection Program is a sub-program of its Structures Monitoring Program. In Appendices A and B of the ALRA for the applicant's Masonry Wall Program, also a Structures Monitoring Program sub-program, this relationship is addressed. In ALRA Section A2.1.40 for the Wooden Power Pole Program this relationship with the applicant's Structures Monitoring Program is not addressed. As documented in the Audit and Review Report, the staff requested the applicant to explain the inconsistency.

In its letter dated December 1, 2005, the applicant stated that ALRA Sections A2.1.40 and B2.1.40 had been modified at the end of the first paragraph by adding: "The Wooden Power Pole Inspection Program is implemented by the Structures Monitoring Program for managing specific aging effects." Also the applicant stated that the Wooden Power Pole Inspection Program had been modified at the end of the program description paragraph by adding: "The Wooden Power Pole Inspection Program is implemented by the Structures Monitoring Program (B2.1.28) for managing specific aging effects."

The staff reviewed information provided in the ALRA and supplemental letters and found it acceptable. With the clarifying statements added by the applicant to ALRA Sections A2.1.40 and B2.1.40 the relationship between its Wooden Power Pole Inspection Program and its Structures Monitoring Program is addressed.

The staff reviewed the Wooden Power Pole Inspection Program against the AMP elements of SRP-LR Section A.1.2.3, and SRP-LR Table A.1-1 focusing on how the program will manage aging effects through the effective incorporation of 10 elements (i.e., "program scope," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," "corrective actions," "confirmation process," "administrative controls," "and "operating experience") addressed here.

(1) Scope of Program - In ALRA Section B2.1.40 the applicant stated that this program applies to wooden power poles relied upon for SBO recovery within the scope of license renewal and subject to and AMR. The program includes visual inspections of the entire structure, pole sounding and circumference measurements, below-grade inspections, any necessary core boring, preservative application, and pesticide treatments.

    The staff confirmed that this element satisfies the criterion of SRP-LR Section A.1.2.3.1 and concludes that this program attribute is acceptable.

(2) Preventive Actions - In ALRA Section B2.1.40 the applicant stated that this program monitors conditions as described in SRP-LR Appendix A.1.1. The program provides for timely detection of loss of material and degradation and physical damage, not preventive or mitigating actions.

    As documented in the Audit and Review Report, the staff noted that at ALRA page B2-89 under scope of program for NMP AMP B2.1.40 the applicant states that the program includes visual inspections of the entire structure, pole sounding and circumference measurements, below-grade inspections, any necessary core boring, preservative application, and pesticide treatments. However, the applicant stated in the preceding paragraph that the Wooden Power Pole Inspection Program monitors conditions and does not support preventive or mitigating actions. The staff requested the applicant to explain why preservative applications are not preventive actions and pesticide treatments are not mitigating actions.

    In its letter dated December 1, 2005, the applicant stated that preservative applications and pesticide treatments will enhance the lives of the poles by minimizing their deterioration; however; the license renewal AMP is not based on these actions and does not credit them. The aging management monitors conditions. The inspection frequency, repair, and replacement of poles are based on the condition of the poles at the time of inspection.

    The staff reviewed the applicant's response and found it acceptable. Although application of preservatives and pesticides to the wooden power poles is part of the Wooden Power Pole Inspection Program license renewal aging management is not based on these actions. For any one pole decreasing the inspection frequency to less than every ten years and repairing or replacing it depends on the condition of the pole at the time of the condition monitoring inspection. Application of preservatives or pesticides is relied upon to prevent aging effects/mechanisms of the wooden power poles under license renewal.

    The staff determined that this program element satisfies the criterion of SRP-LR Appendix A.1.2.3.2 and that inspections under the applicant's Wooden Power Pole

Inspection Program only monitor the condition of the wooden power poles and perform no preventive or mitigating action for aging effects and aging effects mechanisms . On this basis, the staff found the applicant's preventive actions acceptable.

(3) Parameters Monitored/Inspected - In ALRA Section B2.1.40 the applicant stated that wooden power poles will be inspected for material loss, degradation, and physical damage. Techniques include visual examinations of the entire structure including cross members and hardware, pole soundings, circumferential measurements, and below-grade inspections. If necessary core boring, preservative applications, and pesticide treatments are performed if soundings suggest degradation. Visual inspections check the pole for physical or mechanical damage that can affect the life of the pole (lean or tilt, splitting or cracked tops, changes to grade, and shell or butt rot and decay). Excavations will be performed to a depth of approximately 18 inches to detect loss of material or degradation or damage. Pole sounding will be performed by a qualified inspector at various pole locations to detect internal rot/decay, insect damage or infestations, or hollow areas. Core boring of the pole may be performed based on the inspection and sounding results to detect internal decay, insect infestation, or hollow areas. If insect infestation is found the area will be treated with a fumigant prior to plugging of the bored core region. Preservative treatment of the excavated surfaces (including moisture barrier/wrapping) also will be performed prior to recovering. Effective circumference measurements evaluate the pole-loading capacity.

The program also monitors proper pole tagging and labeling with treatment information and application dates.

The staff determined that this program element satisfies the criterion of SRP-LR Appendix A.1.2.3.3 and that the applicant has identified clearly the parameters of wooden power poles that need inspection for aging effects and aging effects mechanisms affecting the ability of the wooden power poles to perform their intended function. Visual examinations of the entire wooden power pole structure with core boring and soundings as needed will check each pole for physical or mechanical damage that can affect the life of the pole. Parameters monitored include lean or tilt, splitting or cracked tops, changes to buried depth, shell or butt rot or decay, internal rot/decay, insect damage or infestations, circumferential measurements, and hollow areas. For these reasons the staff found the applicant's "parameters monitored or inspected" program element acceptable.

(4) Detection of Aging Effects - In ALRA Section B2.1.40 the applicant stated that the inspections in the new program shall be by qualified personnel on components within the scope of license renewal within five years of the expiration of the current operating license. Subsequent visual inspections and testing for the wooden poles will be every ten years. This frequency is based on industry experience, which shows that although the typical wooden pole life is expected to be 30 to 40 years routine inspection and treatment can extend this life by 50 percent or more. Typical industry inspection frequencies for wooden poles currently range from 8 to15 years.

The 10-year visual inspections and testing will detect degradation and identify deficiencies before there is a loss of intended function. All inspections will provide the level of detail and examination necessary to ensure that intended functions are preserved through each subsequent inspection cycle.

The staff determined that this program element satisfies the criteria of SRP-LR Appendix A.1.2.3.4 and that the applicant has identified the frequency of inspection of the wooden power poles as within five years of the expiration of the current operating license and every 10 years after based on industry experience. Every wooden power pole within the scope of license renewal will be inspected. Visual examinations of the entire wooden power pole structure with core boring and soundings as needed are adequate methods to gather data on the condition of the wooden power poles. For these reasons the staff found the applicant's "detection of aging effects" program element acceptable.

(5) Monitoring and Trending - In ALRA Section B2.1.40 the applicant stated that this program shall retain all previous inspection records. These are plant records available for review during the subsequent inspection cycle. Reviews of previous inspection results will provide for trending of long-term degradation or deterioration. This information also could help in evaluating the potential for degradation before the next inspection.

Additionally, the program shall provide for appropriate engineering reviews of the inspection results. Although the inspections may be performed by an outside vendor or contractor or by the applicant's personnel in-house reviews of the results will confirm that the wooden poles are capable of continuing to perform their intended functions through the next inspection cycle.

The staff determined that for visual inspection this program element satisfies the criteria of SRP-LR Appendix A.1.2.3.5. The staff found that the applicant intends to retain all inspection records under its Wooden Power Pole Inspection Program. Reviews of previous inspections will be done so that long-term degradation can be trended. In-house reviews of the results shall be performed to confirm that the wooden poles are capable of continuing to perform their intended functions through the next inspection cycle. For these reasons the staff found the applicant's "monitoring and trending" program element acceptable.

(6) Acceptance Criteria - In ALRA Section B2.1.40 the applicant stated that this program will specify qualification and experience requirements in the inspection, treatment, and reinforcement of wooden power poles for personnel performing inspections. For inspections contracted to outside vendors or contractors all required qualifications including minimum years of experience, pesticide applicator licenses or certifications, and wood treatment and fumigant qualifications are specified. All work by the applicant or vendor/contractor shall be performed to the criteria or standards stated in the NMP activity and through site-specific procedures.

The program will detail the inspection methods with any applicable acceptance/rejection criteria. Any pole found to have loss of material, degradation, or physical damage will be assessed and treated. The capability of a degraded pole to continue performing load-carrying intended functions will be evaluated. Additionally, the program will identify and label wooden poles warranting immediate rejection due to dangerous conditions as well as those with serious but lesser defects requiring repair, reinforcement, or nonemergent replacement. All poles classified as rejected or dangerous will be labeled or tagged during the inspection denoting the degradation severity level.

The staff reviewed this program element to determine whether it satisfies the criteria of SRP-LR Appendix A.1.2.3.6. The staff determined that the applicant intends under its Wooden Power Pole Inspection Program to specify the inspection methods and any applicable acceptance/rejection criteria. In addition detailed qualification and experience requirements will be developed for personnel performing the inspections. The inspection results will be used to evaluate the capability of a degraded pole to continue performing its load-carrying intended functions. For these reasons the staff found the applicant's acceptance criteria acceptable.

(7) Corrective Actions - The adequacy of the applicant's 10 CFR 50 Appendix B Program associated with this program element reviewed by the staff is addressed in SER Section 3.0.4.

In ALRA Section B2.1.40 the applicant stated that the Quality Assurance Program Topical Report documents its commitment to the corrective action criteria of 10 CFR 50 Appendix B. The applicant's Wooden Power Pole Inspection Program will direct the use of the site CAP when conditions adverse to quality are identified. These actions include evaluations of adverse or degraded conditions and wooden pole reinforcement or replacement.

The staff reviewed other aspects of this program element to determine whether it satisfies the criteria of SRP-LR Appendix A.1.2.3.7. The staff determined that the applicant intends to take action to correct conditions adverse to wooden power pole quality by performing evaluations for wooden pole reinforcement or replacement. For these reasons the staff found the applicant's corrective actions acceptable.

(8) Confirmation Process - The adequacy of the applicant's 10 CFR 50 Appendix B Program associated with this program element reviewed by the staff is addressed in SER Section 3.0.4

In ALRA Section B2.1.40 the applicant stated that the Quality Assurance Program Topical Report documents the confirmation process for it under the corrective action criterion. The applicant's confirmation process is implemented through corrective action effectiveness reviews and is performed for selected hardware-related and other conditions significantly adverse to quality. The applicant's CAP includes but is not limited to SR, NSR, and fire protection SSCs. Therefore, those SSCs within the scope of license renewal are addressed as part of the applicant's current CAP.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.8 and concludes that this program attribute is acceptable.

(9) Administrative Controls - The adequacy of the applicant's 10 CFR 50 Appendix B Program associated with this program element reviewed by the staff is addressed in SER Section 3.0.4.

In ALRA Section B2.1.40 the applicant stated that its Wooden Power Pole Inspection Program will be implemented through procedures subject to the 10 CFR 50 Appendix B administrative controls program. The administrative controls for NMP are discussed in its Conduct of Operations description and the Quality Assurance Program Topical Report.

The staff reviewed other aspects of this program element to determine whether it satisfies the criteria of SRP-LR Appendix A.1.2.3.9 and determined that the applicant's Wooden Power Pole Inspection Program has regulatory and administrative controls providing a formal review and approval process of the program. For these reasons the staff found the applicant's administrative controls acceptable.

(10) Operating Experience - In ALRA Section B2.1.40 the applicant stated that the Wooden Power Pole Inspection Program is defined and implemented for license renewal; thus, there is no plant-specific operating experience. Review of corrective action process reports yielded nothing applicable to wooden pole aging or degradation. Inspection scheduling and performance as discussed in the other SRP-LR attributes will provide plant-specific inspection data and experience prior to the end of the current operating period.

The staff recognized that the applicant's CAP which records internal and external plant operating experience will ensure that operating experience is reviewed and incorporated in the future for objective evidence to support the conclusion that the effects of aging are adequately managed.

After discussions with the applicant's technical personnel the staff concludes that the applicant's Wooden Power Pole Inspection Program (NMP2 Only) will manage adequately the aging effects and aging effects mechanisms identified in the ALRA for which this AMP is credited.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.10 and concludes that this program attribute is acceptable.

USAR Supplement. In ALRA Section A2.1.40, the applicant provided the USAR supplement for the Wooden Power Pole Inspection Program. The staff reviewed this section and determined that the information in the USAR supplement provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Wooden Power Pole Inspection Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the USAR supplement for this AMP and concludes that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.7 Torus Corrosion Monitoring Program (NMP1 Only)

Summary of Technical Information in the Amended Application. In ALRA Section B3.3, the applicant described the Torus Corrosion Monitoring Program for NMP1, stating that this is an existing, plant-specific program. The Torus Corrosion Monitoring Program credited for aging management of the NMP1 suppression chamber (torus). This program is based on a prior commitment to periodically monitor torus condition as described in an NRC SER dated August 11, 1994 (NUDOCS: 80615:233-244). The staff reviewed the ALRA to determine whether the applicant has demonstrated that the Torus Corrosion Monitoring Program will manage adequately the aging effects of the NMP1 torus during the period of extended operation as required by 10 CFR 54.21(a)(3).

The applicant states in the ALRA that the Torus Corrosion Monitoring Program manages corrosion of the NMP1 torus through inspection and analysis. This program is designed to ensure that the torus shell and support structure minimum thickness limits are not exceeded. This program provides for the following inspection and analysis methods:

- determination of torus shell thickness through UT measurement
- determination of corrosion rate through analysis of material coupons
- visual inspection of accessible external surfaces of the torus support structure for corrosion

Observations of the torus shell and support structure conditions ensure that timely action can be taken to correct degradation that could lead to loss of intended function. The minimum allowable torus wall thickness is established as 0.431 inches. This program requires in addition to wall thickness measurements determination of corrosion rates from inspection results and the remaining corrosion allowance. The aging evaluation that specifies minimum wall thickness for the NMP1 torus shell is a TLAA for license renewal. The Torus Corrosion Monitoring Program ensures that the NMP1 torus wall and support structure thickness limits are not exceeded. This program applies only to NMP1 because NMP2 is a Mark II containment with no torus.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in ALRA Section B3.3, regarding the applicant's demonstration of the Torus Corrosion Monitoring Program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

The staff reviewed the Torus Corrosion Monitoring Program against the AMP elements found in SRP-LR Section A.1.2.3 and SRP-LR Table A.1-1 focusing on how the program manages aging effects through the effective incorporation of 10 elements (i.e., "program scope," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," "corrective actions," "confirmation process," "administrative controls," "and "operating experience").

The applicant indicated that the corrective actions, confirmation process, and administrative controls are parts of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is addressed in SER Section 3.0.4. The remaining seven elements are discussed here.

(1) Scope of Program - In ALRA Section B3.3 the applicant stated that the NMP1 Torus Corrosion Monitoring Program determines torus shell thickness through UT

measurement, determination of corrosion rate through analysis of material coupons, and visual inspection of accessible external surfaces of the torus support structure for corrosion. The staff found the scope of the Torus Corrosion Monitoring Program acceptable because it is comprehensive in its surveillance of the torus and its support structure.

The staff confirmed that this element satisfies the criterion of SRP-LR Section A.1.2.3.1 and concludes that this program attribute is acceptable.

(2) Preventive Actions - In ALRA Section B3.3 the applicant stated that the Torus Corrosion Monitoring Program monitors conditions and requires no specific preventive actions. The staff agreed that the purpose of the program is to monitor material thickness and corrosion rate to ensure that the torus shell and support structure meet the qualification bases and that no preventive actions are required for this program.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.2 and concludes that this program attribute is acceptable.

(3) Parameters Monitored or Inspected - In ALRA Section B3.3 the applicant stated that the torus wall thickness is measured through UT measurements and torus coupon activities. The condition of the torus external supports is monitored by visual inspection. The staff found that the applicant has selected parameters to be inspected or monitored that can provide evidence of corrosion to ensure that timely action can be taken to correct degradation that could threaten the minimum material thickness requirement.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.3 and concludes that this program attribute is acceptable.

(4) Detection of Aging Effects - In ALRA Section B3.3 the applicant stated that torus wall UT measurements are obtained at approximately six-month intervals over a predefined grid system and that corrosion sample coupons are analyzed during each refueling outage. Corrosion rates are determined through analysis of both data sets and the most conservative corrosion rate for a particular torus bay is used to evaluate aging of the structure. The staff found that monitoring in this manner ensures the torus shell material will meet the minimum required wall thickness and that any degradation is detected before a loss of intended function.

The staff confirmed that this program element satisfies the criterion of SRP-LR Section A.1.2.3.4 and concludes that this program attribute is acceptable.

(5) Monitoring and Trending - In ALRA Section B3.3 the applicant stated that measurements are performed on a predefined schedule that allows for analysis of the corrosion and thickness data for the torus shell over time. The UT results and corrosion data are trended for future reference. Analysis determines the most conservative value for the corrosion rate. Visual inspection findings for the external support structure are compared to previous inspection results. The staff found that the overall monitoring and trending techniques proposed by the applicant manage the applicable aging effects effectively and are acceptable.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.5 and concludes that this program attribute is acceptable.

(6) Acceptance Criteria - In ALRA Section B3.3 the applicant stated that the Torus Corrosion Monitoring Program establishes acceptance criteria for local thickness, average thickness, and corrosion rate of the torus wall. The minimum wall thickness and corrosion rate limits are defined to ensure that wall thickness meets its required value until the next scheduled inspection. The external support structures also are evaluated to ensure that the intended functions are not lost prior to the next scheduled inspection. The staff found these criteria acceptable as consistent with the criteria of the staff's August 11, 1994, SER. The criteria ensure that the torus will continue to meet ASME code requirements that the average minimum wall thickness of the torus shell be not less than 0.431 inch.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.6 and concludes that this program attribute is acceptable.

(10) Operating Experience - In ALRA Section B3.3 the applicant stated that torus wall thinning was observed in the late 1980s following an extended plant shutdown. The applicant stated that the wall thinning was attributed to the layup conditions inside the torus during the extended shutdown. To cope with this plant-specific experience the staff approved the NMP1 Torus Corrosion Monitoring Program in the SER dated August 25, 1992. The program later was updated and the staff evaluation of the updated program was documented in the SER dated August 11, 1994. The applicant stated that review of plant-specific operating experience revealed no discrepancies in the Torus Corrosion Monitoring Program examinations. The applicant also stated that the Torus Corrosion Monitoring Program is adjusted continually to account for industry experience and research. The staff reviewed past inspection reports which indicate no significant changes in the torus wall corrosion rate. Following this review the staff found that this program will manage adequately aging effects on the torus wall and torus support structure.

The staff confirmed that this program element satisfies the criteria of SRP-LR Section A.1.2.3.10 and concludes that this program attribute is acceptable.

UFSAR Supplement. In ALRA Section A1.1.36, the applicant provided the UFSAR supplement for the Torus Corrosion Monitoring Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's Torus Corrosion Monitoring Program, the staff concludes that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.4 Quality Assurance Program Attributes Integral to Aging Management Programs

Pursuant to 10 CFR 54.21(a)(3), a license renewal applicant is required to demonstrate that the effects of aging on structures and components subject to an AMR will be adequately managed so that their intended functions will be maintained consistent with the CLB for the period of extended operation. SRP-LR, Branch Technical Position RLSB-1, "Aging Management Review - Generic," describes ten attributes of an acceptable AMP. Three of these ten attributes are associated with the quality assurance activities of corrective action, confirmation processes, and administrative controls. Table A.1-1, "Elements of an Aging Management Program for License Renewal," of Branch Technical Position RLSB-1 provides the following description of these quality attributes:

- corrective actions - including root cause determination and prevention of recurrence, should be timely
- confirmation process - should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective
- administrative controls - should provide a formal review and approval process

SRP-LR, Branch Technical Position IQMB-1, "Quality Assurance For Aging Management Programs," notes that those aspects of the aging management program that affect quality of safety-related structures, systems, and components are subject to the quality assurance requirements of 10 CFR Part 50 Appendix B. Additionally, for NSR structures and components subject to an AM the existing 10 CFR Part 50 Appendix B QA program may be used by the applicant to address the elements of corrective actions, the confirmation process, and administrative controls. Branch Technical Position IQMB-1 provides the following guidance with regard to the quality assurance attributes of AMPs:

- SR structures and components are subject to 10 CFR Part 50 Appendix B requirements, which are adequate to address all quality-related aspects of an aging management program consistent with the CLB of the facility for the period of extended operation.

- For NSR structures and components that are subject to an AMR for license renewal, an applicant has an option to expand the scope of its 10 CFR Part 50 Appendix B program to include these structures and components to address corrective actions, the confirmation process, and administrative controls for aging management during the period of extended operation. In this case, the applicant should document such a commitment in the NMP1 UFSAR and NMP2 USAR supplements according to 10 CFR 54.21(d).

3.0.4.1 Summary of Technical Information in the Amended Application

In the original LRA and ALRA Appendix B.1.3, "Quality Assurance Program and Administrative Controls," the applicant described the quality attributes of the plant-specific AMPs. The applicant stated that the 10 CFR Part 50 Appendix B program provides corrective actions, confirmation processes, and administrative controls for LR AMPs. Additionally, the scope of the program includes both SR and NSR SSCs subject to an AM for license renewal. In the original LRA and ALRA Section B.1.3, the applicant provided the following generic description of the quality attributes common to all the plant-specific AMPs:

- Corrective Actions - A single corrective actions process is applied regardless of the safety classification of the structure or component. Corrective actions are implemented through the initiation of a CR according to plant procedures established under 10 CFR 50 Appendix B. Site documents that implement aging management activities for license renewal will direct that a CR be prepared according to those procedures whenever unacceptable conditions are found (i.e., the acceptance criteria are not met).

  Equipment deficiencies are corrected through the initiation of a Work Order (WO) according to plant procedures. Although equipment deficiencies may initially be documented by a WO the corrective action process specifies that a CR also be initiated if required.

- Confirmation Process - The focus of the confirmation process is on the follow-up actions that must be taken to verify effective implementation of corrective actions. The measure of effectiveness is in correcting the adverse condition and preventing recurrence of conditions significantly adverse to quality. Plant procedures include provisions for timely evaluation of adverse conditions and implementation of any corrective actions required including root cause determinations and prevention of recurrence. These procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving effective corrective actions to ensure that they are taken. The CR process also monitors for potentially adverse trends. An adverse trend due to recurring adverse conditions will result in a CR. Aging management activities required for license renewal also would uncover any unacceptable condition due to ineffective corrective action.

- Administrative Controls - Administrative controls provide information on procedures and other forms of administrative control documents as well as guidance on classification documents into document types.

3.0.4.2 Staff Evaluation

The staff reviewed the applicant's AMPs described in the original LRA and ALRA Appendices A, "Safety Analysis Report Supplement," and B, "Aging Management Programs and Activities." This review was to assure that the aging management activities were consistent with the staff's guidance of SRP-LR Section A.2, "Quality Assurance for Aging Management Programs (Branch Technical Position IQMB-1)," on quality assurance attributes of AMPs.

The staff's evaluation found the descriptions and applicability of the plant-specific AMPs and their associated quality attributes, provided in the original LRA and ALRA Section B1.3, consistent with the staff's position on quality assurance for aging management. However, the applicant has not described sufficiently the use of the quality assurance program and its associated attributes (corrective action, confirmation process, and administrative controls) in the narrations of AMPs in the original LRA and ALRA Sections A1, "NMP1 Updated Final Safety Analysis Report (UFSAR) Supplement," and A2, "NMP2 Updated Safety Analysis Report (USAR) Supplement."

In RAI 2.1-8 dated November 22, 2004 the staff requested that the applicant supplement the descriptions in Sections A1 and A2 to include a description including references to pertinent guidance as necessary of the quality assurance program attributes credited for the programs described in the original LRA and ALRA Section B1.3. The descriptions in ALRA Sections A1 and A2 should provide sufficient information for the staff to determine if the quality attributes for the ALRA Sections A1 and A2 AMPs are consistent with the review acceptance criteria of SRP-LR Section A.2, "Quality Assurance for Aging Management Programs (Branch Technical Position IQMB-1)."

In response to RAI 2.1-8 by letter dated December 22, 2004, the applicant stated, in part, that the original LRA Sections A1.2 and A2.5 were added to reflect the application of the quality assurance program to the attributes of corrective action, confirmation, and document control. Specifically, the additions in each section contained the following description along with descriptions of each of the elements.

The quality assurance program implements the requirements of 10 CFR 50 Appendix B and is consistent with the summary in SRP-LR Appendix A.2, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," published July 2001. The "corrective action," "confirmation process," and "administrative controls" elements of the quality assurance program are applicable to both SR and NSR SSCs subject to an AM.

Furthermore, the applicant provided the staff with an ALRA submittal dated July 14, 2005, with additional details on the application of the quality assurance program to these three attributes. The staff confirmed that the ALRA description was consistent with the prior response to the request for additional information and the results of the staff's audit of the scoping and screening methodology. On the basis of the supplemental information provided by the applicant in response to the staff's request for information and the incorporation of that information into the ALRA submittal the staff found that the applicant has addressed the request for additional information adequately. Therefore, the staff's concern is resolved.

3.0.4.3 Conclusion

The applicant described the quality attributes of the programs and activities for managing aging effects for both SR and NSR SSCs within the scope of license renewal and stated that the 10 CFR Part 50 Appendix B quality assurance program provides "corrective actions," "confirmation processes," and "administrative controls." The staff concludes that the quality attributes of the applicant's AMPs, as described in the original LRA and ALRA Appendices A and B, are consistent with 10 CFR 54.21(a)(3). Therefore, the applicant's quality assurance description for its AMPs is acceptable.

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant Systems

3.1A NMP1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant Systems

This section of the SER documents the staff's review of the applicant's AMR results for the reactor vessel, internals, and reactor coolant systems components and component groups associated with the following NMP1 systems:

- reactor pressure vessel
- reactor pressure vessel internals
- reactor pressure vessel instrumentation system

- reactor recirculation system
- control rod drive system

3.1A.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.1, the applicant provided AMR results for the reactor vessel, internals, and reactor coolant systems components and component groups. In ALRA Table 3.1.1.A, "NMP1 Summary of Aging Management Programs for the Reactor Vessel, Internals, and Reactor Coolant Systems Evaluated in Chapter IV of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the reactor vessel, internals, and reactor coolant systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.1A.2 Staff Evaluation

The staff reviewed ALRA Section 3.1 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the reactor vessel, internals, and reactor coolant systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.1A.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.1.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.1A.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.1A.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.1A.2.3.

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the reactor vessel, internals, and reactor coolant systems components.

Table 3.1A-1 below provides a summary of the staff's evaluation of NMP1 components, aging effects and aging effects mechanisms , and AMPs listed in ALRA Section 3.1, that are addressed in the GALL Report.

Table 3.1A-1 Staff Evaluation for NMP1 Reactor Vessel, Internals, and Reactor Coolant Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Reactor coolant pressure boundary components (Item Number 3.1.1.A-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis
Steam generator shell assembly (Item Number 3.1.1.A-02)	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry		Not applicable, PWR only
Isolation condenser (Item Number 3.1.1.A-03)	Loss of material due to general, pitting, and crevice corrosion	Inservice inspection; water chemistry	Preventive Maintenance Program (B2.1.32), ASME Sections XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1), Water Chemistry Control Program (B2.1.2)	Consistent with GALL with exception, which recommends further evaluation (See Section 3.1A.2.2.2)
Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm^2 (E > 1 MeV) (Item Number 3.1.1.A-04)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	TLAA	This TLAA is evaluated in Section 4.2, Reactor Vessel Neutron Embrittlement Analysis
Reactor vessel beltline shell and welds (Item Number 3.1.1.A-05)	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Reactor Vessel Surveillance Program (B2.1.19)	Consistent with GALL, which recommends further evaluation (See Section 3.1A.2.2.3)
Westinghouse and B&W baffle/former bolts (Item Number 3.1.1.A-06)	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant-specific		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Small-bore reactor coolant system and connected systems piping (Item Number 3.1.1.A-07)	Crack initiation and growth due to SCC, intergranular SCC, and thermal and mechanical loading	Inservice inspection; water chemistry; one-time inspection	ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1); Water Chemistry Control Program (B2.1.2); One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.1A.2.2.4)
Jet pump sensing line, and reactor vessel flange leak detection line (Item Number 3.1.1.A-08)	Crack initiation and growth due to SCC, intergranular stress corrosion cracking (IGSCC), or cyclic loading	Plant-specific	ASME Sections XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1), Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.1A.2.2.4)
Isolation condenser (Item Number 3.1.1.A-09)	Crack initiation and growth due to stress corrosion cracking (SCC) or cyclic loading	Inservice inspection; water chemistry	ASME Sections XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1), Water Chemistry Control Program (B2.1.2), Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends further evaluation (See Section 3.1A.2.2.4)
Vessel shell (Item Number 3.1.1.A-10)	Crack growth due to cyclic loading	TLAA		Not applicable, PWR only
Reactor internals (Item Number 3.1.1.A-11)	Changes in dimension due to void swelling	Plant-specific		Not applicable, PWR only
PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains (Item Number 3.1.1.A-12)	Crack initiation and growth due to SCC and/or primary water stress corrosion cracking (PWSCC)	Plant-specific		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Cast austenitic stainless steel (CASS) reactor coolant system piping (Item Number 3.1.1.A-13)	Crack initiation and growth due to SCC	Plant-specific		Not applicable, PWR only
Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni-alloys (Item Number 3.1.1.A-14)	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry		Not applicable, PWR only
Westinghouse and B&W baffle former bolts (Item Number 3.1.1.A-15)	Crack initiation and growth due to SCC and IASCC	Plant-specific		Not applicable, PWR only
Westinghouse and B&W baffle former bolts (Item Number 3.1.1.A-16)	Loss of preload due to stress relaxation	Plant-specific		Not applicable, PWR only
Steam generator feedwater impingement plate and support (Item Number 3.1.1.A-17)	Loss of section thickness due to erosion	Plant-specific		Not applicable, PWR only
(Alloy 600) Steam generator tubes, repair sleeves, and plugs (Item Number 3.1.1.A-18)	Crack initiation and growth due to PWSCC, outside diameter stress corrosion cracking (ODSCC), and/or intergranular attack (IGA) or loss of material due to wastage and pitting corrosion, and fretting and wear; or deformation due to corrosion at tube support plate intersections	Steam generator tubing integrity; water chemistry		Not applicable, PWR only
Tube support lattice bars made of carbon steel (Item Number 3.1.1.A-19)	Loss of section thickness due to FAC	Plant-specific		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Carbon steel tube support plate (Item Number 3.1.1.A-20)	Ligament cracking due to corrosion	Plant-specific		Not applicable, PWR only
Steam generator feedwater inlet ring and supports (Item Number 3.1.1.A-21)	Loss of material due to flow-corrosion	Combustion engineering (CE) steam generator feedwater ring inspection		Not applicable, PWR only
Reactor vessel closure studs and stud assembly (Item Number 3.1.1.A-22)	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	Reactor Head Closure Studs Program (B2.1.3)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1.1)
CASS pump casing and valve body pump casing and valve body (Item Number 3.1.1.A-23)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1)
CASS piping (Item Number 3.1.1.A-24)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS		Not applicable (CASS piping does not exist)
BWR piping and fittings; steam generator components (Item Number 3.1.1.A-25)	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow-Accelerated Corrosion Program (B2.1.9)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1) Not applicable, PWR only.
Reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high pressure and high temperature systems (Item Number 3.1.1.A-26)	Loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1) Not applicable, PWR only.

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Feedwater and control rod drive (CRD) return line nozzles (Item Number 3.1.1.A-27)	Crack initiation and growth due to cyclic loading	Feedwater nozzle; CRD return line nozzle	BWR Feedwater Nozzle Program (B2.1.5), BWR Control Rod Drive Return Line (CRDRL) Nozzle Program (B2.1.37)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1.6)
Vessel shell attachment welds (Item Number 3.1.1.A-28)	Crack initiation and growth due to SCC, IGSCC	BWR vessel ID attachment welds; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Vessel ID Attachment Welds (B2.1.4)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1)
Nozzle safe ends, recirculation pump casing, connected systems piping and fittings, body and bonnet of valves (Item Number 3.1.1.A-29)	Crack initiation and growth due to SCC, IGSCC	BWR stress corrosion cracking; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Stress Corrosion Cracking Program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Sections 3.1A.2.1)
Penetrations (Item Number 3.1.1.A-30)	Crack initiation and growth due to SCC, IGSCC, cyclic loading	BWR penetrations; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Vessel Internals Program (B2.1.8), BWR Penetrations Program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1.3)
Core shroud and core plate, support structure, top guide, core spray lines and spargers, jet pump assemblies, control rod drive housing, nuclear instrumentation guide tubes (Item Number 3.1.1.A-31)	Crack initiation and growth due to SCC, IGSCC, IASCC	BWR vessel internals; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Vessel Internals Program (B2.1.8)	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1)
Core shroud and core plate access hole cover (welded and mechanical covers) (Item Number 3.1.1.A-32)	Crack initiation and growth due to SCC, IGSCC, IASCC	ASME Section XI inservice inspection; water chemistry	BWR Vessel Internals Program (B2.1.8), Water Chemistry Control Program (B2.1.2)	Consistent with GALL with exceptions (access hole cover does not exist in NMP1) (See Section 3.1A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Jet pump assembly castings; orificed fuel support (Item Number 3.1.1.A-33)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal aging and neutron irradiation embrittlement	BWR Vessel Internals Program (B2.1.8)	Consistent with GALL (See Section 3.1A.2.1.5) Not applicable for jet pump components
Unclad top head and nozzles (Item Number 3.1.1.A-34)	Loss of material due to general, pitting, and crevice corrosion	Inservice inspection; water chemistry		Not applicable (NMP1 does not have unclad top head enclosure and nozzles)
CRD nozzle (Item Number 3.1.1.A-35)	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry		Not applicable, PWR only
Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting) (Item Number 3.1.1.A-36)	Crack initiation and growth due to cyclic loading, and/or SCC and PWSCC	Inservice inspection; water chemistry		Not applicable, PWR only
Reactor vessel internals CASS components (Item Number 3.1.1.A-37)	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement		Not applicable, PWR only
External surfaces of carbon steel components in reactor coolant system pressure boundary (Item Number 3.1.1.A-38)	Loss of material due to boric acid corrosion	Boric acid corrosion		Not applicable, PWR only
Steam generator secondary manways and handholds (CS) (Item Number 3.1.1.A-39)	Loss of material due to erosion	Inservice inspection		Not applicable, PWR only
Reactor internals, reactor vessel closure studs, and core support pads (Item Number 3.1.1.A-40)	Loss of material due to wear	Inservice inspection		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Pressurizer integral support (Item Number 3.1.1.A-41)	Crack initiation and growth due to cyclic loading	Inservice inspection		Not applicable, PWR only
Upper and lower internals assembly (Westinghouse) (Item Number 3.1.1.A-42)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring		Not applicable, PWR only
Reactor vessel internals in fuel zone region [except Westinghouse and Babcock & Wilcox (B&W) baffle bolts] (Item Number 3.1.1.A-43)	Loss of fracture toughness due to neutron irradiation embrittlement, and void swelling	PWR vessel internals; water chemistry		Not applicable, PWR only
Steam generator upper and lower heads; tubesheets; primary nozzles and safe ends (Item Number 3.1.1.A-44)	Crack initiation and growth due to SCC, PWSCC, IASCC	Inservice inspection; water chemistry		Not applicable, PWR only
Vessel internals (except Westinghouse and B&W baffle former bolts) (Item Number 3.1.1.A-45)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry		Not applicable, PWR only
Reactor internals (B&W screws and bolts) (Item Number 3.1.1.A-46)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring		Not applicable, PWR only
Reactor vessel closure studs and stud assembly (Item Number 3.1.1.A-47)	Loss of material due to wear	Reactor head closure studs		Not applicable, PWR only
Reactor internals (Westinghouse upper and lower internal assemblies; CE bolts and tie rods) (Item Number 3.1.1.A-48)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring		Not applicable, PWR only

The staff's review of the NMP1 component groups followed one of several approaches. One approach, documented in SER Section 3.1A.2.1, discusses the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.1A.2.2, discusses the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.1A.2.3, discusses the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the reactor vessel, internals, and reactor coolant systems components is documented in SER Section 3.0.3.

3.1A.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.1.2.A, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the reactor vessel, internals, and reactor coolant systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Reactor Head Closure Studs Program
- BWR Vessel ID Attachment Welds Program
- BWR Feedwater Nozzle Program
- BWR Stress Corrosion Cracking Program
- BWR Penetrations Program
- BWR Vessel Internals Program
- Flow-Accelerated Corrosion Program
- Reactor Vessel Surveillance Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Systems Walkdown Program
- Bolting Integrity Program
- BWR Control Rod Drive Return Line (CRDRL) Nozzle Program

Staff Evaluation. In ALRA Tables 3.1.2.A-1 through 3.1.2.A-5, the applicant provided a summary of AMRs for the reactor vessel, internals, and reactor coolant systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report dated January 5, 2006. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.1A.2.1.1 Crack Initiation and Growth Due to SCC and/or IGSCC

In the discussion section of ALRA Table 3.1.1.A, Item 3.1.1.A-22, the applicant stated that loss of material due to general corrosion of closure head studs and nuts will be managed using the Reactor Head Closure Studs Program. As documented in the Audit and Review Report, the staff noted that ALRA Table 3.1.1.A, Item 3.1.1.A-22 applies to managing the aging effect and aging effect mechanism of cracking and requested that the applicant provide clarification

In its letter dated December 1, 2005, the applicant responded revising the ALRA Table 3.1.1.A, Item 3.1.1.A-22 discussion column by deleting the reference to managing loss of material and crediting the aging effect and aging effect mechanism of crack initiation and growth due to SCC. The staff found this change consistent with the GALL Report and therefore acceptable.

In its review, the staff found that the applicant had addressed the aging effect and aging effect mechanism appropriately as recommended by the GALL Report.

3.1A.2.1.2 Loss of Material Due to Wear; Loss of Preload Due to Stress Relaxation; Crack Initiation and Growth Due to Cyclic Loading and/or SCC

In the discussion section of ALRA Table 3.1.1.A, Item 3.1.1.A-26, the applicant stated that loss of material due to wear; loss of preload due to stress relaxation, crack initiation and growth due to cyclic loading and/or SCC of the reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high-pressure and high-temperature systems will be managed using the Bolting Integrity Program. As documented in the Audit and Review Report, the staff asked the applicant why Note E is used in ALRA Tables 3.1.2.A-3 and 3.1.2.A-5 when closure bolting will be managed with the applicant's Bolting Integrity Program.

In a letter dated December 1, 2005, the applicant stated that Note E in ALRA Tables 3.1.2.A-3 and 3.1.2.A-5 will be changed to Note B. The staff found this change consistent with the GALL Report and, therefore, acceptable.

In its review the staff found that the applicant had addressed the aging effect and aging effect mechanism appropriately as recommended by the GALL Report.

3.1A.2.1.3 Crack Initiation and Growth Due to SCC, IGSCC, and/or Cyclic Loading

In the discussion section of ALRA Table 3.1.1.A, Item 3.1.1.A-30 the applicant stated that crack initiation and growth due to SCC, IGSCC, and/or cyclic loading of penetrations will be managed using the Water Chemistry Control Program and BWR Vessel Internals Program. The applicant also stated that aging of the CRD stub tube penetrations is managed according to BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," of the applicant's BWR Vessel Internals Program and plant-specific commitments contained in the NRC safety evaluation dated March 25, 1987.

In RAI 3.1.2-1 dated January 13, 2005, the staff requested that the applicant address the difference between the alternative repair roll/expansion techniques and acceptable ASME Code weld repair methods for NMP1 CRD stub tube penetrations experiencing leakage.

In its response by letter dated February 14, 2005, the applicant stated, "NMP committed to implement a strategy whereby during the period of extended operation a leaking control rod drive (CRD) stub tube penetration would be roll repaired. If following the roll repair, this stub tube was to leak within acceptable limits, then a weld repair would be effected no later than one operating cycle following discovery of the leakage." In the original LRA, the applicant stated that it will follow the status of the proposed ASME Code change as to roll/expansion techniques of CRD stub tubes and will implement the final code change or provide an alternative plan for the NMP1 period of extended operation at least one year prior to the expiration of the current operating license (NMP1 Commitment 36).

As documented in the Audit and Review Report, the staff noted that the wording in ALRA Table 3.1.1.A, Item 3.1.1.A-1 and in the applicant's response to RAI 3.1.2-1 imply that NMP1 will operate with CRD stub tube leakage for one operating cycle (two years). The staff did not consider this implication acceptable for the period of extended operation. The safety evaluation dated March 25, 1987, allowing NMP1 to operate with CRD stub tube leakage was acceptable only as a temporary repair. Specifically, Item (6) of the staff's conclusions in the safety evaluation stated, "The proposed leakage criteria provides sufficient time to complete the final development of the prototype mechanical seal and associated tooling and investigate other methods such as weld repair."

In a-RAI 3.1.2-1 dated November 2, 2005, the staff requested that the applicant justify the CRD stub tube leakage repair operation.

In its response by letter dated November 30, 2005, the applicant stated that it had removed the statement of plant-specific commitments contained in the NRC safety evaluation dated March 25, 1987, and replaced it with the following statements:

> If the 10/19/05 draft of Code Case N–730 is approved by the ASME, NMP1 will implement the final code case as conditioned by the NRC. If the code case is not approved by the ASME, NMP1 will seek NRC approval of the 10/19/05 code case draft on a plant specific basis as conditioned by the NRC.
>
> During the period of extended operation, should a CRD stub tube rolled in accordance with the provisions of the code case resume leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:
>
> 1. A welded repair consistent with BWRVIP-58-A, "BWRVIP Internal Access Weld Repair" and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.
> 2. A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1.
> 3. A future developed mechanical/welded repair method subject to the approval of the NRC.

The staff reviewed the applicant's response and found it consistent with the GALL Report and, therefore, acceptable.

In ALRA Table 3.1.2.A-1, the applicant stated that crack initiation and growth due to SCC, IGSCC, and/or cyclic loading of penetrations will be managed using the Water Chemistry Control Program, BWR Penetrations Program, and BWR Vessel Internals Program. As documented in the Audit and Review Report, the staff asked the applicant to clarify which components were managed by its BWR Vessel Internals Program. The applicant responded that the component type penetrations discussed on ALRA Table 3.1.2.A-1include the CRD stub tube and flux monitor penetrations covered by BWRVIP-47.

The staff noted that GALL AMP XI.M8, "BWR Penetration Program," covers BWRVIP-27, which addresses the standby liquid control system nozzle or housing, and BWRVIP-49, which provides guidance for instrument penetrations. As documented in the audit and review, the applicant responded that the CRD stub tube and flux monitor penetrations are managed by BWRVIP-47, which is part of the BWR Vessel Internals Program. The applicant also responded that its Water Chemistry Control Program is applicable to all vessel penetrations; therefore, the line in the ALRA crediting the applicant's BWR Vessel Internals Program also should include the applicant's Water Chemistry Control Program.

In its letter dated December 1, 2005, the applicant supplemented its ALRA with the following changes: (1) the discussion column for ALRA Table 3.1.1.A, Item 3.1.1.A-30 was revised to add the flux monitor penetrations managed by the applicant's BWR Vessel Internals Program; (2) the line item entry for the BWR Vessel Internals Program for penetrations in ALRA Table 3.1.2.A-1 was revised to include the Water Chemistry Control Program. The staff reviewed the applicant's response and found it consistent with the GALL Report and, therefore, acceptable. Therefore, the staff's concern described in a-RAI 3.1.2-1 is resolved.

In its review the staff found that the applicant had addressed the aging effect and aging effect mechanism appropriately as recommended by the GALL Report.

3.1A.2.1.4 Crack Initiation and Growth Due to SCC, IGSCC and/or IASCC

In the discussion section of ALRA Table 3.1.1.A, Item 3.1.1.A-31 the applicant stated that crack initiation and growth due to SCC, IGSCC, and/or IASCC of the core shroud and core plate, support structure, top guide, core spray lines and spargers, control rod drive housing, and nuclear instrumentation guide tubes will be managed using the Water Chemistry Control Program and BWR Vessel Internals Program. As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.1.2.A-2, for example, the applicant's use of Note D, which is credited for the control rod guide tube (CRGT), is not appropriate when comparing CRGTs with the GALL Report and asked the applicant to clarify why Note D is used.

The applicant responded that Note D should be replaced with Note B. Note B is used because the applicant takes exception for its Water Chemistry Control Program. The latest version of the water chemistry guidelines will be implemented in lieu of the guideline provided in BWRVIP-29 (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry." The staff found this implementation acceptable as consistent with the definition of Note B as identified in Nuclear Energy Institute (NEI) 95-10.

In ALRA Table 3.1.2.A-2 the applicant stated that core shroud head bolts and collars will be managed by its BWR Vessel Internals Program with Note D. The staff review found no specific BWR Vessel Internals Program report for this component type. As documented in the Audit and Review Report, the staff asked the applicant to provide additional information as to how its BWR Vessel Internals Program will manage this item along with details of how the applicant inspects core shroud head bolts based on operating experience. The applicant explained that its BWR Vessel Internals Program manages aging of core shroud head bolts and collars. The applicant's BWR Vessel Internals Program includes inspection of NSR components that could impact plant operations. These inspections rely heavily on industry operating experience and such vendor information as GE Nuclear Energy SILs. Based on industry operating experience (SIL 433 and SIL 433 Supplement 1) the applicant's BWR Vessel Internals Program includes a UT inspection program for the shroud head bolts and collars susceptible to IGSCC. Additionally, plant-specific operating experience (SIL 554) already has found evidence of fretting wear of the locking pins and improperly locked shroud head bolts. For these reasons the applicant implemented its BWR Vessel Internals Program to manage aging of core shroud head bolts and collars. As documented in the Audit and Review Report, the staff reviewed the applicant's program basis document and determined that aging of core shroud head bolts and collars is adequately managed using the applicant's BWR Vessel Internals Program.

In ALRA Table 3.1.2.A-2 the applicant credited its BWR Vessel Internals Program for managing aging of the liquid poison spray line and sparger. As documented in the Audit and Review Report, the staff noted that there was no specific BWRVIP report for this component type and asked the applicant to clarify how BWRVIP manages the item with no report for it.

As documented in the Audit and Review Report, the applicant stated that BWRVIP-27, "BWR Vessel and Internals Project, BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines," and BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," are in the basis documents for management of spray line and sparger aging. The basis for BWRVIP-27 aging management is that the spray line connection to the vessel requires inspection while the sparger does not. Both components, however, fall within BWRVIP-47-A baseline requirements. BWRVIP-47-A requires baseline inspection of all components located below the core plate when access is provided. In addition the NRC approval letter of BWRVIP-47-A required at a minimum visual inspection of 5 percent of all welds or components within the first six years of the period, including the liquid poison line and sparger below the core plates. The staff found this basis consistent with the recommendation of the GALL Report and, therefore, acceptable.

In its review the staff found that the applicant had addressed the aging effect and aging effect mechanism appropriately as recommended by the GALL Report.

3.1A.2.1.5 Loss of Fracture Toughness Due to Thermal Aging and Neutron Irradiation Embrittlement

In the discussion section of ALRA Table 3.1.1.A, Item 3.1.1.A-33 the applicant stated that this item is not applicable for the jet pump components as NMP1 has no jet pumps. Aging management of the orificed fuel supports is conducted according to BWRVIP-47 using GALL AMP XI.M9, "BWR Vessel Internals Program."

The GALL Report recommends GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement," to manage the aging effect and aging effect mechanism of loss of fracture toughness due to thermal aging and neutron embrittlement. In a letter dated November 17, 2005, the applicant revised its AMP B2.1.8, "BWR Vessel Internals Program," to address the management of loss of fracture toughness due to neutron fluence and thermal embrittlement for CASS components. The staff's review and evaluation of the applicant's BWR Vessel Internals Program are documented in SER Sections 3.0.3.2.6. The staff found the applicant's BWR Vessel Internals Program acceptable for managing the loss of fracture toughness because the applicant stated that it will meet the GALL AMP XI.M13 recommendations.

In its review the staff found that the applicant had addressed the aging effect and aging effect mechanism appropriately as recommended by the GALL Report.

3.1A.2.1.6 Crack Initiation and Growth Due to Cyclic Loading

In the discussion section of ALRA Table 3.1.1.A, Item 3.1.1.A-27 the applicant stated that NMP1 manages aging of feedwater nozzles with the BWR Feedwater Nozzle Program, consistently with GALL AMP XI.M5, "Feedwater Nozzle." The applicant also stated that GALL AMP X1.M5 is credited with managing cracking of feedwater nozzle thermal sleeves due to SCC. The absence of nozzle cracking proves that the thermal sleeve intended function is not degraded. In addition the applicant stated that for CRDRL nozzles NMP1 manages aging with the BWR CRDRL Nozzle Program, which is consistent with GALL AMP XI.M6, "BWR Control Rod Drive Return Line Nozzle." The applicant also credited GALL AMP X1.M6 with managing CRDRL nozzle thermal sleeves cracking due to SCC. The applicant stated that the absence of nozzle cracking proves that the thermal sleeve intended function is not degraded. In a letter dated September 15, 2005, the applicant stated that its BWR Feedwater Nozzle and BWR CRDRL Nozzle Programs had been removed as the programs credited for the feedwater nozzle and CRDRL nozzle thermal sleeves.

As documented in the Audit and Review Report, the staff asked the applicant to address the aging management for the thermal sleeves. In a letter dated December 1, 2005, the applicant responded that it will use inspections performed under the BWR Vessel Internals Program using surrogate components more readily accessible for examination. For NMP1 the surrogate components will be the feedwater sparger end bracket welds. In this letter the applicant also provided its basis for choosing the feedwater sparger end bracket welds:

> The NMP1 feedwater nozzle thermal sleeves are fabricated from nickel-based Alloy 600 (Inconel 600). A full penetration weld joins the thermal sleeve to the outboard end of the carbon steel feedwater sparger. This weld was made with Alloy 82 and Alloy 182 weld fillers. The thermal-sleeve to sparger weld, or the heat affected zone in the Alloy 600 base material, is considered the most likely location for IGSCC in the thermal sleeve.

The applicant added that each feedwater sparger is supported by end brackets which provide a spring force that helps hold the thermal sleeve in place. The feedwater sparger end bracket welds consist of three welds, the sparger arm to sparger end plate welds (Weld #1), sparger end plate to bracket end plate weld (Weld #2), and the sparger bracket end plate to end bracket assembly welds (Weld #3), which are dissimilar metal welds that use Alloy 182 or 82 weld fillers.

In addition the applicant stated that SCC of the feedwater thermal sleeves or the associated welds is possible but is considered less likely than for other welds with the same weld filler as the feedwater sparger because the inconel-to-carbon steel welds are heat-treated shop welds and not creviced. Service experience has demonstrated that Alloy 82 is resistant to IGSCC in BWR coolant. Alloy 182 is less resistant to IGSCC than Alloy 82 but has performed acceptably with aggravating factors like lack of fusion or a creviced condition. These conditions are more likely in field welds. The Alloy 600-to-carbon steel welds in the thermal sleeve are full-penetration welds and do not create a creviced condition. Additionally, the thermal sleeve assembly was heat-treated after welding. The #1 end bracket welds use Alloy 182 filler metal in a mildly creviced condition, making them more susceptible to IGSCC than the thermal sleeve-to-sparger welds. Additionally, the #1 welds are exposed on the outer diameter to reactor coolant chemistry which has a higher ECP and thus is more likely to cause IGSCC than feedwater, which has a much lower ECP. Therefore, the applicant stated, if cracking is not found in the #1 welds inspection of the thermal sleeve-to-sparger welds is not necessary.

Furthermore, the applicant stated that the most susceptible of the three feedwater sparger end bracket welds (Weld #2) are subject to EVT-1 under BWRVIP. If cracking is found in these welds the other end bracket welds (#1 and #3) are inspected. If cracking is found in the less susceptible end bracket welds the necessity to inspect the thermal sleeve-to-sparger welds will be evaluated. The applicant's BWR Vessel Internals Program will, therefore, be credited with managing cracking of the thermal sleeve as the susceptibility of the critical thermal sleeve weld to IGSCC is bounded by other welds inspected under the applicant's BWR Vessel Internals Program. In its letter dated December 1, 2005, the applicant revised the ALRA to add an EVT-1 examination of the NMP1 feedwater sparger brackets as an enhancement to the BWR Vessel Internals Program to address this issue. The staff reviewed the applicant's response and found it acceptable because the applicant demonstrated that inspection of surrogate components bounds the feedwater thermal sleeve.

In a letter dated December 1, 2005, the applicant also provided operating experience to address the CRDRL nozzle thermal sleeves as follows:

> The inspections of the CRDRL nozzle and safe-ends in 1978 identified IGSCC cracking of the safe-end material, but did not identify fatigue-related cracking. The CRDRL safe-end and the thermal sleeve were replaced in 1978 with design changes to improve resistance to both IGSCC and fatigue. The replacement thermal sleeve material is IGSCC resistant low carbon Type 316L stainless steel material. The thermal sleeve is welded to the safe-end with low carbon Type 308L weld filler. To reduce the probability of fatigue, the thermal sleeve pipe protrudes 7 inches out from the flow shield which promotes mixing away from the vessel wall thus preventing thermal cycling at the vessel wall and at the flow shield.

The applicant stated that as a result of industry operating experience from 2002 and 2003 it completed detailed thermal fatigue assessments and augmented inspections of the safe-end, the thermal sleeve attachment weld to the safe-end, and the thermal sleeve weld to the flow shield. These inspections were performed in 2004 and 2005. The inspections to date have detected no IGSCC or thermal fatigue-related cracking. Because the 2003 operating experience identified cracking of the thermal shield flow baffle on the thermal shield additional EVT-1s of the thermal shield to flow shield weld from the vessel ID are planned for 2007 and at a 10-year frequency thereafter consistent with the ISI inspection interval. This EVT-1 examination of the CRDRL thermal sleeve flow shield weld visible from the vessel ID during each ISI interval is consistent with the frequency adopted for the feedwater nozzle surrogate weld location on the feedwater end brackets.

In addition the applicant stated that a one-time UT of the CRDRL safe-end base metal was performed in 2004 under the NMP augmented ISI program 26 years of operation after the 1978 replacement (three outages prior to the license renewal term). This inspection detected no IGSCC or thermal fatigue cracking of the safe-end location. The inspection was a manual performance demonstration initiative (PDI) qualified inspection and the PDI mockup included the thermal sleeve attachment weld to the safe-end. The exam records note the presence of the thermal sleeve attachment weld. This exam is considered sufficient to detect significant circumferential IGSCC cracking of the thermal sleeve at the thermal sleeve attachment weld; however, consistent with the surrogate weld inspection methodology employed for the feedwater nozzle thermal sleeve, the EVT-1 inspection of the thermal sleeve flow shield weld also will be used as a surrogate weld inspection location for the thermal sleeve to safe-end attachment weld.

In addition to the inspections, the applicant added, temperature monitoring for thermal cycling was performed to confirm that the CRD return flow rates were sufficient at NMP1 to ensure that no unstable thermal cycling from hot reactor water return flow occurs at NMP1. The testing and analyses confirmed the sufficiency of the CRD return flow for stable return line conditions with no reverse flow,

The overall assessment, according to the applicant, was that the safe-end and thermal sleeve replacement with IGSCC-resistant materials and the one-time UT of the thermal sleeve attachment weld after 26 years confirms that the thermal sleeve attachment weld is not a high-risk IGSCC location. In addition the thermal monitoring of this location and the inspection after 26 years of operation also confirmed that no high-cycle thermal fatigue conditions at this location could create high thermal cycle fatigue-related cracking.

Furthermore, the applicant continued, the analyses and one-time inspections in 2004-2005 are adequate to detect potential cracking from either IGSCC or fatigue of the CRDRL nozzle thermal sleeve to safe-end attachment weld. Even though IGSCC is considered a low probability for this location because of the materials of construction the BWRVIP program will include an enhancement starting in 2007. An EVT-1 inspection of the thermal shield to flow shield weld from the vessel ID will be performed at that time and at a 10-year frequency consistently with the ISI interval.

The applicant also stated that in addition to the condition of the flow shield weld this EVT-1 inspection of the thermal sleeve flow shield weld will be a surrogate inspection of the thermal sleeve to the safe-end attachment weld. In its letter dated December 1, 2005, the applicant revised its ALRA as follows:

1. ALRA Sections A1.1.12, A1.4, and B2.1.8 were revised to incorporate the commitment [NMP1 Commitment 40] to perform the EVT-1 inspection of the thermal shield to flow shield weld starting in 2007 and proceeding at a 10-year frequency consistent with the ISI inspection interval thereafter.

2. ALRA Table 3.1.1.A-1, Item 3.1.1.A-27 and ALRA Table 3.1.2.A-1 were revised to reflect the changes.

The staff reviewed the applicant's response and found it acceptable as the applicant's surrogate weld inspection, in addition to the results of its one-time inspections in 2004 to 2005, provide adequate aging management for the CRDRL thermal sleeve.

In its review the staff found that the applicant had addressed the aging effect and aging effect mechanism appropriately for NMP1 CRDRL nozzle thermal sleeves to meet the recommendation of the GALL Report.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that there is reasonable assurance that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.1.2.C of its letter dated August 19, 2005, the applicant provided further evaluation of aging management, for NMPNS, as recommended by the GALL Report for the reactor vessel, internals, and reactor coolant systems components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to pitting and crevice corrosion
- loss of fracture toughness due to neutron irradiation embrittlement
- crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking
- crack growth due to cyclic loading
- changes in dimension due to void swelling
- crack initiation and growth due to stress corrosion cracking or primary water stress corrosion cracking
- crack initiation and growth due to stress corrosion cracking or irradiation-assisted stress corrosion cracking
- loss of preload due to stress relaxation
- loss of section thickness due to erosion

- crack initiation and growth due to PWSCC, ODSCC, or intergranular attack or loss of material due to wastage and pitting corrosion or loss of section thickness due to fretting and wear or denting due to corrosion of carbon steel tube support plate
- loss of section thickness due to flow-accelerated corrosion
- ligament cracking due to corrosion
- loss of material due to flow-accelerated corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.1.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.1A.2.2.1 Cumulative Fatigue Damage

In Section 3.1.2.C.1 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

As documented in the Audit and Review Report, the staff noted that on ALRA Table 3.1.2.A-2 fatigue damage of CRD assemblies (including drive mechanism and housing) will be managed through the TLAA but in ALRA Sections B.2.1-8 the applicant stated that there were no TLAAs. The staff asked the applicant to explain how the specified components are managed for NMP1. The applicant responded that the only reactor vessel internals components for NMP1 with calculations or analyses meeting TLAA criteria are the core shroud tie rod assemblies, the clamps, and the CRD assemblies (including drive mechanism and housing). The tie rod assemblies and clamps are repairs for horizontal and vertical core shroud welds which had ASME III-type stress and fatigue analyses performed during the design process. The pressure boundary portion of the CRD assemblies was evaluated for fatigue. A cumulative usage factor was determined for the CRD penetration including the stub tube, CRD housing, and the stub tube-to-vessel weld and housing-to-stub tube weld. The AMR for the stub tube is addressed in ALRA Table 3.1.2.A-1. The applicant also responded that for reactor vessel internals components where there is no analysis meeting TLAA criteria the AMP column of ALRA Table 3.1.2.A-2 will be modified to replace "TLAA evaluated in accordance with 10 CFR 54.21(c)" with "None." A plant-specific note referencing the relevant BWRVIP inspection and evaluation guideline or other basis for not managing fatigue will be added to ALRA Table 3.1.2.A-2 for each component with "None" in the AMP column for the aging effect and aging effect mechanism of cumulative fatigue damage or where the TLAA is applicable only to a subset of the component type.

In its letter dated December 1, 2005, the applicant responded by revising ALRA Tables 3.1.2.A-2 and 3.1.2.B-2 to address this issue. The staff determined that a high cumulative fatigue usage factor indicates a high potential for crack initiation. Although the applicant's response removed the aging effect of cumulative fatigue damage for those components identified in the December 1, 2005 letter the aging effect of cracking is adequately managed through other AMPs.

The staff reviewed the response and found the applicant's action consistent with the GALL Report and therefore acceptable.

3.1A.2.2.2 Loss of Material Due to Pitting and Crevice Corrosion

The staff reviewed Section 3.1.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.2.

In Section 3.1.2.C.2 of.a letter dated August 19, 2005, the applicant addressed loss of material of isolation condenser components due to general pitting and crevice corrosion.

SRP-LR Section 3.1.2.2.2.2 states that loss of material due to pitting and crevice corrosion could occur in BWR isolation condenser components. The existing program relies on control of reactor water chemistry to mitigate corrosion and on ASME Sections XI ISI. However, the existing program should be augmented to detect loss of material due to pitting or crevice corrosion. The GALL Report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation.

The applicant stated in Section 3.1.2.C.2 of its letter dated August 19, 2005, that NMP1 has emergency (isolation) condensers (ECs). The design of the emergency condensers features end bells welded to the EC shell that are not designed to be removed; therefore, eddy current testing of the tubing is not possible. Loss of material is managed by a combination of several programs. The Water Chemistry Control Program controls chemical contaminants in both the tube and shell side water to prevent conditions that would promote pitting and crevice corrosion. The EC tube side, which is ASME Class 2, is subject to a system inservice pressure test under the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program. The pressure test would detect a tube leak caused by pitting or crevice corrosion. The EC shell is ASME Class 3 and subject to a functional test under the applicant's Inservice Pressure Testing Program, which is part of its ASME Sections XI (Subsections IWB, IWC, and IWD) ISI Program. The functional test would detect loss of material due to pitting and crevice corrosion if the corrosion caused a through-wall leak of the EC shell.

In Section 3.1.2.C.2 of its letter dated August 19, 2005, the applicant also stated that for additional verification that a tube leak does not exist NMP1 will implement an online tube leakage test. The test will be performed by isolating the makeup and drain valves to the emergency condenser tube side and monitoring the shell side level for 24 to 48 hours for any increase in water level on the shell side indicating tube leakage. The online test will be incorporated as a new activity in the Preventive Maintenance Program and will be implemented prior to the period of extended operation.

The staff's review and evaluations of the applicant's Water Chemistry Control and ASME Sections XI (Subsections IWB, IWC, and IWD) ISI and Preventive Maintenance Programs are documented in SER Sections 3.0.3.2.2, 3.0.3.2.1, and 3.0.3.3.1, respectively.

The applicant further stated in Section 3.1.2.C.2 of its letter dated August 19, 2005, that its Preventive Maintenance Program is also credited for managing loss of material due to pitting and crevice corrosion because it includes the temperature monitoring of the emergency cooling system including the heat exchangers. Continuous radiation monitoring of the EC shell side vents also would indicate a tube leak.

In addition in Section 3.1.2.C.2 of its letter dated August 19, 2005, the applicant stated that because none of the activities would detect loss of material due to pitting and crevice corrosion before a leak occurred these activities will be supplemented by a visual inspection for cracking and loss of material of the accessible outer surfaces of the peripheral tubes, tube sheet, and emergency condenser shell. This activity also will be incorporated into the applicant's Preventive Maintenance Program.

As documented in the Audit and Review Report dated January 18, 2006, the staff noted that inaccessibility alone cannot justify exemption from inspection where required for aging management and operating experience (documented in IEB 76-01, "BWR Isolation Condenser Tube Failure") indicates tube cracking as an issue. As documented in the Audit and Review Report, the staff asked the applicant to provide additional justification addressing this issue. The applicant responded that the aging management activities provide adequate assurance with no need for eddy current testing that any tube degradation in the isolation condensers will not lead to a loss of intended function. These activities include water chemistry control, temperature monitoring of the shell side and tube side water, continuous radioactivity monitoring of the condenser vent line, periodic performance testing, and a future on-line tube leakage test. NMP1 has experienced tube leakage previously and replaced the whole tube bundle with upgraded material in 1997. A keep-fill modification also was installed to eliminate the stressor which caused the tube failures. Therefore, the applicant continued because the original isolation condenser tubes lasted 28 years with an aging stressor the new tubes are expected to perform their intended function through the period of extended operation with improved material and upgraded system design and monitoring.

As documented in the Audit and Review Report dated January 18, 2006, the staff during its audits in the week of September 19, 2005, asked the applicant to provide its basis for not performing eddy current testing. In its letter dated December 1, 2005, the applicant provided its basis as follows:

1) Monitoring and detection of conditions in the steam inlet (tube side) and shell side of the isolation condensers ensures conditions will not re-occur.
   a) Water temperature
   b) Water chemistry (conductively, chloride, nitrates, sulfates)

2) A commitment has been made to perform a tube leak test at operating pressure to detect small leaks (NMP1 Commitment 29 and NMP2 Commitment 27).

The staff reviewed the applicant's nuclear commitment tracking list to confirm that the online tube leakage test will be implemented as a new activity in the Preventive Maintenance Program as indicated in Commitment 29 of ALRA Section A1.4. The staff reviewed the applicant's response and determined that NMP1 isolation condenser tube aging is adequately managed and that the tubes will be able to perform their intended function for at least an additional 23 years to the end of the period of extended operation.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.1.2.2.2. For those line items that apply to Section 3.1.2.C.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement

The staff reviewed Section 3.1.2.C.3 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.1.2.2.3.

In Section 3.1.2.C.3 of its letter dated August 19, 2005, the applicant addressed loss of fracture toughness due to neutron irradiation embrittlement of the reactor vessel.

SRP-LR Section 3.1.2.2.3 states that certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3 and that TLAAs must be evaluated in accordance with 10 CFR 54.21(c)(1). SER Section 4.2 documents the staff's review of the applicant's evaluation of this TLAA.

SRP-LR Section 3.1.2.2.3 states that a loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel.

The Reactor Vessel Surveillance Program monitors neutron irradiation embrittlement of the reactor vessel.

In ALRA Table 3.1.2.A-1 the applicant stated that loss of fracture toughness of vessel shells (beltline, lower shell, upper nozzle shell and upper RPV shell, and vessel shell welds including attachment welds) will be managed using its Reactor Vessel Surveillance Program. As documented in the Audit and Review Report, the staff asked the applicant to clarify which areas have neutron fluence exceeding 1E17 n/cm^2 (E>1MeV).

The applicant responded that vessel shells - beltline and vessel shells - lower and the beltline welds have a neutron fluence exceeding 1E17 n/cm^2. Aging of these components is managed by the applicant's Reactor Vessel Surveillance Program. The component type, attachment welds, does not need to be managed by the applicant's Reactor Vessel Surveillance Program because even though these welds receive a neutron fluence greater than or equal to 1E17 n/cm^2 they are not ferritic material. The applicant modified ALRA Table 3.1.2.A-1 to reflect those components managed through its Reactor Vessel Surveillance Program. The staff found this management consistent with the GALL Report and therefore acceptable. In a letter dated December 1, 2005, the applicant revised its ALRA Table 3.1.2.A-1 to address this issue. The staff's review and evaluation of the applicant's Reactor Vessel Surveillance Program are documented in SER Sections 3.0.3.2.16.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.1.2.2.3. For those line items that apply to Section 3.1.2.C.3 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking

The staff reviewed Section 3.1.2.C.4 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.1.2.2.4.

In Section 3.1.2.C.4 of a letter dated August 19, 2005, the applicant addressed crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in small-bore reactor coolant systems and connected system piping less than nominal pipe size (NPS) 4.

SRP-LR Section 3.1.2.2.4 states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in small-bore reactor coolant systems and connected system piping less than NPS 4. The existing program relies on ASME Section XI ISI and on control of water chemistry to mitigate SCC. The GALL Report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and that the component intended function will be maintained during the extended period. The AMPs should be augmented to verify that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4 including pipe, fittings, and branch connections. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect and aging effect mechanism is not occurring and that the component's intended function will be maintained during the period of extended operation.

In the ALRA, the applicant also stated that for NMP1 aging of the subject small-bore piping is managed by the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program, Water Chemistry Control Program, and One-Time Inspection Program.

Additionally, the applicant stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that for small-bore piping and fittings in the NMP1 CRD system not part of its ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program, it credits only its Water Chemistry Control and One-Time Inspection Programs for aging management.

The applicant further stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that for the small-bore piping whether included in its ASME Sections XI (Subsections IWB, IWC, and IWD) ISI Program or not the inspections conducted under its One-Time Inspection Program will consist of either NDEs using methods with demonstrated capability to detect cracks on the inside surfaces of the piping or destructive examinations. Both nondestructive and destructive examinations will be of a sample of the piping.

In ALRA Table 3.1.2.A-5 the applicant stated that aging of CASS valves will be managed using its ASME Section XI (Subsections IWB, IWC, and IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs. The intended functions of the CASS valve are leakage boundary (spatial) (LBS) and structural integrity attached (SIA). As documented in the Audit and Review Report, the staff noted that LBS and SIA apply only to NSR components. The applicant was informed and replied that its statement was an editorial mistake. The applicant revised ALRA Table 3.1.2.A-5 to assign its ASME Section XI (Subsections IWB, IWC, and IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs to manage aging of the pressure boundary valves and its One-Time Inspection and Water Chemistry Control Programs to manage aging of the LBS and SIA valves. In a letter dated December 1, 2005, the applicant revised ALRA Table 3.1.2.A-5 to address this issue. The staff found this revision consistent with the GALL Report and therefore acceptable.

The staff's review and evaluation of the applicant's ASME Sections XI (Subsection IWB, IWC, and IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs are documented in SER Sections 3.0.3.2.1, 3.0.3.1.4 and 3.0.3.2.2, respectively.

In addition the staff reviewed ALRA Sections 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.2.

Also in Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant addressed crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in BWR vessel flange leak detection lines and BWR jet pump sensing lines.

SRP-LR Section 3.1.2.2.4 also states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in the BWR vessel flange leak detection line and the BWR jet pump sensing line. The GALL Report recommends that a plant-specific aging management program be evaluated to mitigate or detect crack initiation and growth due to SCC of vessel flange leak detection lines.

The applicant stated in the letter dated August 19, 2005, that for NMP1 cracking of the vessel flange leak detection lines is managed by the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program, One-Time Inspection Program, and Water Chemistry Control Program. The inspections conducted under the applicant's One-Time Inspection Program consist of either NDEs using methods with a demonstrated capability to detect cracks on the inside surfaces of the piping or destructive examinations. Both nondestructive and destructive examinations will be of a sample of the piping.

The applicant also stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that NMP1 has no jet pump sensing line; therefore, the aging effect and aging effect mechanism of jet pump sensing lines cracking is not applicable to NMP1.

In ALRA Table 3.1.2.A-1, the applicant stated that aging of wrought austenitic stainless steel (WASS) valves will be managed by its ASME Section XI (Subsection IWB, IWC, and IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs. The intended functions of the component are LBS and SIA associated with NSR components. As documented in the Audit and Review Report, the staff asked the applicant to explain why NSR components are managed by ASME ISI and why ALRA Table 3.1.1.A, Item 3.1.1.A-08 was determined to belong to this component type if it is NSR. The applicant stated that small-bore valves associated with the vessel flange leak detection lines are NSR for NMP1. These lines/valves have an ISI pressure test performed when there is an RFO; hence, WASS valves are managed by the applicant's ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program. The staff found this management acceptable as consistent with the GALL Report.

The staff's review and evaluation of the applicant's ASME Section XI (Subsections IWB, IWC, and IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs are documented in SER Sections 3.0.3.2.1, 3.0.3.1.4 and 3.0.3.2.2, respectively.

In addition the staff reviewed ALRA Section 3.1.2.C.4 against the criteria of SRP-LR Section 3.1.2.2.4.3.

Also in Section 3.1.2.C.4 of the letter dated August 19, 2005, the applicant addressed crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in BWR isolation condenser components. SRP-LR Section 3.1.2.2.4.3 states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in BWR isolation condenser components. The program relies on control of reactor water chemistry to mitigate SCC and on ASME Section XI ISI; however, the program should be augmented to detect cracking due to SCC or cyclic loading. The GALL Report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation.

The applicant stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that NMP1 has ECs. The EC design features end bells welded to the EC shell not designed to be removed; therefore, eddy current testing of the tubing is not possible. Cracking is managed by several programs. The Water Chemistry Control Program controls chemical contaminants in both tube and shell side water to prevent conditions that would promote cracking. The EC tube side, which is ASME Class 2, is subject to a system inservice pressure test under the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program. The pressure test detects tube leaks caused by cracking. The EC shell is ASME Class 3 and subject to a functional test under the applicant's Inservice Pressure Testing Program which is part of its ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program. The functional test would detect cracking due to SCC or cyclic loading if the crack caused a through-wall leak of the EC shell.

In Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant also stated that for additional confirmation of no tube leaks NMP1 will implement an online tube leakage test. The test will isolate the makeup and drain valves to the EC tube side and monitor the shell side water level for 24 to 48 hours. A water level rise on the shell side during the test would indicate tube leakage. The online test will be incorporated as a new activity in the Preventive Maintenance Program. The new activity will be implemented prior to the period of extended operation.

In addition the applicant stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that its Preventive Maintenance Program is also credited for detecting cracking because it includes the temperature monitoring of the emergency cooling system including the heat exchangers. Temperature monitoring can indicate tube leaks quickly. Continuous radiation monitoring of the EC shell side vents also would detect a tube leak.

In Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant also stated that because none of these activities would detect crack initiation or SCC before a leak occurred they will be supplemented by a visual inspection for cracking from the accessible outer surfaces of the peripheral tubes, tube sheet, and EC shell. This inspection also will be incorporated into the applicant's Preventive Maintenance Program.

The staff's review and evaluation of the applicant's Water Chemistry Control, ASME Section XI (Subsections IWB, IWC, and IWD) ISI, and Preventive Maintenance Programs are documented in SER Sections 3.0.3.2.2, 3.0.3.2.1 and 3.0.3.3.1, respectively.

As documented in the Audit and Review Report dated January 18, 2006, the staff noted that inaccessibility alone cannot justify exemption from inspection required for aging management and operating experience (documented in Inspection and Enforcement Bulletin (IEB) 76-01, "BWR Isolation Condenser Tube Failure") indicates cracking as an issue. As documented in the Audit and Review Report, the staff asked the applicant to provide additional justification to address this issue. The applicant responded that the aging management activities provide adequate assurance with no need for eddy current testing that any tube degradation in the isolation condensers will not lead to a loss of intended function. These activities include water chemistry control, temperature monitoring of the shell side and tube side water, continuous radioactivity monitoring of the condenser vent line, periodic performance testing, and a future on-line tube leakage test. NMP1 experienced tube leakage previously and replaced the whole tube bundle with upgraded material in 1997. A keep fill modification also was installed to eliminate the stressor which caused the tube failures. Therefore, the applicant continued in response, because the original isolation condenser tubes lasted 28 years with an aging stressor the new tubes are expected to perform their intended function through the period of extended operation with improved material, upgraded system design, and monitoring.

As documented in the Audit and Review Report dated January 18, 2006, the staff asked the applicant during its audits in the week of September 19, 2005, to provide its basis for not performing eddy current testing. In a letter dated December 1, 2005, the applicant provided its basis:

1) Condition and stresses that are precursors to SCC of tubes have been eliminated by:

   a) Lowering temperature of the tubes primary and shell side water
   b) Maintaining shell side water chemistry
   c) Maintaining BWR primary water chemistry

2) The susceptibility of the tubes to SCC has been improved by design changes to:

   a) Replace the tube bundle material with Type 316 stainless steel (low carbon)
   b) Install a keep fill system to maintain steam water interface above top of tube bundle (no thermal cycles)

3) Monitoring and detecting in the steam inlet (tube) side and shell side of the isolation condensers ensure that conditions will not recur

   a) Water temperature
   b) Water chemistry (conductively, chloride, nitrates, sulfates)

4) A commitment has been made to perform a tube leak test at operating pressure to detect small leaks.

The staff reviewed the applicant's nuclear commitment tracking list to confirm that the online tube leakage test will be implemented as a new activity in the Preventive Maintenance Program as stated in NMP1 Commitment 29. The staff reviewed the applicant's response and determined that NMP1 isolation condenser tube aging is adequately managed and that the tubes will be able to perform their intended function at least an additional 23 years to the end of the period of extended operation.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.1.2.2.4. For those line items that apply to Section 3.1.2.C.4 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.5 Crack Growth due to Cyclic Loading (NMP1)

The staff reviewed Section 3.1.2.C.5 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.5.

In Section 3.1.2.C.5 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.5 states that crack growth due to cyclic loading could occur in the reactor vessel shell and the reactor coolant system piping and fittings. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.6 Changes in Dimension due to Void Swelling

The staff reviewed Section 3.1.2.C.6 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.6.

In Section 3.1.2.C.6 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.6 states that changes in dimension due to void swelling could occur in reactor internal components. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.7 Crack Initiation and Growth due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking

The staff reviewed Section 3.1.2.C.7 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.7.

In Section 3.1.2.C.7 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.7 states that crack initiation and growth due to SCC and PWSCC could occur: (1) in PWR core support pads (or core guide lugs), instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains; (2) in PWR CASS reactor coolant system piping and fittings and pressurizer surge line nozzles; and (3) in PWR pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni alloys. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.8 *Crack Initiation and Growth due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking*

The staff reviewed Section 3.1.2.C.8 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.8.

In Section 3.1.2.C.8 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.8 states that crack initiation and growth due to SCC or IASCC could occur in baffle/former bolts in Westinghouse and B&W reactors. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.9 *Loss of Preload due to Stress Relaxation*

The staff reviewed Section 3.1.2.C.9 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.9.

In Section 3.1.2.C.9 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.9 states that loss of preload due to stress relaxation could occur in baffle/former bolts in Westinghouse and B&W reactors. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.10 *Loss of Section Thickness due to Erosion*

The staff reviewed Section 3.1.2.C.10 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.10.

In Section 3.1.2.C.10 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.10 states that loss of section thickness due to erosion could occur in steam generator feedwater impingement plates and supports. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.11 Crack Initiation and Growth due to PWSCC, ODSCC, or Intergranular Attack or Loss of Material due to Wastage and Pitting Corrosion or Loss of Section Thickness due to Fretting and Wear or Denting due to Corrosion of Carbon Steel Tube Support Plate

The staff reviewed Section 3.1.2.C.11 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.11.

In Section 3.1.2.C.11 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.11 states that crack initiation and growth due to PWSCC, ODSCC, or IGA or loss of material due to wastage and pitting corrosion or deformation due to corrosion could occur in alloy 600 components of the steam generator tubes, repair sleeves and plugs. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.12 Loss of Section Thickness due to Flow-accelerated Corrosion

The staff reviewed Section 3.1.2.C.12 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.12.

In Section 3.1.2.C.12 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.12 states that loss of section thickness due to flow-accelerated corrosion could occur in tube support lattice bars made of carbon steel. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.13 Ligament Cracking due to Corrosion

The staff reviewed Section 3.1.2.C.13 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.13.

In Section 3.1.2.C.13 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.13 states that ligament cracking due to corrosion could occur in carbon steel components in the steam generator tube support plate. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.14 Loss of Material due to Flow-accelerated Corrosion

The staff reviewed Section 3.1.2.C.14 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.14.

In Section 3.1.2.C.14 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.14 states that loss of material due to flow-accelerated corrosion could occur in feedwater inlet ring and supports. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP1.

3.1A.2.2.15 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.1.2.A-1 through 3.1.2.A-5, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.1.2.A-1 through 3.1.2.A-5, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

The staff's review as provided in the following sections of this safety evaluation is limited to those components not consistent with or not addressed in the GALL Report for the following systems in the NMP1 reactor coolant system (RCS) group, the RPV, RPV internals, RPV instrumentation system, and CRD system. The assessment for the NMP1 RPV valves, reactor recirculation system components, and the CRD system valves are addressed in SER Section 3.1A.2.3.4.

3.1A.2.3.1 Reactor Vessel, Internals, and Reactor Coolant System – NMP1 Reactor Pressure Vessel – Summary of Aging Management Evaluation – ALRA Table 3.1.2.A-1

The NMP1 RPV contains and supports the reactor core, reactor internals, and the reactor coolant/moderator. The RPV forms part of the reactor coolant pressure boundary (RCPB) and serves as a barrier against leakage of radioactive materials to the drywell. The NMP1 RPV is a vertical, cylindrical pressure vessel with hemispherical heads. The cylindrical shell and hemispherical heads are fabricated from low-alloy carbon steel clad on the interior with stainless steel weld overlay. The top head secured to the vessel with studs and nuts includes two concentric seal-rings between the vessel head flange and the vessel flange to prevent reactor coolant leakage. The top head leak detection line taps off of the vessel head between the seal rings to detect leakage if the inner seal-ring fails. The top head also includes nine safety valves that prevent overpressurization of the RPV. The vessel shell and bottom head include penetration nozzles for the various systems that comprise the RCPB including the CRD housing and in-core instrumentation thimbles. The RPV is supported by a steel skirt welded to the bottom head. The base of the skirt is supported circumferentially by a ring girder and sole plate fastened to a concrete foundation which carries the load of the reactor building foundation slab.

Summary of Technical Information in the Application. The applicant's plant-specific AMRs for the RPV components are listed in ALRA Table 3.1.2.A-1. The specific RPV components for NMP1 that have AMR results not consistent with or not addressed in the GALL Report and within the scope of ALRA Table 3.1.2.A-1 include:

- RPV core differential pressure, CRD stub tube, flux monitor, instrumentation, and vessel drain penetrations
- RPV support skirt and attachment welds
- RPV top head closure studs and nuts
- RPV valves

The applicant identified the materials of fabrication for these RPV components as carbon steel and low alloy steel. The applicant identified the applicable environments for these RPV components as containment air, non-borated water, and treated water (including steam).

The applicant credited the FAC Program with managing loss of material for the RPV core differential pressure, CRD stub tube, flux monitor, instrumentation, and vessel drain penetrations. The ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program is credited for the managing loss of material for the RPV support skirt and attachment welds. The Water Chemistry Control Program and the One-Time Inspection Program are credited for managing the loss of material for the RPV valves. The applicant credited the Reactor Head Closure Studs Program with managing loss of material for the RPV top head closure studs and nuts. In addition, the applicant credited TLAA 4.3, "Thermal Fatigue," with managing cumulative fatigue damage of the RPV top head closure studs and nuts. The applicant credited the Selective Leaching of Materials Program and the Water Chemistry Control Program with managing loss of material for the CRD system valves.

Staff Evaluation. The staff reviewed ALRA Table 3.1.2.A-1, which summarizes the results of AMR evaluations for the RPV component groups. The staff's assessment of the RPV components not consistent with or not addressed in the GALL Report for NMP1 is provided in this section. The assessment for the NMP1 RPV valves is provided in SER Section 3.1A.2.3.4.

RPV Core Differential Pressure, CRD Stub Tube, Flux Monitor, Instrumentation, and Vessel Drain Penetrations

Identification of Aging Effects - In ALRA Table 3.1.2.A-1, the applicant indicated that loss of material due to FAC is an aging effect for the core differential pressure, CRD stub tube, flux monitor, instrumentation, and vessel drain penetrations fabricated from carbon or low-alloy steel and exposed to a treated water or steam in a high-temperature environment.

FAC is a phenomenon in which repetitive cycles of corrosion and erosion cause wall thinning of carbon or low-alloy steel components exposed to high temperature, high velocity water or water-steam environments. Normally, FAC occurs only if the environmental temperatures are above 200°F. The rate of metal loss depends on a complex interplay of many factors like water chemistry, material composition, and hydrodynamics.

The staff determined that the applicant indicated adequately that loss of material due to FAC is an AERM for the core differential pressure, CRD stub tube, flux monitor, instrumentation, and vessel drain penetrations exposed to these environments. This aging effect is not addressed in the GALL Report Volume 2 for these components, materials, and environments; therefore, the staff found the applicant's approach acceptable because it is conservative relative to the GALL Report Volume 2 and is consistent with the EPRI Report, "Recommendations for an Effective Flow-Accelerated Corrosion Program."

Aging Management Programs - In ALRA Table 3.1.2.A-1, the applicant credits the FAC Program with aging management of the core differential pressure, CRD stub tube, flux monitor, instrumentation, and vessel drain penetrations for loss of material due to FAC. Even though the GALL Report Volume 2 does not address an AMP for these components, materials, and environments, it does recommend crediting the Flow-Accelerated Corrosion Program with managing wall thinning of carbon steel piping and fitting components due to FAC; therefore, the staff found the applicant's proposal conservative relative to the GALL Report Volume 2, and acceptable. The applicant's FAC Program is an AMP entirely consistent with GALL AMP XI.M17. The staff's evaluation of the FAC Program is in SER Section 3.0.3.1.3.

RPV Support Skirt and Attachment Welds

Identification of Aging Effects - In ALRA Table 3.1.2.A-1, the applicant indicated that loss of material due to general corrosion is an aging effect for RPV support skirt and attachment welds fabricated from carbon or low-alloy steel and exposed to an environment of "air with thermal fatigue." The applicant definition of "air with thermal fatigue" is "this environment is applied to components exposed to air, that are also subject to thermal cycles of sufficient magnitude for thermal fatigue to be a concern." The air environment is the containment air surrounding the RPV and the support skirt.

GALL Report Volume 2 does not identify loss of material due to general corrosion as an aging effect in carbon and low-alloy steel when these materials are exposed to an environment of containment air; however, carbon and low-alloy steel may rust or corrode in air with elevated humidity. The staff concludes that the applicant has addressed this issue conservatively; therefore, the staff found the applicant's identification of this AERM acceptable for the RPV support skirt and attachment welds.

Aging Management Programs - In ALRA Table 3.1.2.A-1, the applicant credits the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program with aging management of the RPV support skirt and attachment welds for loss of material due to general corrosion. By letter dated November 22, 2005, the staff indicated that it agreed with the applicant in crediting the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program with managing the RPV attachment welds for loss of material due to general corrosion; however, the staff requested that the applicant address why the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program was credited with managing the RPV support skirt for loss of material due to general corrosion. Instead, the staff recommended that this aging effect in the RPV support skirt be managed by the ASME Section XI (Subsection IWF) ISI Program because the RPV support skirt is an ASME Class MC support. By letter dated December 5, 2005, the applicant revised Table 3.1.2.A-1 to indicate that the AERM of loss of material of the RPV support skirt would be managed by the ASME Section XI (Subsection IWF) ISI Program. The staff found the applicant's response acceptable because the RPV support skirt is an ASME Class MC component and, therefore, is managed appropriately by the ASME Section XI (Subsection IWF) ISI Program.

GALL Report Volume 2 does not identify an AMP for managing loss of material due to general corrosion for these components, materials, and environments. The staff found the applicant's proposal conservative relative to the GALL Report Volume 2 and, therefore, acceptable. The applicant's ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program is an AMP consistent with GALL AMP XI.M1 with exceptions. The staff's evaluation of the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program is in SER Section 3.0.3.2.1. The applicant's ASME Section XI (Subsection IWF) Program is an AMP consistent with GALL AMP XI.S3 with exceptions. The staff's evaluation of the ASME Section XI (Subsection IWF) Program is in SER Section 3.0.3.2.19.

RPV Top Head Closure Studs and Nuts

Identification of Aging Effects - In ALRA Table 3.1.2.A-1, the applicant indicated that loss of material due to general, crevice, and pitting corrosion is an aging effect applicable to the RPV top head closure studs and nuts fabricated from carbon or low-alloy steel and exposed to an environment of non-borated water systems with operating temperatures ≥ 212 °F leaking fluid (i.e., leakage of the reactor coolant).

GALL Report Volume 2 identifies crack initiation and growth, SCC and IGSCC as aging effects for RPV top head closure studs and nuts fabricated from carbon or low alloy steel exposed to air, leaking reactor coolant water, or steam at 288 °C, but does not identify loss of material due to crevice, general, and pitting corrosion as aging effects in carbon and low-alloy steel exposed to leakage of the non-borated reactor coolant or the steam environment. However, carbon and low-alloy steel may rust or corrode when exposed to aqueous liquids. The staff concludes that the applicant has conservatively addressed this issue; therefore, the staff found the applicant's identification of this AERM acceptable.

Also, in ALRA Table 3.1.2.A-1, the applicant indicated that cumulative fatigue damage is an aging effect applicable to the RPV top head closure studs and nuts because of thermal cycling of heatup and cooldown and other transient operating conditions of these components. The staff found this indication acceptable because it meets the provisions in SRP-LR Chapter 3.1-1800 Revision 1 Report for assessing cumulative fatigue damage in ASME Code Class 1 components. SER Section 4.3 discusses the staff's assessment of those plant components required to have thermal fatigue analyses for license renewal.

Aging Management Programs - In ALRA Table 3.1.2.A-1, the applicant credits the Reactor Head Closure Studs Program with aging management of loss of material due to general, pitting, and crevice corrosion of the RPV top head closure studs and nuts. Even though the GALL Report Volume 2 does not identify an AMP for these components, materials, and environments the staff found the applicant's proposal conservative relative to the GALL Report Volume 2 and, therefore, acceptable. The applicant's Reactor Head Closure Studs Program is an AMP consistent with an exception with GALL AMP XI.M3. The staff's evaluation of the Reactor Head Closure Studs Program is in SER Section 3.0.3.2.3.

In ALRA Table 3.1.2.A-1, the applicant proposed in ALRA Section 4.3 to use the TLAA for assessing cumulative fatigue damage of the RPV top head closure studs and nuts. This proposal is consistent with the GALL Report Revision 1 and is, therefore, acceptable. The staff's evaluation of the applicant's TLAA on thermal fatigue of ASME Code Class 1 components is in SER Section 4.3.

RPV Valves

The review of the RPV valves is provided in SER Section 3.1A.2.3.4.

Conclusion. The staff has reviewed the applicant's plant-specific AMRs for the RPV components exposed to the containment air, non-borated water, and treated water (including steam) environments. For these AMRs, the staff has determined that the applicant has identified the aging effects applicable for these components exposed to these environments. The staff has also determined that the applicant has credited either an appropriate inspection-based AMP, an appropriate mitigation-based AMP, a TLAA, or combination of these strategies to manage the aging effects applicable to the RPV components exposed to these environments. On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the NMP1 RPV will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3.2 Reactor Vessel, Internals, and Reactor Coolant System – NMP1 Reactor Pressure Vessel Internals – Summary of Aging Management Evaluation – ALRA Table 3.1.2.A-2

The NMP1 RPV internals support the core and other internal components, maintain fuel configuration (coolable geometry) during normal operation and accident conditions, and maintain reactor coolant flow through the core. The RPV internals consist of the components internal to the RPV, mainly the reactor core, core shroud, core shroud stabilizers, core shroud support structures, top guide, CRD guide tubes, feedwater sparger, core spray spargers, liquid poison sparger, steam separator assembly, and the steam dryer assembly. All of the RPV internals except the shroud support assembly and springs in the fuel assemblies are fabricated from stainless steel. The shroud support plates, spacers, tie rods, head bolts, and associated welds are fabricated from nickel-based alloys. The shroud support essentially sustains all of the vertical weight of the core structure and the steam separator assembly. Each guide tube with its fuel support casing bears the weight of four fuel assemblies and rests on a CRD housing welded to the stub tube mounted on the vessel bottom head.

The applicant's plant-specific AMRs for the RPV internal components are identified in ALRA Table 3.1.2.A-2. The staff determined that no RPV internal components for NMP1 have AMR results not consistent with or addressed in the GALL Report. Therefore, in this review, the staff did not perform an evaluation of the NMP1 RPV internal components.

3.1A.2.3.3 Reactor Vessel, Internals, and Reactor Coolant System – NMP1 Reactor Vessel Instrumentation System – Summary of Aging Management Evaluation – ALRA Table 3.1.2.A-3

The NMP1 RPV instrumentation system monitors and transmits information about key RPV operating parameters during normal and emergency operations. Instrumentation is installed to monitor reactor parameters and indicate these on meters, chart recorders, and hydraulic indicator units located in the control room, on remote shutdown panels, and in instrument rooms. The parameters monitored are RPV temperature, water level and pressure, core differential pressure, core spray sparger break (differential pressure), and reactor safety valve position. This system also provides control signals to various systems which in turn initiate appropriate actions required if a monitored parameter exceeds a desired set point. Systems receiving control signals from the RPV instrumentation system include the reactor protection, automatic depressurization, anticipated transient without scram (ATWS), feedwater/high pressure coolant injection (HPCI), and shutdown cooling systems. The top head leak detection line is addressed with the RPV (ALRA Section 2.3.1.A.1). The RPV instrumentation system consists of piping, valves, and excess flow check valves that provide a fluid path from the RPV to various instrumentation.

The applicant's plant-specific AMRs for the RPV instrumentation system components are identified in ALRA Table 3.1.2.A-3. The staff determined that no RPV instrumentation system components for NMP1 have AMR results not consistent with or not addressed in the GALL Report. Therefore, in this review, the staff did not perform an evaluation of the NMP1 RPV instrumentation system components.

3.1A.2.3.4 Reactor Vessel, Internals, and Reactor Coolant System – NMP1 Reactor Recirculation System – Summary of Aging Management Evaluation – ALRA Table 3.1.2.A-4

Summary of Technical Information in the Application. The description of the reactor recirculation system, recirculation flow control, and the control of the reactor recirculation pumps can be found in ALRA Section 2.3.1.A.4. The portion of the reactor recirculation system containing components subject to AMR includes the entire main reactor recirculation flow path which begins at the suction nozzle to and ends at the discharge nozzle of each recirculation loop for NMP1. SR instrument piping and associated components connected to the recirculation loops are also subject to AMR. The components requiring an AMR for the reactor recirculation system and their intended functions are shown in ALRA Table 2.3.1.A.4-1. The AMR results for these components are provided in ALRA Table 3.1.2.A-4. However, the staff has used in its evaluation the following information provided in the original LRA pertinent to the reactor recirculation system.

The materials of construction for NMP1 are carbon or low-alloy steel (yield strength < 100 Ksi and > 100 Ksi), cast austenitic stainless steel, and wrought austenitic stainless steel.

In the original LRA Section 3.1.2.A.4 the applicant lists the following environments to which the NMP1 Reactor Recirculation System components are exposed:

- air
- closure bolting for non-borated water systems with operating temperatures ≥ 212 °F
- treated water, temperature < 140 °F, low flow
- treated water or steam, temperature > 482 °F
- treated water or steam, temperature > 482 °F, low flow

The following AMPs manage these aging effects in the NMP1 reactor recirculation system components:

- ASME Code Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Bolting Integrity Program
- BWR Stress Corrosion Cracking Program
- One-Time Inspection Program
- Water Chemistry Control Program
- System Walkdown Program

Staff Evaluation. The applicant described its AMR for the reactor recirculation system in ALRA Section 3.1. The staff reviewed this section to determine whether the applicant had identified all aging effects applicable to components in these systems and demonstrated that the effects of aging on the components will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe them.

The applicant identified the following aging effects for the reactor recirculation system:

- cracking
- cumulative fatigue damage
- loss of fracture toughness

- loss of material
- loss of preload

In ALRA Table 3.1.2.A-4 the applicant identified cracking and cumulative fatigue damage as aging effects applicable to the recirculation system closure bolting, piping and fittings, recirculation pumps, and valves. Cumulative fatigue damage is evaluated in SER Section 4.3, "Metal Fatigue Analysis." The aging effect of loss of fracture toughness is associated with the pressure boundary materials in reactor recirculation pumps and in valves made of cast austenitic stainless steel and operating at or above 480 °F. Loss of material has been detected as an aging effect in carbon or low-alloy steel and austenitic stainless steel with treated water environment operating below 140 °F for such components as piping and fittings, valves, and restriction orifices in the reactor recirculation system. The loss of preload is an aging effect applicable to closure bolting for non-borated water systems operating at or above 212 °F. The staff notes that this assessment is consistent with the GALL Report.

The applicant identified cracking as an aging effect applicable to the recirculation system austenitic stainless steel components (piping and fittings, tubing, valve bodies, flow elements, thermowells, restricting orifices) and to the high-strength low-alloy steel primary pressure closure bolting exposed to reactor coolant water. The applicant also identified this aging effect for cast stainless steel components exposed to reactor coolant water. The applicant identified crack initiation and growth due to thermal and mechanical loading as an aging effect applicable to small-bore stainless steel piping and fittings and low-alloy steel pressure boundary closure bolting in the reactor recirculation system. The staff notes that this assessment is consistent with the GALL Report. The staff requested confirmation that the applicant had no flaws evaluated according to IWB-3600, "Analytical Evaluation of Flaws," under the ASME Code Section XI ISI Program as such an evaluation would require a TLAA under the regulation. The applicant's response indicated that the NMP1 Reactor Recirculation System contains five welds that had flaw evaluations performed according to IWB-3600. Re-inspection of each weld found no growth of the indication. The applicant's evaluation determined that each of the indications was related to the fabrication of the component and was not caused by IGSCC. The staff previously had accepted the applicant's evaluation. Therefore, there is no TLAA required for any of the subject flaw evaluations.

The applicant stated under item number 3.1.1.A-07 in ALRA Table 3.1.1.A, that for small-bore reactor coolant system and connected systems piping a plant-specific destructive examination or an NDE of the inside surfaces will be conducted as part of a one-time inspection to verify that service-induced weld cracking has not occurred. Additionally, for small bore piping and fittings in the NMP1 CRD system not part of the ISI program NMP1 credits only the Water Chemistry and One-Time Inspection Programs. The applicant's One-Time Inspection AMP is described in ALRA Section B.2.1.20 and the applicant states that it is consistent with GALL Report AMP XI.M32, "One-Time Inspection."

In ALRA Table 3.1.2.A-1, applicable to the vessel drain line, the applicant identified cumulative fatigue damage and cracking as aging effects requiring management. The applicant uses TLAA to manage cumulative fatigue damage and the BWR Penetration Program and Water Chemistry Control Program to manage cracking. Because of the size of the drain line volumetric examination is not required by ASME Code Section XI. In response to the staff's request for information about the adequacy of the AMP applicable to the reactor vessel drain line not volumetrically examined the applicant stated that the ASME Code Section XI pressure test is performed at every refueling outage. As a function of the pressure test a concurrent VT-2 examination is performed according to acceptance standards stated in Subsection IWB-3522. The source of any leakage detected during this examination is required to be located and evaluated according to Subsection IWA-5250 prior to return of the system to service. One source of leakage could be through-wall pitting or crevice corrosion as the loss of material mechanism applicable to stainless steel piping and components. Also performed at every inspection interval under the ISI program according to the acceptance standards stated in Subsection IWB-3517 is a VT-1 examination of all reactor vessel drain line bolting, studs, and nuts. The staff considers the AMPs of the reactor vessel drain line effective for the period of extended operation.

In ALRA Table 3.1.1.A-1, item number 3.1.1.A-09, the applicant identified SCC and cyclic loading as aging effects for isolation condensers and credits the Preventive Maintenance Program for managing them. The isolation condensers are parts of the reactor coolant pressure boundary and, therefore, should be inspected according to ASME Code Section XI. The Preventive Maintenance Program does not require volumetric examination for structural integrity of pressure boundary material or welds. In response to the staff's request for information on the management of aging effects of cracking in stainless steel tubes and in shell welds the applicant stated that ASME Section XI Inservice Inspection (Subsections IWB, IWC, and IWD) and the Water Chemistry Control Programs are credited in addition to the Preventive Maintenance Program for managing the aging effect of cracking in stainless steel tubes and in shell welds. Continuous radiation monitoring of the isolation condenser shell also is credited. These changes utilize detection methods in addition to visual inspection to ensure detection and correction of aging degradation prior to a loss of intended function. These revisions to ALRA Table 3.1.1.A bring the credited programs in line with the guidance of GALL Report Item IV.C1.4-a for the NMP1 isolation condensers.

In reviewing ALARA Table 3.1.1.A-1, the staff requested that the applicant to submit additional information about its plant-specific experience with IGSCC of the reactor coolant pressure boundary piping, mitigative actions taken, and revised inspection schedules following the BWRVIP-75A guidelines. The staff requested that the applicant provide information on how its implementation of HWC and NMCA at NMP1 has affected monitoring of water chemistry parameters. In its response, the applicant stated that recent plant-specific experience at NMP1 had detected indications in four reactor recirculation system welds during the 1999 refueling outage. The applicant performed its re-inspection evaluations, and determined that the indications were fabrication-related and not from IGSCC. The scope and schedule of inspection for IGSCC are according to GL 88-01 as modified by BWRVIP-75A. The current inspection schedule except for Category A welds subsumed in the alternate Risk-Informed ISI Program is consistent with the revised inspection frequency allowed by BWRVIP-75A for normal water chemistry. In implementing HWC and NMCA, NMP1 began treating the reactor vessel internals with noble metal chemicals in May 2000 and began injecting hydrogen into reactor water in June 2000. The impact for NMP1 operating under HWC versus normal water chemistry is that the electrochemical potential is monitored with a goal of < -0.23V SHE (standard hydrogen reference electrode) to verify the effectiveness of HWC.

The staff's review concludes that the applicant has identified the appropriate aging effects for the components in the NMP1 reactor recirculation system.

Conclusion.The staff concludes that there is reasonable assurance that the applicant adequately identified the aging effects and the AMPs credited for managing them for the reactor recirculation system and that the components' intended functions will be maintained consistently with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3). The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate program description of the AMPs credited for managing aging in the reactor coolant system – recirculation system as required by 10 CFR 54.21(d).

3.1A.2.3.5 Reactor Vessel, Internals, and Reactor Coolant System – NMP1 Control Rod Drive System – Summary of Aging Management Evaluation – ALRA Table 3.1.2.A-5

The NMP1 CRD system is designed to change core reactivity by changing the position of control rods within the reactor core in response to manual control signals and to scram the reactor in response to manual or automatic signals. The system also provides high-pressure makeup to the RPV for a specified leakage of 25 gpm and provides core cooling in the case of a small line break (up to 0.003 ft^2). The CRD system also provides water to the RPV level instrumentation reference leg backfill system and to the keep-fill system for the emergency cooling system.

Summary of Technical Information in the Application. The applicant's plant-specific AMRs for the CRD system components are given in ALRA Table 3.1.2.A-5 and in the revised Table 3.1.2.A-5 of the applicant's letter dated December 20, 2005. The specific CRD system components for NMP1 that have AMR results that are not consistent with, or not addressed in, the GALL Report include:

- CRD system valves
- CRD pumps

The applicant identifies that the materials of fabrication for these CRD system components include copper alloys, aluminum bronze, and wrought austenitic stainless steel. The applicant identifies that the applicable environments for these CRD system components include treated water, temperature ≥ 140 °F, but < 212 °F, low flow environments (i.e., the reactor coolant environment).

The applicant credits the One-Time Inspection Program and the Water Chemistry Control Program to manage loss of material for the CRD system valves. The applicant also credits the One-Time Inspection Program and the Water Chemistry Control Program to manage cracking of the CRD pumps.

Staff Evaluation. The staff reviewed ALRA Table 3.1.2.A-5, and the revised Table 3.1.2.A-5 of the applicant's letter dated December 20, 2005, which summarizes the results of AMR evaluations for the CRD system components for NMP1. The staff's assessment of the CRD system components that are not consistent with, or not addressed in, the GALL Report for NMP1 is provided below. It should be noted that the assessments for the NMP1 CRD system valves are addressed in SER Section 3.1A.2.3.4.

Identification of Aging Effects - In Table 3.1.2.A-5 of the applicant's letter dated December 20, 2005, the applicant identified that cracking is an applicable aging effect for the CRD pumps that are fabricated from wrought austenitic stainless steel and are exposed to an environment of treated water, temperature ≥ 140 °F, but < 212 °F, low flow environments. These components are made from materials and exposed to environments that are similar to those for the wrought austenitic stainless steel CRD system valves exposed to reactor coolant, as identified in the GALL Report

The applicant identified cracking as an aging effect in wrought austenitic stainless steel when these materials are exposed to the reactor coolant. Based on this analysis, the staff found that the applicant's determination is acceptable.

Aging Management Programs - In Table 3.1.2.A-5 of the applicant's letter dated December 20, 2005, the applicant credits the One-Time Inspection and Water Chemistry Control Programs with aging management of cracking for the CRD pumps. The GALL Report does not address an AMP for these component, material, and environment combinations. However, the GALL Report does address the AMPs (One-Time Inspection and Water Chemistry Control Programs) for this material and environment combination that are consistent with the programs that the applicant has identified to manage cracking. Therefore, the staff found the applicant's proposal to be acceptable. The applicant's One-Time Inspection Program is a new AMP that is entirely consistent with GALL AMP XI.M32. The staff's evaluation of the One-Time Inspection Program is in SER Section 3.0.3.1.4. The applicant's Water Chemistry Control Program is an existing AMP that is entirely consistent with GALL AMP XI.M2. The staff's evaluation of the Water Chemistry Program is in SER Section 3.0.3.2.2.

Conclusion. The staff has reviewed the applicant's plant-specific AMRs for the CRD system components that are exposed to the treated water, temperature ≥ 140 °F, but < 212 °F, low flow environments. For these AMRs, the staff determined that the applicant identified the aging effects that are applicable for these components under exposure to these environments. The staff also determined that the applicant credited either an appropriate inspection-based AMP, an appropriate mitigation-based AMP, or combination of these management strategies to manage the aging effects that are applicable to the CRD system components under exposure to these environments. On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the NMP1 CRD system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.3 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the NMP1 RPV, RPV internals, and RCS components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B NMP2 Aging Management of Reactor Vessel, Internals, and Reactor Coolant Systems

This section of the SER documents the staff's review of the applicant's AMR results for the reactor vessel, internals, and reactor coolant systems components and component groups associated with the following NMP2 systems:

- reactor pressure vessel
- reactor pressure vessel internals
- reactor pressure vessel instrumentation system
- reactor recirculation system
- control rod drive system

3.1B.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.1, the applicant provided AMR results for the reactor vessel, internals, and reactor coolant systems components and component groups. In ALRA Table 3.1.1.B, "NMP2 Summary of Aging Management Programs for Reactor Vessel, Internals, and Reactor Coolant Systems Evaluated in Chapter IV of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the reactor vessel, internals, and reactor coolant systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.1B.2 Staff Evaluation

The staff reviewed ALRA Section 3.1 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the reactor vessel, internals, and reactor coolant systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.1B.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.1.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.1B.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.1B.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.1B.2.3.

Finally, the staff reviewed the AMP summary descriptions in the USAR supplement to ensure that they provide an adequate description of the programs credited with managing or monitoring aging for the reactor vessel, internals, and reactor coolant systems components.

Table 3.1B-1 below provides a summary of the staff's evaluation of NMP2 components, aging effects and aging effects mechanisms , and AMPs listed in ALRA Section 3.1, that are addressed in the GALL Report.

Table 3.1B-1 Staff Evaluation for NMP2 Reactor Vessel, Internals, and Reactor Coolant Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Reactor coolant pressure boundary components (Item Number 3.1.1.B-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis
Steam generator shell assembly (Item Number 3.1.1.B-02)	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry		Not applicable, PWR only
Isolation condenser (Item Number 3.1.1.B-03)	Loss of material due to general, pitting, and crevice corrosion	Inservice inspection; water chemistry		Not applicable (isolation condenser does not exist - See Section 3.1B.2.2.2)
Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm^2 (E > 1 MeV) (Item Number 3.1.1.B-04)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	TLAA	This TLAA is evaluated in Section 4.2, Reactor Vessel Neutron Embrittlement Analysis
Reactor vessel beltline shell and welds (Item Number 3.1.1.B-05)	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Reactor Vessel Surveillance Program (B2.1.19)	Consistent with GALL, which recommends further evaluation (See Section 3.1B.2.2.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Westinghouse and B&W baffle/former bolts (Item Number 3.1.1.B-06)	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant-specific		Not applicable, PWR only
Small-bore reactor coolant system and connected systems piping (Item Number 3.1.1.B-07)	Crack initiation and growth due to SCC, intergranular SCC, and thermal and mechanical loading	Inservice inspection; water chemistry; one-time inspection	ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1); Water Chemistry Control Program (B2.1.2); One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.1B.2.2.4)
Jet pump sensing line, and reactor vessel flange leak detection line (Item Number 3.1.1.B-08)	Crack initiation and growth due to SCC, intergranular stress corrosion cracking (IGSCC), or cyclic loading	Plant-specific	ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1); Water Chemistry Control Program (B2.1.2); One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (see Section 3.1B.2.2.4)
Isolation condenser (Item Number 3.1.1.B-09)	Crack initiation and growth due to stress corrosion cracking (SCC) or cyclic loading	Inservice inspection; water chemistry		Not applicable (isolation condenser does not exist - (see Section 3.1B.2.2.4))
Vessel shell (Item Number 3.1.1.B-10)	Crack growth due to cyclic loading	TLAA		Not applicable, PWR only
Reactor internals (Item Number 3.1.1.B-11)	Changes in dimension due to void swelling	Plant-specific		Not applicable, PWR only
PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains (Item Number 3.1.1.B-12)	Crack initiation and growth due to SCC and/or primary water stress corrosion cracking (PWSCC)	Plant-specific		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Cast austenitic stainless steel (CASS) reactor coolant system piping (Item Number 3.1.1.B-13)	Crack initiation and growth due to SCC	Plant-specific		Not applicable, PWR only
Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni-alloys (Item Number 3.1.1.B-14)	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry		Not applicable, PWR only
Westinghouse and B&W baffle former bolts (Item Number 3.1.1.B-15)	Crack initiation and growth due to SCC and IASCC	Plant-specific		Not applicable, PWR only
Westinghouse and B&W baffle former bolts (Item Number 3.1.1.B-16)	Loss of preload due to stress relaxation	Plant-specific		Not applicable, PWR only
Steam generator feedwater impingement plate and support (Item Number 3.1.1.B-17)	Loss of section thickness due to erosion	Plant-specific		Not applicable, PWR only
(Alloy 600) Steam generator tubes, repair sleeves, and plugs (Item Number 3.1.1.B-18)	Crack initiation and growth due to PWSCC, outside diameter stress corrosion cracking (ODSCC), and/or intergranular attack (IGA) or loss of material due to wastage and pitting corrosion, and fretting and wear; or deformation due to corrosion at tube support plate intersections	Steam generator tubing integrity; water chemistry		Not applicable, PWR only
Tube support lattice bars made of carbon steel (Item Number 3.1.1.B-19)	Loss of section thickness due to FAC	Plant-specific		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Carbon steel tube support plate (Item Number 3.1.1.B-20)	Ligament cracking due to corrosion	Plant-specific		Not applicable, PWR only
Steam generator feedwater inlet ring and supports (Item Number 3.1.1.B-21)	Loss of material due to flow-corrosion	Combustion engineering (CE) steam generator feedwater ring inspection		Not applicable, PWR only
Reactor vessel closure studs and stud assembly (Item Number 3.1.1.B-22)	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	Reactor Head Closure Studs Program (B2.1.3)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1.1)
CASS pump casing and valve body (Item Number 3.1.1.B-23)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1)
CASS piping (Item Number 3.1.1.B-24)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS		Not applicable (CASS piping does not exist)
BWR piping and fittings; steam generator components (Item Number 3.1.1.B-25)	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow Accelerated Corrosion Program (B2.1.9)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1) Not applicable, PWR only
Reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high pressure and high temperature systems (Item Number 3.1.1.B-26)	Loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1) Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Feedwater and control rod drive (CRD) return line nozzles (Item Number 3.1.1.B-27)	Crack initiation and growth due to cyclic loading	Feedwater nozzle; CRD return line nozzle	BWR Feedwater Nozzle Program (B2.1.5), BWR Control Rod Drive Return Line (CRDRL) Nozzle Program (B2.1.37)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1.2)
Vessel shell attachment welds (Item Number 3.1.1.B-28)	Crack initiation and growth due to SCC, IGSCC	BWR vessel ID attachment welds; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Vessel ID Attachment Welds Program (B2.1.4)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1)
Nozzle safe ends, recirculation pump casing, connected systems piping and fittings, body and bonnet of valves (Item Number 3.1.1.B-29)	Crack initiation and growth due to SCC, IGSCC	BWR stress corrosion cracking; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Stress Corrosion Cracking Program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1)
Penetrations (Item Number 3.1.1.B-30)	Crack initiation and growth due to SCC, IGSCC, cyclic loading	BWR penetrations; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Penetrations Program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1)
Core shroud and core plate, support structure, top guide, core spray lines and spargers, jet pump assemblies, control rod drive housing, nuclear instrumentation guide tubes (Item Number 3.1.1.B-31)	Crack initiation and growth due to SCC, IGSCC, IASCC	BWR vessel internals; water chemistry	Water Chemistry Control Program (B2.1.2), BWR Vessel Internals Program (B2.1.8)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1)
Core shroud and core plate access hole cover (welded and mechanical covers) (Item Number 3.1.1.B-32)	Crack initiation and growth due to SCC, IGSCC, IASCC	ASME Section XI inservice inspection; water chemistry	BWR Vessel Internals Program (B2.1.8), Water Chemistry Control Program (B2.1.2)	Consistent with GALL with exceptions Access hole cover is managed through BWRVIP
Jet pump assembly castings; orificed fuel support (Item Number 3.1.1.B-33)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal aging and neutron irradiation embrittlement	BWR Vessel Internals Program (B2.1.8)	Consistent with GALL (see Section 3.1B.2.1.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Unclad top head and nozzles (Item Number 3.1.1.B-34)	Loss of material due to general, pitting, and crevice corrosion	Inservice inspection; water chemistry	Water Chemistry Control Program (B2.1.2), ASME Section XI, *Inservice Inspection* (Subsections IWB, IWC, IWD) Program (B2.1.1)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1)
CRD nozzle (Item Number 3.1.1.B-35)	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry		Not applicable, PWR only
Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting) (Item Number 3.1.1.B-36)	Crack initiation and growth due to cyclic loading, and/or SCC and PWSCC	Inservice inspection; water chemistry		Not applicable, PWR only
Reactor vessel internals CASS components (Item Number 3.1.1.B-37)	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement		Not applicable, PWR only
External surfaces of carbon steel components in reactor coolant system pressure boundary (Item Number 3.1.1.B-38)	Loss of material due to boric acid corrosion	Boric acid corrosion		Not applicable, PWR only
Steam generator secondary manways and handholds (CS) (Item Number 3.1.1.B-39)	Loss of material due to erosion	Inservice inspection		Not applicable, PWR only
Reactor internals, reactor vessel closure studs, and core support pads (Item Number 3.1.1.B-40)	Loss of material due to wear	Inservice inspection		Not applicable, PWR only
Pressurizer integral support (Item Number 3.1.1.B-41)	Crack initiation and growth due to cyclic loading	Inservice inspection		Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Upper and lower internals assembly (Westinghouse) (Item Number 3.1.1.B-42)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring		Not applicable, PWR only
Reactor vessel internals in fuel zone region [except Westinghouse and Babcock & Wilcox (B&W) baffle bolts] (Item Number 3.1.1.B-43)	Loss of fracture toughness due to neutron irradiation embrittlement, and void swelling	PWR vessel internals; water chemistry		Not applicable, PWR only
Steam generator upper and lower heads; tubesheets; primary nozzles and safe ends (Item Number 3.1.1.B-44)	Crack initiation and growth due to SCC, PWSCC, IASCC	Inservice inspection; water chemistry		Not applicable, PWR only
Vessel internals (except Westinghouse and B&W baffle former bolts) (Item Number 3.1.1.B-45)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry		Not applicable, PWR only
Reactor internals (B&W screws and bolts) (Item Number 3.1.1.B-46)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring		Not applicable, PWR only
Reactor vessel closure studs and stud assembly (Item Number 3.1.1.B-47)	Loss of material due to wear	Reactor head closure studs		Not applicable, PWR only
Reactor internals (Westinghouse upper and lower internal assemblies; CE bolts and tie rods) (Item Number 3.1.1.B-48)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring		Not applicable, PWR only

The staff's review of the NMP2 component groups followed one of several approaches. One approach, documented in SER Section 3.1B.2.1, discusses the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.1B.2.2, discusses the staff's review of the

AMR results for components in the reactor vessel, internals, and reactor coolant systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.1B.2.3, discusses the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the reactor vessel, internals, and reactor coolant systems components is documented in SER Section 3.0.3.

3.1B.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.1.2.B, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the reactor vessel, internals, and reactor coolant systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Reactor Head Closure Studs Program
- BWR Vessel ID Attachment Welds Program
- BWR Feedwater Nozzle Program
- BWR Stress Corrosion Cracking Program
- BWR Penetrations Program
- BWR Vessel Internals Program
- Flow-Accelerated Corrosion Program
- Reactor Vessel Surveillance Program
- One-Time Inspection Program
- Systems Walkdown Program
- Bolting Integrity Program
- BWR Control Rod Drive Return Line (CRDRL) Nozzle Program

Staff Evaluation. In ALRA Tables 3.1.2.B-1 through 3.1.2.B-5, the applicant provided a summary of AMRs for the reactor vessel, internals, and reactor coolant systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.1B.2.1.1 Crack Initiation and Growth Due to SCC and/or IGSCC

In the discussion section of ALRA Table 3.1.1.B, Item 3.1.1.B-22 the applicant stated that the Reactor Head Closure Studs Program is credited for closure head studs and nuts that have an aging effect and aging effect mechanism of loss of material due to general corrosion. As documented in the audit and review report, the staff noted that ALRA Table 3.1.1.B, Item 3.1.1.B-22 applies to the aging effect and aging effect mechanism of cracking and asked the applicant to provide clarification.

In its letter dated December 1, 2005, the applicant revised the ALRA Table 3.1.1.B, Item 3.1.1.B-22 discussion column by deleting the reference to managing loss of material and crediting the aging effect and aging effect mechanism of crack initiation and growth due to SCC. The staff found this revision consistent with the GALL Report and, therefore, acceptable.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.1B.2.1.2 Crack Initiation and Growth Due to Cyclic Loading

In the discussion section of ALRA Table 3.1.1.B, Item 3.1.1.B-27, the applicant stated that for feedwater nozzles NMP2 manages aging with the BWR Feedwater Nozzle Program, which is consistent with GALL AMP XI.M5, "Feedwater Nozzle."

In the ALRA, the applicant stated that GALL AMP XI.M5 is credited also with managing cracking of feedwater nozzle thermal sleeves due to SCC. Verification of the absence of nozzle cracking provides proof that the thermal sleeve intended function is not degraded. For CRDRL nozzles NMP2 manages aging with the BWR CRDRL Nozzle Program, which is consistent with GALL AMP XI.M6, "BWR Control Rod Drive Return Line Nozzle." GALL AMP XI.M6 is credited also with managing cracking of CRD return line nozzle thermal sleeves due to SCC. The applicant stated that verification of the absence of nozzle cracking proves that the thermal sleeve intended function is not degraded. In its letter dated September 15, 2005, the applicant stated that its BWR Feedwater Nozzle and BWR CRDRL Nozzle Programs had been removed as credited programs for the feedwater nozzle and CRDRL nozzle thermal sleeves. As documented in the audit and review report, the staff asked the applicant to address the aging management for the feedwater nozzle thermal sleeves. The applicant responded that it will use inspections performed under the BWR Vessel Internals Program with surrogate components more readily accessible for examination. For NMP2, the surrogate components are the feedwater sparger end bracket welds. As documented in the audit and review report, the applicant also provided its basis for choosing the feedwater sparger end bracket welds as follows.

The applicant noted that a similar evaluation of the NMP1 feedwater sparger welds and the selection of surrogate welds accessible for inspection also would be acceptable for NMP2. These accessible welds would be used as a leading indicator of potential IGSCC cracking of the thermal sleeve. If cracking is found in these welds a supplemental evaluation of the thermal sleeve integrity would be required.

The applicant stated that review of the NMP2 feedwater thermal sleeve and sparger had been completed and had confirmed that the thermal sleeve material is 316L with several hidden stainless steel welds. The fabrication method review, not complete, will determine the welding procedures. If the hidden welds were stress relieved they would not be considered susceptible to IGSCC and the aging effect of cracking would not be considered applicable to NMP2.

In addition, as documented in the audit and review report, the applicant stated that review of the NMP2 feedwater sparger installation details found field installation of a 20,000 lbf load creating a 0.125 inch cold spring to the sparger. The sparger end brackets were pinned, locking in the cold spring, and then final field-welded with a fillet weld. The applicant stated further that this installation detail is similar to that of NMP1. The result of the cold spring is a fit-up net tensile stress superimposed on the weld residual stress. The combination of the fit-up stress (cold spring) plus the residual stress of the field weld conditions and the fillet weld crevice geometry is more susceptible to IGSCC than the thermal sleeve welds. The corrosion potential of reactor water in the region of the feedwater sparger end bracket welds is equivalent to if not greater than that of the reactor water in contact with the outside diameter weld of the thermal sleeve. The applicant also stated that an EVT-1 examination of the NMP1 and NMP2 feedwater sparger end bracket welds will be added to its BWR Vessel Internals Program as an enhancement. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP2 feedwater thermal sleeve concludes that the hidden welds are not IGSCC-susceptible the NMP2 inspections will be discontinued.

Furthermore, the applicant concluded that overall inspection of the NMP2 feedwater sparger end bracket welds represents conservative inspection of the material condition of the hidden thermal sleeve welds for potential IGSCC cracking. Therefore, consistent with the discussion between the staff and the applicant, as documented in the audit and review report, cracking of the NMP2 feedwater nozzle thermal sleeves will be managed by the applicant's BWR Feedwater Nozzle, BWR Vessel Internals, and Water Chemistry Control Programs. In its letter dated December 1, 2005, the applicant stated that it will add an EVT-1 examination of the NMP2 feedwater sparger brackets as an enhancement to its BWR Vessel Internals Program to address this issue. The staff reviewed the applicant's response and found it acceptable because the applicant's surrogate weld inspection manages aging adequately for the feedwater nozzle thermal sleeves.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.1B.2.1.3 Loss of Fracture Toughness Due to Thermal Aging and Neutron Irradiation Embrittlement

In the discussion section of ALRA Table 3.1.1.B, Item 3.1.1.B-33 the applicant stated that loss of fracture toughness due to thermal aging and neutron irradiation embrittlement of jet pumps is managed by BWRVIP-41, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines," of GALL AMP XI.M9, "BWR Vessel Internals Program." Aging management of the orificed fuel supports is conducted according to BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," of GALL AMP XI.M9.

GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel," is credited for managing the aging effect and aging effect mechanism of loss of fracture toughness due to thermal aging and neutron embrittlement. In its letter dated November 17, 2005, the applicant revised its BWR Vessel Internals Program to address the management of fracture toughness due to neutron fluence and thermal embrittlement for NMP CASS components. The staff's review and evaluation of the applicant's BWR Vessel Internals Program are documented in SER Section 3.0.3.2.6. The staff found the applicant's BWR Vessel Internals Program acceptable for managing the loss of fracture toughness because the applicant committed to meet the GALL AMP XI.M13 recommendation.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.1.2.C of its letter dated August 19, 2005, the applicant provided further evaluation of aging management for NMPNS as recommended by the GALL Report for the reactor vessel, internals, and reactor coolant systems components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to pitting and crevice corrosion
- loss of fracture toughness due to neutron irradiation embrittlement
- crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking
- crack growth due to cyclic loading
- changes in dimension due to void swelling
- crack initiation and growth due to stress corrosion cracking or primary water stress corrosion cracking
- crack initiation and growth due to stress corrosion cracking or irradiation-assisted stress corrosion cracking
- loss of preload due to stress relaxation
- loss of section thickness due to erosion
- crack initiation and growth due to PWSCC, ODSCC, or intergranular attack or loss of material due to wastage and pitting corrosion or loss of section thickness due to fretting and wear or denting due to corrosion of carbon steel tube support plate
- loss of section thickness due to flow-accelerated corrosion
- ligament cracking due to corrosion
- loss of material due to flow-accelerated corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.1.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.1B.2.2.1 Cumulative Fatigue Damage

In Section 3.1.2.C.1 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs according to 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

As documented in the audit and review report, the staff noted that for ALRA Table 3.1.2.A-2 (on page 3.1-51), the fatigue damage of CRD assemblies (including drive mechanism and housing) will be managed through the TLAA but that in ALRA Appendix B, Aging management program and activities (page B2-25), the applicant stated that there are no TLAAs. The staff asked the applicant to explain how the specified NMP1 components are managed. The applicant responded that the only NMP1 reactor vessel internals (RVI) components with calculations or analyses meeting TLAA criteria are the core shroud tie rod assemblies, the clamps, and the CRD assemblies (including drive mechanism and housing). The tie rod assemblies and clamps are repairs for horizontal and vertical core shroud welds on which ASME III-type stress and fatigue analyses were performed during the design process. The pressure boundary portion of the CRD assemblies was evaluated for fatigue. A cumulative usage factor was determined for the CRD penetration including the stub tube, CRD housing, and the stub tube-to-vessel weld and housing-to-stub tube weld. The AMR for the stub tube is addressed in ALRA Table 3.1.2.A. The applicant also responded that for RVI components with no analysis meeting TLAA criteria the "Aging Management Program" column of ALRA Table 3.1.2.A-2 will be modified to replace "TLAA evaluated according to 10 CFR 54.21(c)" with "None." A plant-specific note referencing the relevant BWRVIP Inspection and Evaluation guideline or other basis for not managing fatigue will be added to ALRA Table 3.1.2.A-2 for each component with "None" in the AMP column for the aging effect and aging effect mechanism of cumulative fatigue damage or where the TLAA is applicable only to a subset of the component type.

In its letter dated December 1, 2005, the applicant responded by revising ALRA Table 3.1.2.A-2 and Table 3.1.2.B-2 to address this issue. The staff determined that a high cumulative fatigue usage factor indicates a high potential for crack initiation. Although the applicant's response removed the aging effect of cumulative fatigue damage for those components identified in the December 1, 2005, letter, the aging effect of cracking is adequately managed through other AMPs. Therefore, the staff found the response acceptable.

The staff's review of the applicant's response found its action consistent with the GALL Report and therefore acceptable.

3.1B.2.2.2 Loss of Material Due to Pitting and Crevice Corrosion

The staff reviewed Section 3.1.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.1.2.2.2.

The applicant stated in Section 3.1.2.C.2 of its letter dated August 19, 2005 that the aging effect and aging effect mechanism of pitting and crevice corrosion are not applicable to the PWR steam generator shell assembly. The staff determined that the aging effect and aging effect mechanism of PWR steam generator shell assembly pitting and crevice corrosion are not applicable to NMP.

Because NMP has no components from this group the staff found this aging effect and aging effect mechanism not applicable to NMP.

In addition the staff reviewed 10 CFR 3.1.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR 10 CFR 3.1.2.2.2.

In Section 3.1.2.C.2 of its letter dated August 19, 2005, the applicant also addressed loss of material due to isolation condenser components due to general pitting and crevice corrosion. The applicant stated in the August 19, 2005, letter that NMP2 has no isolation condensers; therefore this aging effect and aging effect mechanism are not applicable to NMP2.

Because NMP2 has no isolation condensers the staff found this aging effect and aging effect mechanism not applicable to NMP2.

3.1B.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

The staff reviewed Section 3.1.2.C.3 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.1.2.2.3.

In Section 3.1.2.C.3 of its letter dated August 19, 2005, the applicant addressed loss of fracture toughness due to neutron irradiation embrittlement of the reactor vessel.

SRP-LR Section 3.1.2.2.3 states that certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3 and must be evaluated according to 10 CFR 54.21(c)(1). SER Section 4.2 documents the staff's review of the applicant's evaluation of this TLAA.

SRP-LR Section 3.1.2.2.3 states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel.

The Reactor Vessel Surveillance Program monitors neutron irradiation embrittlement of the reactor vessel. The staff review and evaluation of the applicant's Reactor Vessel Surveillance Program are documented in SER 10 CFR 3.0.3.2.16.

In ALRA Table 3.1.2.B-1 the applicant stated that loss of fracture toughness of vessel shells (beltine, lower shell, upper nozzle shell, and upper RPV shell and vessel shell welds (including attachment welds) will be managed by its Reactor Vessel Surveillance Program. The staff asked the applicant to clarify which areas have neutron fluence exceeding 1E17 n/cm^2 (E>1MeV).

The applicant responded that vessel shells - beltline and vessel shells - lower and the beltline welds have a neutron fluence exceeding 1E17 n/cm^2. The applicant's Reactor Vessel Surveillance Program manages aging of these components. The component type attachment welds needs no management by the applicant's Reactor Vessel Surveillance Program because even though these welds receive a neutron fluence equal to or greater than E17 n/cm^2 they are not ferritic material. The only carbon/low alloy steel attachment welds are the steam dryer holddown bracket attachment welds in the upper head which are low-fluence welds. The applicant modified ALRA Table 3.1.2.B-1 to show those components managed by the Reactor Vessel Surveillance Program. In its letter dated December 1, 2005, the applicant revised ALRA Table 3.1.2.B-1 to address this issue. The staff reviewed the applicant's letter and found this revision consistent with the GALL Report and, therefore, acceptable.

In ALRA Table 3.1.2.B-1 the applicant stated that loss of fracture toughness of nozzles will be managed by its Reactor Vessel Surveillance Program. The staff asked the applicant to clarify which nozzles will be managed by the Reactor Vessel Surveillance Program.

As documented in the audit and review report, the applicant responded that LPCI/residual heat removal (RHR) nozzles and water level nozzle will be managed by the Reactor Vessel Surveillance Program. Activities of the Reactor Vessel Surveillance Program include an analysis of these nozzles for pressure-temperature (P-T) limits considering the projected fluence for 54 effective full-power years (EFPYs) for them. In its letter dated December 1, 2005, the applicant added a plant-specific Note 76 to ALRA Table 3.1.2.B-1 to specify those components managed by the Reactor Vessel Surveillance Program. The staff found this note consistent with the GALL Report and therefore acceptable.

SRP-LR Section 3.1.2.2.3 states that loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in Westinghouse and B&W baffle/former bolts.

In Section 3.1.2.C.3 of its letter dated August 19, 2005, the applicant stated that this item pertains to PWR baffle/former bolts only and is not applicable to NMP.

Because NMP has no components in this group the staff found that this aging effect and aging effect mechanism not applicable.

The staff concludes that the applicant's programs have met the criteria of SRP-LR Section 3.1.2.2.3. For those line items addressed in Section 3.1.2.C.3 of the applicant's letter dated August 19, 2005, the staff determined that the applicant has demonstrated consistent with the GALL Report that aging effects will be adequately managed so that intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B.2.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking

The staff reviewed Section 3.1.2.C.4 of the applicant's letter dated August 19, 2005 against the criteria of SRP-LR Section 3.1.2.2.4.

In Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant addressed crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in small-bore reactor coolant systems and connected system piping less than NPS 4.

SRP-LR Section 3.1.2.2.4.1 states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in small-bore reactor coolant systems and connected system piping less than NPS 4. The program relies on ASME Section XI ISI and on control of water chemistry to mitigate SCC. The GALL Report recommends a plant-specific destructive examination or a NDE that permits inspection of the inside surfaces of the piping to ensure that cracking has not occurred and that component intended function will be maintained during the extended period. The AMPs should be augmented by confirming that service-induced weld cracking has not occurred in small-bore piping less than NPS 4 including pipe, fittings, and branch connections. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect and aging effect mechanism are not occurring and that the component's intended function will be maintained during the period of extended operation.

In Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant also stated that for NMP2 aging of the subject small-bore piping is managed by the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program, Water Chemistry Control Program, and One-Time Inspection Program.

Additionally the applicant stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that for NMP2 reactor vessel instrumentation, reactor recirculation, and CRD systems not part of its ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program NMP credits only its Water Chemistry Control and One-Time Inspection Programs to manage aging.

The applicant further stated in Section 3.1.2.C.4 of its letter dated August 19, 2005, that for the small-bore piping included in the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program or not the inspections of the One-Time Inspection Program will use either NDE methods with a demonstrated capability to detect cracks on the inside surfaces of the piping or destructive examinations. Both nondestructive and destructive examinations will be performed on a piping sample.

The staff reviewed the applicant's ISI plan and One-Time Inspection Program and found them adequate to managed this cracking issue and consistent with the GALL Report recommendation. The staff's evaluations of the applicant's ASME Section XI (Subsections IWB, IWC, and IWD) ISI, Water Chemistry Control, and One-Time Inspection Programs are documented in SER Sections 3.0.3.2.1, 3.0.3.2.2, and 3.0.3.1.4, respectively.

In addition the staff reviewed Section 3.1.2.C.4 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.1.2.2.4.

Also in Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant addressed crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in the BWR reactor vessel flange leak detection line and BWR jet pump sensing line.

SRP-LR Section 3.1.2.2.4 also states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in the BWR reactor vessel flange leak detection line and the BWR jet pump sensing line. The GALL Report recommends that a plant-specific aging management program be evaluated to mitigate or detect crack initiation and growth due to SCC of vessel flange leak detection line.

The applicant stated in its letter dated August 19, 2005, that for NMP1 and NMP2 cracking of the vessel flange leak detection lines is managed by the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program, One-Time Inspection Program, and Water Chemistry Control Program. The inspections conducted under the applicant's One-Time Inspection Program will use either NDE methods with a demonstrated capability to detect cracks on the inside surfaces of the piping or destructive examinations. Both nondestructive and destructive examinations will be performed on a piping sample. A portion of the NMP2 vessel flange leak detection line is carbon steel not subject to cracking. The applicant stated that loss of material of the carbon steel portion is managed by its Water Chemistry Control and One-Time Inspection Programs.

The applicant also stated in its letter dated August 19, 2005, that for NMP2 the jet pump sensing lines are not within the scope of license renewal; therefore, the aging effect and aging effect mechanism of cracking for jet pump sensing lines is not applicable at NMP.

The staff reviewed the applicant's piping and instrument drawings (P&ID) and ISI plan to determine whether the applicant's program is adequate and consistent with the GALL Report recommendation.

The staff's review and evaluation of the applicant's ASME Section XI (Subsections IWB, IWC, and IWD) ISI, Water Chemistry Control and One-Time Inspection Programs are documented in SER Sections 3.0.3.2.1, 3.0.3.2.2, and 3.0.3.1.4, respectively.

Furthermore, the staff reviewed Section 3.1.2.C.4 of the applicant's letter dated August19, 2005, against the criteria of SRP-LR Section 3.1.2.2.4.

Also in Section 3.1.2.C.4 of its letter dated August 19, 2005, the applicant addressed crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in BWR isolation condenser components.

The applicant stated in its August 19, 2005, letter that NMP2 has no isolation condensers; therefore, this aging effect and aging effect mechanism is not applicable to NMP2.

Because NMP2 has no isolation condensers the staff found this aging effect and aging effect mechanism not applicable to NMP2.

The staff concludes that there is reasonable assurance that the applicant's programs have met the criteria of SRP-LR Section 3.1.2.2.4. For those line items addressed in Section 3.1.2.C.4 of the applicant's letter dated August 19, 2005, the staff determined that the applicant has demonstrated that the effects of aging will be adequately managed consistent with the GALL Report and that intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B.2.2.5 Crack Growth due to Cyclic Loading

The staff reviewed Section 3.1.2.C.5 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.5.

In Section 3.1.2.C.5 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.5 states that crack growth due to cyclic loading could occur in the reactor vessel shell and the reactor coolant system piping and fittings. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.6 Changes in Dimension due to Void Swelling

The staff reviewed Section 3.1.2.C.6 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.6.

In Section 3.1.2.C.6 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.6 states that changes in dimension due to void swelling could occur in reactor internal components. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.7 Crack Initiation and Growth due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking

The staff reviewed Section 3.1.2.C.7 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.7.

In Section 3.1.2.C.7 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.7 states that crack initiation and growth due to SCC and PWSCC could occur: (1) in PWR core support pads (or core guide lugs), instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains; (2) in PWR CASS reactor coolant system piping and fittings and pressurizer surge line nozzles; and (3) in PWR pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni alloys. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.8 Crack Initiation and Growth due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking

The staff reviewed Section 3.1.2.C.8 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.8.

In Section 3.1.2.C.8 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.8 states that crack initiation and growth due to SCC or IASCC could occur in baffle/former bolts in Westinghouse and B&W reactors. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff concurs that this aging effect is not applicable to NMP2.

3.1B.2.2.9 Loss of Preload due to Stress Relaxation

The staff reviewed Section 3.1.2.C.9 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.9.

In Section 3.1.2.C.9 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.9 states that loss of preload due to stress relaxation could occur in baffle/former bolts in Westinghouse and B&W reactors. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.10 Loss of Section Thickness due to Erosion

The staff reviewed Section 3.1.2.C.10 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.10.

In Section 3.1.2.C.10 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.10 states that loss of section thickness due to erosion could occur in steam generator feedwater impingement plates and supports. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.11 Crack Initiation and Growth due to PWSCC, ODSCC, or Intergranular Attack or Loss of Material due to Wastage and Pitting Corrosion or Loss of Section Thickness due to Fretting and Wear or Denting due to Corrosion of Carbon Steel Tube Support Plate

The staff reviewed Section 3.1.2.C.11 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.11.

In Section 3.1.2.C.11 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.11 states that crack initiation and growth due to PWSCC, ODSCC, or IGA or loss of material due to wastage and pitting corrosion or deformation due to corrosion could occur in alloy 600 components of the steam generator tubes, repair sleeves and plugs. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

Based on the above review, the staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.12 Loss of Section Thickness due to Flow-accelerated Corrosion

The staff reviewed Section 3.1.2.C.12 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.12.

In Section 3.1.2.C.12 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.12 states that loss of section thickness due to flow-accelerated corrosion could occur in tube support lattice bars made of carbon steel. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.13 Ligament Cracking due to Corrosion

The staff reviewed Section 3.1.2.C.13 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.1.2.2.13.

In Section 3.1.2.C.13 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.13 states that ligament cracking due to corrosion could occur in carbon steel components in the steam generator tube support plate. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.14 Loss of Material due to Flow-accelerated Corrosion

The staff reviewed Section 3.1.2.C.14 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.1.2.2.14.

In Section 3.1.2.C.14 of letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

SRP-LR Section 3.1.2.2.14 states that loss of material due to flow-accelerated corrosion could occur in feedwater inlet ring and supports. SRP-LR Table 3.1-1 states that further evaluation for this aging effect is only applicable to PWR plants.

The staff found that this aging effect is not applicable to NMP2.

3.1B.2.2.15 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 includes the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.1.2.B-1 through 3.1.2.B-5, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.1.2.B-1 through 3.1.2.B-5, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.1B.2.3.1 Reactor Vessel, Internals, and Reactor Coolant System – NMP2 Reactor Pressure Vessel – Summary of Aging Management Evaluation – ALRA Table 3.1.2.B-1

The NMP2 RPV contains and supports the reactor core, reactor internals, and the reactor coolant/moderator. The RPV forms part of the RCPB and serves as a barrier against leakage of radioactive materials to the drywell. The NMP2 RPV is a vertical, cylindrical pressure vessel with hemispherical bottom and top heads. The cylindrical shell and top and bottom heads of the RPV are fabricated from low-alloy steel, the interior of which is clad with stainless steel weld overlay except for the top head and nozzle and nozzle weld zones. The RPV top head is secured to the RPV by studs and nuts. The RPV flanges are sealed with two concentric metal seal rings designed to permit no detectable leakage through the inner or outer seal at any operating condition. The top head leak detection lines tap off of the vessel head between the seal rings to detect leakage should the inner seal-ring fail.

The RPV is penetrated by various nozzles and the CRD housings and in-core instrumentation thimbles are welded to the bottom head of the RPV. The concrete and steel vessel support pedestal is constructed as part of the building foundation. Steel anchor bolts set in the concrete extend through the bearing plate and secure the flange of the RPV support skirt to the bearing plate and thus to the support pedestal.

Summary of Technical Information in the Application. The applicant's plant-specific AMRs for the RPV components are identified in ALRA Table 3.1.2.B-1. By letter dated December 5, 2005, in ALRA Table 3.1.2.B-1, the applicant identified the following RPV components with AMR results that are not consistent with or not addressed in the GALL Report:

- RPV core differential pressure and liquid control, CRD stub tube, drain lines, in-core instruments, and instrumentation penetrations
- RPV support skirt and attachment welds
- RPV top head closure studs and nuts
- RPV top head leak detection lines
- RPV valves

The applicant identified the materials of fabrication for these RPV components as carbon steel and low alloy steel. The applicant indicated that applicable environments for these RPV components include containment air, non-borated water, and treated water (including steam).

The applicant credited the FAC Program with managing loss of material for the RPV core differential pressure and liquid control, CRD stub tube, drain lines, in-core instruments, and instrumentation penetrations. The ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program is credited with the management of loss of material for the RPV support skirt and attachment welds. The applicant credited the Reactor Head Closure Studs Program with managing loss of material of the top head closure studs and nuts. The Water Chemistry Control Program and the One-Time Inspection Program are credited with managing the loss of material for the RPV top head leak detection lines and the RPV valves. In addition the applicant credited TLAA 4.3, "Thermal Fatigue," with managing cumulative fatigue damage of the top head closure studs and nuts and the top head leak detection lines.

Staff Evaluation. The staff reviewed ALRA Table 3.1.2.B-1 which summarizes the results of AMR evaluations for the NMP2 RPV component groups. The staff's assessment of the RPV components not consistent with or addressed in the GALL Report for NMP2 is provided below. The assessments of the NMP2 RPV top head leak detection lines and the RPV valves are in SER Section 3.1B.2.3.4.

RPV Core Differential Pressure and Liquid Control, CRD Stub Tube, Drain Lines, In-core Instruments, and Instrumentation Penetrations

Identification of Aging Effects - In ALRA Table 3.1.2.B-1, the applicant identified loss of material due to FAC as an aging effect applicable to the RPV core differential pressure and liquid control, CRD stub tube, drain lines, in-core instruments, and instrumentation penetrations fabricated from carbon or low alloy steel exposed to a treated water or steam in a high-temperature environment.

FAC is a phenomenon in which repetitive cycles of corrosion and erosion cause wall thinning of carbon steel or low-alloy steel components exposed to high-temperature, high-velocity water or water/steam environments. Normally, FAC occurs only with environmental temperatures above 200 °F. The rate of metal loss depends on a complex interplay of such parameters as water chemistry, material composition, and hydrodynamics.

The staff determined that the applicant adequately identified loss of material due to FAC as an AERM for the RPV core differential pressure and liquid control, CRD stub tube, drain lines, in-core instruments, and instrumentation penetrations exposed to these environments. This aging effect is not addressed in GALL Report Volume 2 for these component, material, and environment combinations; therefore, the staff concludes that this AERM is acceptable because it is conservative relative to GALL Report Volume 2 and consistent with the EPRI Report, "Recommendations for an Effective Flow-Accelerated Corrosion Program."

Aging Management Programs - In ALRA Table 3.1.2.B-1 the applicant credited the FAC Program with managing loss of material due to FAC for the RPV core differential pressure and liquid control, CRD stub tube, drain lines, in-core instruments, and instrumentation penetrations. Even though GALL Report Volume 2 does not address an AMP for such component, material, and environment combinations, it does recommend crediting the FAC Program with managing FAC-induced wall thinning of carbon steel piping and fitting components. The staff found the applicant's proposal conservative relative to GALL Report Volume 2 and, therefore, acceptable. The applicant's FAC Program (ALRA AMP B2.1.9) is entirely consistent with GALL AMP XI.M17. The staff's evaluation of the FAC Program is in SER Section 3.0.3.1.3.

RPV Support Skirt and Attachment Welds

Identification of Aging Effects - In ALRA Table 3.1.2.B-1 and by letter dated December 5, 2005, the applicant identified loss of material due to general corrosion as an applicable aging effect for the RPV support skirt and attachment welds fabricated from carbon or low alloy steel and exposed to an environment of "air with thermal fatigue." The applicant's definition of "air with thermal fatigue" is "this environment is applied to components exposed to air, that are also subject to thermal cycles of sufficient magnitude for thermal fatigue to be a concern." The air environment is the containment air surrounding the RPV and the support skirt.

GALL Report Volume 2 does not identify loss of material due to general corrosion as an aging effect in carbon and low alloy steel when these materials are exposed to an environment of containment air; however, carbon and low alloy steel may rust or corrode in the presence of air with an elevated humidity level. The staff found that the applicant has addressed this issue conservatively; therefore, the staff found the applicant's identification of this AERM acceptable for the RPV support skirt and attachment welds.

Aging Management Programs - In ALRA Table 3.1.2.B-1 the applicant credited the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program with managing loss of material due to general corrosion for the RPV support skirt. By letter dated November 22, 2005, the staff requested that the applicant address why the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program was credited with managing loss of material due to general corrosion in the RPV support skirt. Instead, the staff recommended that this aging effect in the RPV support skirt be managed by the ASME Section XI (Subsection IWF) ISI Program because the RPV support skirt is an ASME Class MC support. By letter dated December 5, 2005, the applicant revised Table 3.1.2.B-1 to indicate that the AERM of loss of material of the RPV support skirt would be managed by the ASME Section XI (Subsection IWF) ISI Program. The staff found the applicant's response acceptable because the RPV support skirt is an ASME Class MC component, and, therefore, is managed appropriately by the ASME Section XI (Subsection IWF) ISI Program.

By letter dated December 5, 2005, the applicant indicated that it credits the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program with managing the loss of material due to general corrosion in the RPV attachment welds.

The GALL Report Volume 2 does not identify any AMPs for managing loss of material due to general corrosion for these component, material, and environment combinations. The staff found the applicant's proposal conservative relative to the GALL Report Volume 2 and, therefore, acceptable. The applicant's ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program is an AMP consistent with GALL AMP XI.M1 with exceptions. The staff's evaluation of the ASME Section XI (Subsections IWB, IWC, and IWD) ISI Program is in SER Section 3.0.3.2.1. The applicant's ASME Section XI (Subsection IWF) ISI Program is an AMP consistent with GALL AMP XI.S3 with exceptions. The staff's evaluation of the ASME Section XI (Subsection IWF) ISI Program is in SER Section 3.0.3.2.19.

<u>RPV Top Head Closure Studs and Nuts</u>

Identification of Aging Effects - In ALRA Table 3.1.2.B-1, the applicant identified loss of material due to general, crevice, and pitting corrosion as an aging effect applicable to the RPV top head closure studs and nuts fabricated from carbon or low alloy steel and exposed to an environment of non-borated water systems with operating temperatures $\geq$ 212 °F.

The GALL Report Volume 2 identifies crack initiation and growth, SCC and IGSCC as aging effects for RPV top head enclosure closure studs and nuts fabricated from carbon or low alloy steel exposed to air, leaking reactor coolant water, or steam at 288 °C, but does not identify loss of material due to general, crevice, and pitting corrosion as aging effects in carbon and low alloy steel when exposed to leakage of non-borated reactor coolant or steam. However, carbon and low alloy steel may rust or corrode when exposed to aqueous liquids. The staff found that the applicant has addressed this issue conservatively; therefore, the staff found the applicant's identification of this AERM acceptable.

Also in ALRA Table 3.1.2.B-1, the applicant identified cumulative fatigue damage as an aging effect applicable to the RPV top head closure studs and nuts because of thermal cycling from heatup and cooldown and other transient operating conditions of these components. The staff found this identification acceptable because it meets the provisions in of SRP-LR Revision 1

Chapter 3.1 for assessing cumulative fatigue damage in ASME Code Class 1 components. SER Section 4.3 contains the staff's assessment of those plant components requiring thermal fatigue analyses for license renewal.

Aging Management Programs - In ALRA Table 3.1.2.B-1, the applicant credited the Reactor Head Closure Studs Program with management of loss of material due to general, pitting, and crevice corrosion for the RPV top head closure studs and nuts. Even though the GALL Report Volume 2 does not address an AMP for these component, material, and environment combinations, the staff found the applicant's proposal conservative relative to GALL Report Volume 2 and, therefore, acceptable. The applicant's Reactor Head Closure Studs Program (ALRA AMP B2.1.3) is an AMP consistent with exception to GALL AMP XI.M3. The staff's evaluation of the Reactor Head Closure Studs Program is in SER Section 3.0.3.2.3.

In ALRA Table 3.1.2.B-1, the applicant proposed managing cumulative fatigue damage of the RPV top head closure studs and nuts with the TLAA. This proposal is consistent with SRP-LR Revision 1 and is, therefore, acceptable. The staff's evaluation of the applicant's TLAA on thermal fatigue of ASME Code Class 1 components is in SER Section 4.3.

RPV Valves

The review of the RPV valves is in SER Section 3.1B.2.3.4.

Conclusion. The staff has reviewed the applicant's plant-specific AMRs for evaluating the RPV components exposed to the containment air, non-borated water, and treated water (including steam) environments. For these AMRs the staff has determined that the applicant has identified aging effects applicable to these components that are exposed to these environments. The staff also has determined that the applicant has credited either an appropriate inspection-based AMP, an appropriate mitigation-based AMP, a TLAA, or combination of these strategies with managing the aging effects applicable to the RPV components exposed to these environments. The staff's review concludes that the applicant has demonstrated that the aging effects associated with the NMP2 RPV will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B.2.3.2 Reactor Vessel, Internals, and Reactor Coolant System – NMP2 Reactor Pressure Vessel Internals – Summary of Aging Management Evaluation – ALRA Table 3.1.2.B-2

The NMP2 RPV internals support the core and other internal components, maintain fuel configuration (coolable geometry) during normal operation and accident conditions, and provide reactor coolant flow through the core. The main NMP2 RPV internals components are the reactor core, core shroud, core shroud stabilizers, core shroud support structures, top guide, CRD guide tubes, feedwater sparger, core spray spargers, steam dryer, and the jet pumps. Except for the Zircaloy used in the fuel assemblies reactor internals are stainless steel or other corrosion-resistant alloys.

Summary of Technical Information in the Application. The applicant's plant-specific AMRs for the RPV internals components are in ALRA Table 3.1.2.B-2. The specific RPV components for NMP2 with AMR results not consistent with or addressed in the GALL Report and within the scope of ALRA Table 3.1.2.B-2 include:

- core shroud head bolts
- core shroud support structures (bolts, brackets, cap screws, clamps, keepers, restraints, and supports)

The applicant identified the materials of fabrication for the core shroud head bolts and the core shroud support structures (including the bolts, brackets, clamps, keepers, restraints, and supports) as nickel-based alloys. The material of fabrication for the cap screws is carbon or low alloy steel. The applicant identified applicable environments for these RPV internals components as treated water (including steam) environments of temperatures ≥ 482 °F, treated water or steam, high temperature with neutron fluences of $< 5 \times 10^{20}$ n/cm^2 (E > 1.0 MeV), and treated water or steam high temperature with neutron fluences of $\geq 1 \times 10^{17}$ n/cm^2 (E > 1.0 MeV).

The applicant credited the BWR Vessel Internals and the Water Chemistry Control Programs with managing cracking of the core shroud head bolts and core shroud support structures. In addition the applicant credited TLAA 4.3, "Thermal Fatigue," with managing cumulative fatigue damage of the core shroud support structures.

Staff Evaluation. The staff reviewed ALRA Table 3.1.2.B-2, which summarizes the results of AMR evaluations for the NMP2 RPV internal components. The staff's assessment of the RPV internals components not consistent with or addressed in the GALL Report for NMP2 is provided here.

RPV Internals - Core Shroud Head Bolts

Identification of Aging Effects - In ALRA Table 3.1.2.B-2 the applicant identified SCC or IGSCC as an aging effect applicable to the core shroud head bolts fabricated from nickel-based alloys and exposed to a treated water or steam temperature ≥ 482 °F environment.

GALL Report Volume 2 does not identify SCC or IGSCC as an AERM for the core shroud head bolts. However, as these components are made from materials identical to those of the nickel-alloy RPV internal components that have AMR Commodity Group line items on SCC/IGSCC in GALL Report Volume 2 the staff concludes that there is reasonable assurance that the applicant's determination is consistent with the GALL Report Volume 2 for other RPV internal components made from nickel-based alloy materials and acceptable.

Also in ALRA Table 3.1.2.B-2 the applicant identified cumulative fatigue damage as an aging effect applicable to the core shroud head bolts because of thermal cycling from heatup, cooldown, and other operating transient conditions of these components. The staff found this identification acceptable because it meets the provisions in the SRP-LR Section 3.1 Revision 1 Report for assessing cumulative fatigue damage in RPV internal components. Refer to SER Section 4.3 for the staff's assessment of plant components required to have thermal fatigue analyses for license renewal.

Aging Management Programs - In ALRA Table 3.1.2.B-2 the applicant credited the BWR Vessel Internals and the Water Chemistry Control Programs with aging management of SCC/IGSCC of the core shroud head bolts. Even though GALL Report Volume 2 does not address an AMP for such component, material, and environment combinations it does recommend crediting the BWR Vessel Internals and Water Chemistry Programs with managing SCC and IGSCC for stainless steel and nickel-alloy components (i.e., core shroud, core plate, core plate bolts, holddown beams, etc). Therefore, the staff found the applicant's proposal acceptable. The applicant's BWR Vessel Internals Program is an AMP entirely consistent with GALL AMP XI.M9. The staff's evaluation of the BWR Vessel Internals Program is in SER Section 3.0.3.2.6. The applicant's Water Chemistry Control Program is an AMP entirely consistent with GALL AMP XI.M2. The staff's evaluation of the Water Chemistry Program is in SER Section 3.0.3.2.2.

In ALRA Table 3.1.2.B-2 in ALRA Section 4.3 the applicant proposed using the TLAA for managing cumulative fatigue damage of the core shroud head bolts. This proposal is consistent with the NUREG-1800 Revision 1 Report and is, therefore, acceptable. The staff's evaluation of the applicant's TLAA on thermal fatigue of RPV internal components is in SER Section 4.3.

RPV Internals Core Shroud Support Structures (bolts, cap screws, and supports)

Identification of Aging Effects - In ALRA Table 3.1.2.B-2, the applicant identified SCC or IGSCC as an aging effect applicable to the core shroud support structures fabricated from carbon or low alloy steels and nickel-based alloys that are exposed to treated water or steam, high temperature with neutron fluences of $< 5 \times 10^{20}$ n/cm^2 (E > 1.0 MeV).

The GALL Report Volume 2 does not identify SCC or IGSCC as an AERM for the RPV internals core shroud support structures. Industry experience has not indicated that carbon steel or low alloy steel materials are susceptible to SCC or IGSCC but that stainless steel and nickel-based alloy materials are. The applicant has identified conservatively SCC/IGSCC as an aging effect applicable to the carbon steel/low alloy steel core shroud support structures (i.e., the core shroud support cap screws). Therefore, the staff concludes that there is reasonable assurance that the applicant's determination is conservative relative to the AMR Commodity Group line items in the GALL Report Volume 2 for RPV internal components made from stainless steel.

The staff also concludes that the applicant's identification of SCC/IGSCC for the nickel-based core shroud support structures (i.e., the bolts and supports) is consistent with the AMR Commodity Group line items in the GALL Report Volume 2 for RPV internal components made from nickel-based alloy materials and acceptable.

Also in ALRA Table 3.1.2.B-2, the applicant identified cumulative fatigue damage as an aging effect applicable to the core shroud support structures because of thermal cycling from heatup, cooldown, and other operating transient conditions of these components. The staff found this identification acceptable because it meets the provisions in the SRP-LR Chapter 3.1 Revision 1 Report for assessing cumulative fatigue damage in RPV internal components. Refer to SER Section 4.3 for the staff's assessment of plant components required to have thermal fatigue analyses for license renewal.

Aging Management Programs - In ALRA Table 3.1.2.B-2 the applicant credited the BWR Vessel Internals and Water Chemistry Control Programs with aging management of

SCC/IGSCC of the core shroud support structures. Even though the GALL Report Volume 2 does not address an AMP for such component, material, and environment combinations it does recommend crediting the BWR Vessel Internals and Water Chemistry Programs with managing SCC and IGSCC for RPV internal components (i.e., core shroud, core plate, core plate bolts, holddown beams, etc). Therefore, the staff found the applicant's proposal acceptable. The applicant's BWR Vessel Internals Program is an AMP entirely consistent with GALL AMP XI.M9. The staff's evaluation of the BWR Vessel Internals Program is in SER Section 3.0.3.2.6. The applicant's Water Chemistry Control Program is an AMP entirely consistent with GALL AMP XI.M2. The staff's evaluation of the Water Chemistry Control Program is in SER Section 3.0.3.2.2.

In ALRA Table 3.1.2.B-2 in ALRA Section 4.3 the applicant proposed using the TLAA for managing cumulative fatigue damage of the RPV internals core shroud support structures. This proposal is consistent with the SRP-LR Revision 1 and, therefore, acceptable. The staff's evaluation of the applicant's TLAA on thermal fatigue of RPV internal components is in SER Section 4.3.

Conclusion. The staff reviewed the applicant's plant-specific AMRs for evaluating the RPV internals components exposed to the treated water (including steam) environments of temperatures ≥ 482°F, treated water or steam high temperature with neutron fluences of $< 5 \times 10^{20}$ n/cm^2 (E > 1.0 MeV), and treated water or steam high temperature with neutron fluences of ≥ 1×10^{17} n/cm^2 (E > 1.0 MeV) environments. For these AMRs the staff determined that the applicant has identified the aging effects applicable to components that are exposed to these environments. The staff has also determined that the applicant credited either an appropriate inspection-based AMP, an appropriate mitigation-based AMP, a TLAA, or combination of these strategies with managing the aging effects applicable to the RPV internal components exposed to these environments. The staff's review concludes that the applicant has demonstrated that the aging effects of NMP2 RPV internals will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B.2.3.3 Reactor Vessel, Internals, and Reactor Coolant System – NMP2 Reactor Vessel Instrumentation System – Summary of Aging Management Evaluation – ALRA Table 3.1.2.B-3

The NMP2 RPV instrumentation system monitors and transmits information about key RPV operating parameters during normal and emergency operations. Instrumentation is installed to monitor reactor parameters and indicate them on meters, chart recorders and hydraulic indicator units located in the control room, on remote shutdown panels, and in instrument rooms. The parameters monitored are RPV temperature, water level and pressure, and core flow and core plate differential pressure. This system also provides control signals to various systems which in turn initiate the appropriate actions required if the monitored parameter exceeds its desired set point. Systems receiving control signals from the RPV instrumentation system include the reactor protection, primary containment isolation, automatic depressurization, feedwater control, reactor recirculation flow control, redundant reactivity control, and RHR (shutdown cooling mode) systems. The RPV instrumentation system consists of piping, valves, and restricting orifices that provide a fluid path from the RPV to various instrumentation.

Summary of Technical Information in the Application. The applicant's plant-specific AMRs for the RPV instrumentation system components are in Table 3.1.2.B-3 of the ALRA. The specific RPV components for NMP2 with AMR results not consistent with or addressed in the GALL Report and within the scope of ALRA Table 3.1.2.B-3 include:

- RPV instrumentation system closure bolting
- RPV instrumentation system piping and fittings

The applicant identified materials of fabrication for these RPV instrumentation components as martensitic, precipitation-hardenable, and superferritic stainless steels and carbon and low alloy steels. The applicant identified applicable environments for these RPV instrumentation system components as non-borated water systems with operating temperatures ≥ 212 °F and treated water or steam temperature ≥ 482 °F (high temperature) environments.

The applicant credited the Bolting Integrity Program with managing cracking, loss of material, and loss of preload of the RPV instrumentation system closure bolting. The applicant credited the One-Time Inspection and the Water Chemistry Control Programs with managing loss of material for the RPV instrumentation system piping and fittings.

Staff Evaluation. The staff reviewed ALRA Table 3.1.2.B-3, which summarizes the results of AMR evaluations for the NMP2 RPV instrumentation system components. The staff's assessment of the RPV instrumentation system components not consistent with or addressed in the GALL Report for NMP2 is provided here. It should be noted that the assessment for the NMP2 RPV instrumentation system piping and fittings is in SER Section 3.1B.2.3.4.

RPV Instrumentation System Closure Bolting

Identification of Aging Effects - In ALRA Table 3.1.2.B-3 the applicant identified SCC or IGSCC, loss of material due to wear, and loss of preload due to thermal effects, gasket creep, and self-loosening as aging effects applicable to RPV instrumentation system closure bolting fabricated from martensitic, precipitation-hardenable, and superferritic stainless steels and exposed to a non-borated water system with operating temperatures ≥ 212 °F environment (i.e., the reactor coolant or its steam environment).

The GALL Report Volume 2 does not identify these aging effects as applicable AERMs for these components; however, as these components are made from materials similar to those for the stainless steel RCPB closure bolting in high-pressure and high-temperature environments identified in the GALL Report Volume 2; therefore, the staff concludes that there is reasonable assurance that the applicant's determination is consistent with the AERMs identified in GALL Report Volume 2 for RCPB closure bolting and found the applicant's determination acceptable.

Aging Management Programs - In ALRA Table 3.1.2.B-3 the applicant credited the Bolting Integrity Program with aging management of SCC or IGSCC, loss of material due to wear, and loss of preload due to thermal effects. Even though the GALL Report Volume 2 does not address an AMP for such component, material, and environment combinations it does recommend crediting the Bolting Integrity Program with managing SCC, loss of material due to wear, loss of preload due to thermal effects, gasket creep, and self-loosening of stainless steel RCPB pump and valve closure bolting in high-pressure and high-temperature systems. Therefore, the staff finds the applicant's proposal acceptable. The applicant's Bolting Integrity

Program is an AMP consistent with GALL AMP XI.M18 with exceptions. The staff's evaluation of the Bolting Integrity Program is in SER Section 3.0.3.2.23.

Conclusion. The staff reviewed the applicant's plant-specific AMRs for evaluating the RPV instrumentation system components exposed to non-borated water with operating temperatures ≥ 212 °F and treated water or steam temperature ≥ 482 °F (high temperature) environments. For these AMRs the staff determined that the applicant has identified aging effects applicable to these components exposed to these environments. The staff also determined that the applicant has credited either an appropriate inspection-based AMP, an appropriate mitigation-based AMP, or combination of these strategies with managing aging effects applicable to the RPV instrumentation system components exposed to these environments. The staff finds that the applicant has demonstrated that the aging effects associated with the NMP2 RPV instrumentation system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B.2.3.4 Reactor Vessel, Internals, and Reactor Coolant System – NMP2 Reactor Recirculation System – Summary of Aging Management Evaluation – ALRA Table 3.1.2.B-4

Summary of Technical Information in the Application. The description of the reactor recirculation system, recirculation flow control, and the control of the reactor recirculation pumps can be found in ALRA Section 2.3.1.B.4. Reactor recirculation system components subject to AMR include the entire main reactor recirculation flow path which begins at the suction nozzle and ends at the discharge manifold nozzles to the jet pump risers of each recirculation loop for NMP2. SR instrument piping and associated components connected to the recirculation loops are also subject to AMR. The components requiring an AMR for the reactor recirculation system and their intended functions are shown in ALRA Table 2.3.1.B.4-1. The AMR results for these components are shown in ALRA Table 3.1.2.B-4. The following information pertains to the reactor recirculation system provided in the ALRA which the staff has used in its evaluation.

The materials of construction are carbon or low alloy steel (yield strength < 100 Ksi and > 100 Ksi), CASS, and wrought austenitic stainless steel including nickel-based alloys in piping and fittings.

In ALRA Section 3.1.2.B.4 the applicant listed the following environments to which NMP2 reactor recirculation system components are exposed:

- air
- closure bolting for non-borated water systems with operating temperatures ≥ 212 °F
- hydraulic fluid
- treated water, temperature < 140 °F
- treated water, temperature < 140 °F, low flow
- treated water, temperature ≥ 140 °F, but < 212 °F
- treated water, temperature ≥ 140 °F, but < 212 °F, low flow
- treated water or steam, temperature ≥ 482 °F

- treated water or steam, temperature ≥ 482 °F, low flow

The applicant identified the following aging effects associated with the NMP1 and NMP2 Reactor Recirculation System piping requiring management:

- cracking
- cumulative fatigue damage
- loss of fracture toughness
- loss of material
- loss of preload

The following AMPs manage these aging effects in the NMP2 reactor recirculation system components:

- ASME Code Section XI (Subsections IWB, IWC, IWD) ISI Program
- Bolting Integrity Program
- BWR Stress Corrosion Cracking Program
- One-Time Inspection Program
- Water Chemistry Control Program

Staff Evaluation. The applicant described its AMR for the reactor recirculation system in ALRA Section 3.1. The staff reviewed this section to determine whether the applicant had identified all the applicable aging effects for components in these systems and demonstrated that the aging effects on the components will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3). The staff also reviewed the USAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

The applicant identified the following aging effects for the reactor recirculation system:

- cracking
- cumulative fatigue damage
- loss of fracture toughness
- loss of material
- loss of preload

In ALRA Table 3.1.2.B-4 the applicant identified cracking and cumulative fatigue damage as aging effects applicable to the recirculation system closure bolting, piping and fittings, recirculation pumps, and valves. Cumulative fatigue damage is evaluated in SER Section 4.3, "Metal Fatigue Analysis." The aging effect of loss of fracture toughness is associated with the pressure boundary materials in reactor recirculation pumps and in CASS valves operating at or above 480 °F. The loss of material has been identified as an aging effect in carbon or low alloy steel or austenitic stainless steel with treated water environment operating below 140 °F for such components as piping and fittings, valves, and restriction orifices in the reactor recirculation system. The loss of preload is identified as the applicable aging effect in closure bolting for non-borated water system operating at or above 212 °F. The staff noted that this assessment is consistent with the GALL Report.

The applicant identified cracking as an aging effect applicable to the recirculation system austenitic stainless steel components (piping and fittings, tubing, valve bodies, flow elements, thermowells, restricting orifices) and to the high-strength low-alloy steel primary pressure closure bolting exposed to reactor coolant water. The applicant also identified this aging effect for CASS components exposed to reactor coolant water. The applicant identified crack initiation and growth due to thermal and mechanical loading as an aging effect applicable to small-bore stainless steel piping and fittings and low-alloy steel pressure boundary closure bolting in the reactor recirculation system. The staff noted that this assessment is consistent with the GALL Report. The staff requested confirmation that the applicant had no flaws evaluated according to IWB-3600 "Analytical Evaluation of Flaws" under the ISI program of ASME Code, Section XI as such an evaluation would require a TLAA under the regulation. The applicant's response indicated that the NMP2 Reactor Recirculation System has no weld evaluated according to IWB-3600.

The applicant stated under item number 3.1.1.B-07 in ALRA Table 3.1.1.B that for the small-bore reactor coolant system and connected systems piping a plant-specific destructive examination or an NDE of the inside surfaces of the piping will be conducted as part of a one-time inspection to verify that service-induced weld cracking is not occurring in the small-bore piping. The applicant's One-Time Inspection AMP is described in ALRA Section B.2.1.20 and the applicant stated that it is consistent with GALL Report Chapter XI.M32, "One-Time Inspection."

In ALRA Table 3.1.2.B-1 the applicant identified cumulative fatigue damage and cracking as AERMs applicable to the vessel drain line. The applicant uses TLAA to manage cumulative fatigue damage and the BWR Penetration Program and Water Chemistry Control Program to manage cracking. Because of the size of the drain line volumetric examination is not required by ASME Code Section XI. In response to the staff's request for information about the adequacy of the AMP applicable to the reactor vessel drain line which is not volumetrically examined the applicant stated that the ASME Code Section XI pressure test is performed every refueling outage. As a function of the pressure test a concurrent VT-2 examination is performed according to acceptance standards stated in Subsection IWB-3522. Any source of leakage detected during this examination must be located and evaluated according to Subsection IWA-5250 prior to return of the system to service. One source of leakage could be from through-wall pitting or crevice corrosion as the applicable loss of material mechanism for stainless steel piping and components. Also performed under the ISI program according to the Subsection IWB-3517 acceptance standards is a VT-1 examination of all reactor vessel drain line bolting, studs, and nuts at every inspection interval. The staff considers the reactor vessel drain line AMPs effective for the period of extended operation.

The staff, however, requested, during the audit, that the applicant submit information about its plant-specific experience related to IGSCC of the reactor coolant pressure boundary piping, mitigative actions taken, and revised inspection schedules following the BWRVIP-75A guidelines. The staff requested that the applicant provide information about its implementation of HWC and NMCA at NMP2 and how implementation has affected monitoring of water chemistry parameters. In response the applicant stated that there have been two indications of potential IGSCC at NMP2. A mechanical stress improvement process was applied to one of the welds to improve the residual stress distribution in the region of the flaw to eliminate the potential for flaw growth. The weld has been classified as a GL 88-01 Category E weld and will be inspected once every six years. The second indication was repaired by weld overlay. The scope and the schedule of inspection for IGSCC are according to GL 88-01 as modified by BWRVIP-75A. The current inspection schedule except for Category A welds subsumed in the alternate Risk-Informed ISI Program is according to the revised inspection frequency allowed by BWRVIP-75A for normal water chemistry. With respect to implementation of HWC and NMCA NMP2 treated the reactor vessel internals with noble metal chemicals in September 2000 and began injecting hydrogen into reactor water in January 2001. Under HWC versus normal water chemistry the electrochemical potential is monitored with a goal of < -0.23V SHE for the effectiveness of HWC. For NMP2 the significant change in water chemistry control when HWC is in operation is the addition of hydrogen-to-oxygen molar ratio monitoring as an indirect means of determining the electrochemical potential.

The staff's review concludes that the applicant had identified appropriate aging effects for the components in the NMP2 reactor recirculation system.

Conclusion. The staff concludes that the applicant had identified adequately the aging effects and the AMPs credited for managing them for the reactor recirculation system and that the components' intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3). The staff also reviewed the applicable USAR supplement program descriptions and concludes that the USAR supplement adequately describes the AMPs credited for managing aging in the reactor coolant system – recirculation system as required by 10 CFR 54.21(d).

3.1B.2.3.5 Reactor Vessel, Internals, and Reactor Coolant System – NMP2 Control Rod Drive System – Summary of Aging Management Evaluation – ALRA Table 3.1.2.B-5

The NMP2 CRD system is designed to change core reactivity by changing the position of control rods within the reactor core in response to manual control signals and to scram the reactor in response to manual or automatic signals. The system also provides water to the nuclear boiler instrumentation system reference leg backfill injection lines and the reactor water cleanup and reactor recirculation pump seals.

Summary of Technical Information in the Application. The applicant's plant-specific AMRs for the CRD system components are in ALRA Table 3.1.2.B-5. The specific NMP2 CRD system components with AMR results not consistent with or addressed in the GALL Report and within the scope of ALRA Table 3.1.2.B-5 include:

- CRD system accumulators
- CRD hydraulic control units
- CRD system piping and fittings
- CRD system valves

The applicant identified materials of fabrication for these CRD system components as including carbon and low alloy steels. The applicant identified applicable environments for these CRD system components as treated water or steam, temperature ≥ 212 °F < 482 °F, low flow environments (i.e., the reactor coolant or its steam environment).

The applicant credited the One-Time Inspection and Water Chemistry Control Programs with managing loss of material for the CRD system accumulators, hydraulic control units, and valves. The applicant also credited the One-Time Inspection Program and the Water Chemistry Control Program with managing cracking of the CRD system piping and fittings.

Staff Evaluation. The staff reviewed ALRA Table 3.1.2.B-5, which summarizes the results of AMR evaluations for the NMP2 CRD system components. The staff's assessment of the CRD system components not consistent with or addressed in the GALL Report for NMP2 is provided here. It should be noted that the assessments for the NMP2 CRD system piping and fittings and CRD system valves are in SER Section 3.0.3.

CRD System Accumulators and Hydraulic Control Units

Identification of Aging Effects - In ALRA Table 3.1.2.B-5 the applicant identified loss of material due to general, pitting, and crevice corrosion as an aging effect applicable to the CRD system accumulators and the CRD hydraulic control units fabricated from carbon or low alloy steel and exposed to an environment of treated water or steam, temperature ≥ 212 °F < 482 °F, low flow environments. These components are made from materials and exposed to environments similar to those for the steel and stainless steel isolation condenser components exposed to reactor coolant as identified in the SRP-LR Revision 1.

The applicant identified loss of material due to crevice, general, and pitting corrosion as aging effects in carbon and low alloy steel when these materials are exposed to the reactor coolant or its steam environment. The staff found the applicant's determination acceptable.

Aging Management Programs - In ALRA Table 3.1.2.B-5 the applicant credited the One-Time Inspection and Water Chemistry Control Programs with aging management of loss of material due to general, pitting, and crevice corrosion for the CRD system accumulators and the CRD hydraulic control units. The SRP-LR Revision 1 does not address an AMP for these component, material, and environment combinations; however, the SRP-LR Revision 1 does address the AMPs (One-Time Inspection Program and the Water Chemistry Control Program) for this material and environment combination consistent with programs that the applicant identified with managing loss of material due to general, pitting, and crevice corrosion. Therefore, the staff found the applicant's proposal acceptable. The applicant's One-Time Inspection Program is a new AMP consistent with GALL AMP XI.M32. The staff's evaluation of the One-Time Inspection Program is in SER Section 3.0.3.1.4. The applicant's Water Chemistry Control Program is an AMP consistent with GALL AMP XI.M2. The staff's evaluation of the Water Chemistry Program is in Section 3.0.3.2.2.

Conclusion. The staff reviewed the applicant's plant-specific AMRs for evaluating the CRD system components exposed to the treated water or steam, temperature ≥ 212 °F < 482 °F, low flow environments. For these AMRs the staff determined that the applicant had identified the aging effects applicable for components that are exposed to these environments. The staff also determined that the applicant had credited either an appropriate inspection-based AMP, an appropriate mitigation-based AMP, or combination of these strategies with managing the aging effects applicable to the CRD system components that are exposed to these environments. The staff's review concludes that the applicant had demonstrated that the aging effects of the NMP2 CRD system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.1B.3 Conclusion

The staff concludes that there is reasonable assurance that the applicant provided sufficient information to demonstrate that the effects of aging for the NMP2 reactor vessel, internals, and reactor coolant systems components within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable USAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the reactor vessel, internals, and reactor coolant systems, as required by 10 CFR 54.21(d).

3.2 Aging Management of Engineered Safety Features

3.2A NMP1 Aging Management of Engineered Safety Features

This section of the SER documents the staff's review of the applicant's AMR results for the engineered safety features (ESF) systems components and component groups associated with the following systems:

- *containment spray system*
- *core spray system*
- *emergency cooling system*

3.2A.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.2, the applicant provided AMR results for the ESF systems components and component groups. In ALRA Table 3.2.1.A, "NMP1 Summary of Aging Management Programs for the Engineered Safety Features Systems Evaluated in Chapter V of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the ESF systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.2A.2 Staff Evaluation

The staff reviewed ALRA Section 3.2 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the ESF systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.2A.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria of SRP-LR Section 3.2.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.2A.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.2A.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.2A.2.3.

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the ESF systems components.

Table 3.2A-1 below provides a summary of the staff's evaluation of NMP1 components, aging effects/mechanisms, and AMPs listed in ALRA Section 3.2, that are addressed in the GALL Report.

Table 3.2A-1 Staff Evaluation for NMP1 Engineered Safety Features Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Piping, fittings, and valves in emergency core cooling system (Item Number 3.2.1.A-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis
Piping, fittings, pumps, and valves in emergency core cooling system (Item Number 3.2.1.A-02)	Loss of material due to general corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.2)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems (Item Number 3.2.1.A-03)	Loss of material due to general corrosion	Plant-specific	Open-Cycle Cooling Water System Program (B2.1.10), One-Time Inspection Program (B2.1.20), Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.2)
Piping, fittings, pumps, and valves in emergency core cooling system (Item Number 3.2.1.A-04)	Loss of material due to pitting and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.3)
Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems (Item Number 3.2.1.A-05)	Loss of material due to pitting and crevice corrosion	Plant-specific	Open-Cycle Cooling Water System Program (B2.1.10), One-Time Inspection Program (B2.1.20), Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.3)
Containment isolation valves and associated piping (Item Number 3.2.1.A-06)	Loss of material due to MIC	Plant-specific	None	Not applicable (See Section 3.2A.2.2.4)
Seals in standby gas treatment system (Item Number 3.2.1.A-07)	Changes in properties due to elastomer degradation	Plant-specific	Preventive Maintenance Program (B2.1.32), Systems Walkdown Program (B2.1.33)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.5)
High pressure safety injection (charging) pump miniflow orifice (Item Number 3.2.1.A-08)	Loss of material due to erosion	Plant specific	None	Not applicable, PWR only
Drywell and suppression chamber spray system nozzles and flow orifices (Item Number 3.2.1.A-09)	Plugging of flow orifice and spray nozzles by general corrosion products	Plant specific	None	Not applicable (See Section 3.2A.2.2.7)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
External surface of carbon steel components (Item Number 3.2.1.A-10)	Loss of material due to general corrosion	Plant specific	Systems Walkdown Program (B2.1.33)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.2)
Piping and fittings of CASS in emergency core cooling system (Item Number 3.2.1.A-11)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	None	Not applicable There are no CASS piping and fittings with this aging effect/ mechanism in NMP1 ESF system
Components serviced by open-cycle cooling system (Item Number 3.2.1.A-12)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	None	Not applicable Heat exchangers has own open-cycle cooling system
Components serviced by closed-cycle cooling system (Item Number 3.2.1.A-13)	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	None	Not applicable No components serviced by closed-cycle cooling water system
Emergency core cooling system valves and lines to and from HPCI and RCIC pump turbines (Item Number 3.2.1.A-14)	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow-Accelerated Corrosion Program (B2.1.9)	Consistent with GALL, which recommends no further evaluation (See Section 3.2A.2.1) Not applicable for HPCI lines and RCIC pump turbines
Pumps, valves, piping, and fittings in containment spray and emergency core cooling systems (Item Number 3.2.1.A-15)	Crack initiation and growth due to SCC	Water chemistry	None	Not applicable, PWR only
Pumps, valves, piping, and fittings in emergency core cooling systems (Item Number 3.2.1.A-16)	Crack initiation and growth due to SCC and IGSCC	Water chemistry and BWR stress corrosion cracking	Water Chemistry Control Program (B2.1.2), BWR Stress Corrosion Cracking Program (B2.1.6), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends no further evaluation (See Section 3.2A.2.1.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Carbon steel components (Item Number 3.2.1.A-17)	Loss of material due to boric acid corrosion	Boric acid corrosion	None	Not applicable, PWR only
Closure bolting in high pressure or high temperature systems (Item Number 3.2.1.A-18)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.2A.2.1)

The staff's review of the NMP1 component groups followed one of several approaches. One approach, documented in SER Section 3.2A.2.1, discusses the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.2A.2.2, discusses the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.2A.2.3, discusses the staff's review of the AMR results for components in the ESF systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the ESF systems components is documented in SER Section 3.0.3.

3.2A.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.2.2.A, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the ESF systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- BWR Stress Corrosion Cracking Program
- Open-Cycle Cooling Water System Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Preventive Maintenance Program
- Systems Walkdown Program
- Bolting Integrity Program

Staff Evaluation. In ALRA Tables 3.2.2.A-1 through 3.2.2.A-3, the applicant provided a summary of AMRs for the ESF systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different AMP is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.2A.2.1.1 Crack Initiation and Growth Due to SCC and IGSCC

In the discussion section of ALRA Table 3.2.1.A Item 3.2.1.A-16 the applicant stated that for small-bore valves and piping the One-Time Inspection Program is used to manage this aging effect and aging effect mechanism. The GALL Report suggests using the BWR Stress Corrosion Cracking Program and Water Chemistry Control Program for managing SCC and IGSCC in pumps, valves, piping, and fittings in emergency core cooling systems.

As documented in the Audit and Review Report, the staff noted that for ALRA Table 3.2.2.A-3 line item component type piping and fittings, material type wrought austenitic stainless steel, aging effect cracking, and the One-Time Inspection Program it was not clear whether these components also are age-managed by the applicant's Water Chemistry Control and BWR Stress Corrosion Cracking Programs. It was also not clear to which components the applicant's One-Time Inspection Program applied within this component type grouping. The staff requested the applicant to clarify this line item.

In its letter dated December 1, 2005, the applicant stated that for the components in the subject line item the BWR Stress Corrosion Cracking Program was not credited because this line item is for small bore piping. Piping and fittings in the emergency condenser system age- managed by the applicant's One-Time Inspection Program, are not included in its BWR Stress Corrosion Cracking Program either because they are small bore piping (< 4 inches nominal diameter), they are in a low temperature environment, or they are not made from austenitic stainless steel material. However, the applicant's Water Chemistry Control Program in addition to its One-Time Inspection Program should have been credited for this line item. The subject line item was revised to credit the applicant's Water Chemistry Control Program in addition to its One-Time Inspection Program for managing cracking for this component group. Note 10 was also added to the "Notes" column.

The staff reviewed the applicant's response and determined that after revision of the applicant's AMR line item as described the use of its Water Chemistry Control Program to manage cracking is consistent with the GALL Report. Because the line item component is small bore piping and fittings the applicant's BWR Stress Corrosion Cracking Program is not applicable and its One-Time Inspection Program is an adequate alternative.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.2.2.C of the letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the ESF systems components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general corrosion
- local loss of material due to pitting and crevice corrosion
- local loss of material due to MIC
- changes in properties due to elastomer degradation
- local loss of material due to erosion
- buildup of deposits due to corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.2.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.2A.2.2.1 Cumulative Fatigue Damage

In Section 3.2.2.C.1 of the letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs according to 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

3.2A.2.2.2 Loss of Material due to General Corrosion

The staff reviewed Section 3.2.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.2.1.

In Section 3.2.2.C.2 of its letter dated August 19, 2005, the applicant addressed loss of material at locations with stagnant flow conditions due to general corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system.

SRP-LR Section 3.2.2.2.2.1 states that the management of loss of material due to general corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system should be evaluated further. The AMP relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation. However, control of primary water chemistry does not prevent loss of material due to general corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the applicant's Chemistry Control Program should be verified to ensure that corrosion does not occur.

The GALL Report recommends further evaluation of programs to manage loss of material due to general corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect and aging effect mechanism does not occur or progresses very slowly so the component's intended function will be maintained during the period of extended operation.

In its letter dated August 19, 2005, the applicant stated that for NMP1 the containment spray, core spray, emergency cooling, and main steam (for automatic depressurization) systems are applicable. The aging effect and aging effect mechanism are managed by the combination of the Water Chemistry Control Program and One-Time Inspection Program.

The staff reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

In addition the staff reviewed Section 3.2.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.2.2.

In Section 3.2.2.C.2 of its letter dated August 19, 2005, the applicant also addressed loss of material due to general corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

SRP-LR Section 3.2.2.2.2.2 also states that loss of material due to general corrosion could occur in the drywell and suppression chamber spray systems header and spray nozzle components, standby gas treatment system components, containment isolation valves and associated piping, the automatic depressurization system piping and fittings, emergency core cooling system header piping and fittings and spray nozzles, and the external surfaces of carbon steel components. The GALL Report recommends further plant-specific evaluation to ensure adequate aging effect and aging effect mechanism management.

In its letter dated August 19, 2005, the applicant also stated that for NMP1 the applicable systems are the containment spray, core spray, emergency cooling, reactor building ventilation (for standby gas treatment), and main steam (for automatic pressurization) systems. The aging effect and aging effect mechanism for internal surfaces is managed by the One-Time Inspection, Preventive Maintenance, or Open-Cycle Cooling Water System Programs. The aging effect and aging effect mechanism for external surfaces of carbon steel components in the emergency core cooling system is managed by the Systems Walkdown Program.

The staff review and evaluations of the applicant's One-Time Inspection, Preventive Maintenance, Open-Cycle Cooling Water System, and Systems Walkdown Programs are documented in SER Sections 3.0.3.1.4, 3.0.3.3.1, 3.0.3.2.7, and 3.0.3.3.2, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.2.2.2.2. For those line items that apply to Section 3.2.2.C.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion

The staff reviewed Section 3.2.2.C.3 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.3.1.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant addressed loss of material at locations with stagnant flow conditions due to pitting and crevice corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system.

SRP-LR Section 3.2.2.2.3.1 states that the management of local loss of material due to pitting and crevice corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling system piping and fittings and with lines to the suppression chamber and to the drywell and suppression chamber spray system should be evaluated further. The AMP relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation. However, control of coolant water chemistry does not prevent loss of material due to crevice and pitting corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the applicant's Water Chemistry Control Program should be verified to ensure that corrosion does not occur. The GALL Report recommends further evaluation of programs to manage the loss of material due to pitting and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant stated that the containment spray, core spray, and emergency cooling systems are applicable for NMP1. The aging effect and aging effect mechanism are managed by a combination of the Water Chemistry Control Program and One-Time Inspection Program.

The staff's review and evaluations of the applicant's Water Chemistry Control and One-Time Inspection Programs are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

In addition the staff reviewed Section 3.2.2.C.3 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.3.2.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant also addressed loss of material due to pitting and crevice corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material due to pitting and crevice corrosion could occur in the containment isolation valves and associated piping and automatic depressurization system piping and fittings. The GALL Report recommends further evaluation to ensure adequate aging effect and aging effect mechanism management.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant stated that the containment spray, core spray, emergency cooling, and main steam (for automatic depressurization) systems are applicable for NMP1. The aging effect and aging effect mechanism are managed by the One-Time Inspection Program, the Preventive Maintenance Program, or the Open-Cycle Cooling Water System Program.

The staff's review and evaluations of the applicant's One-Time Inspection, Preventive Maintenance, and Open-Cycle Cooling Water System Programs are documented in SER Sections 3.0.3.1.4, 3.0.3.3.1 and 3.0.3.2.7, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria in the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.2.2.2.3. For those line items that apply to Section 3.2.2.C.3 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion

The staff reviewed Section 3.2.2.C.4 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.4.

The applicant stated in Section 3.2.2.C.4 of its letter dated August 19, 2005, that the aging effect and aging effect mechanism of local loss of material due to microbiologically influenced corrosion (MIC) in containment isolation valves and associated piping is not applicable to NMP. The applicant considers MIC an aging effect and aging effect mechanism for systems with raw water as an environment. NMP1 has no raw water environment for containment isolation valves or the associated piping. Therefore, this issue is not applicable. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that the local loss of material due to MIC in containment isolation valves and associated piping is not applicable to NMP1.

Because NMP1 has no containment isolation valves subject to this aging effect and aging effect mechanism the staff determined that it is not applicable to NMP1.

3.2A.2.2.5 Changes in Properties Due to Elastomer Degradation

The staff reviewed Section 3.2.2.C.5 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.5.

In Section 3.2.2.C.5 of its letter dated August 19, 2005, the applicant addressed change in material properties of seals in the standby gas treatment system.

SRP-LR Section 3.2.2.2.5 states that changes in properties due to elastomer degradation could occur in seals associated with the standby gas treatment system ductwork and filters. The GALL Report recommends further evaluation to ensure adequate aging effect and aging effect mechanism management.

In the ALRA, the applicant also stated the NMP1 reactor building ventilation system provides the equivalent function of a standby gas treatment system. For the internal surfaces of the system's seals (grouped with blowers) aging effects/mechanisms are managed by the Preventive Maintenance Program. For external surfaces the aging effects/mechanisms are managed by the Systems Walkdown Program. The staff's review and evaluations of the applicant's Preventive Maintenance and Systems Walkdown Programs are documented in SER Sections 3.0.3.3.1 and 3.0.3.3.2.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.2.2.2.5. For those line items that apply to Section 3.2.2.C.5 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.2.6 Local Loss of Material Due to Erosion

The staff reviewed Section 3.2.2.C.6 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.6.

In Section 3.2.2.C.6 of its letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

Because NMP is a BWR the staff found this aging effect and aging effect mechanism not applicable to NMP.

3.2A.2.2.7 Buildup of Deposits Due to Corrosion

The staff reviewed Section 3.2.2.C.7 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.7.

In Section 3.2.2.C.7 of its letter dated August 19, 2005, the applicant addressed the plugging of components due to general corrosion in the spray nozzles and flow orifices of the drywell and suppression chamber spray system.

SRP-LR Section 3.2.2.2.7 states that the plugging of components due to general corrosion could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system. This aging effect and aging effect mechanism applies since the spray nozzles and flow orifices are wetted occasionally even though most of the time this system is on standby. The wetting and drying of these components can aid in the acceleration of this particular corrosion. The GALL Report recommends further evaluation to ensure adequate aging effect and aging effect mechanism management.

In Section 3.2.2.C.7 of its letter dated August 19, 2005, the applicant stated that the NMP1 containment spray system contains the subject spray nozzles and flow orifices. Plugging of spray nozzles due to general corrosion is not an applicable aging effect and aging effect mechanism as these components are stainless steel and not susceptible to general corrosion. The plugging of flow orifices due to general corrosion is not an applicable aging effect and aging effect mechanism because the lines containing these components are drained completely following each system operation in which they are wetted. The draining ensures that no corrosion products accumulate in the flow orifices. The flow orifices are located in the containment spray heat exchanger drain lines such that plugging would not be impact the intended safety function adversely.

The staff found that general corrosion of stainless steel spray nozzles is not an effect/ mechanism requiring aging management. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that plugging of orifices has no adverse impact upon the intended function of the system.

3.2A.2.2.8 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.2.2.A-1 through 3.2.2.A-3, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.2.2.A-1 through 3.2.2.A-3, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.2A.2.3.1 Engineered Safety Features Systems NMP1 Containment Spray System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.A-1

The staff reviewed ALRA Table 3.2.2.A-1, which summarizes the results of AMR evaluations for the containment spray system component groups.

The staff reviewed the following original LRA Table 3.2.2.A-1 line items for the NMP1 Containment Spray System.

- Wrought stainless steel bolting in an air environment where the applicant identified no aging effect.
- Loss of material of gray cast iron external surfaces in an air environment is managed by the Systems Walkdown Program. The applicant stated that this line item is for external surfaces of carbon steel components not in the GALL Report (Note F, 4).
- Loss of material for carbon or low alloy steel (yield strength < 100 ksi) filters/strainers in a demineralized untreated water low flow environment is managed by the One-Time Inspection and Water Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment (Note H).
- Loss of material as an aging effect for gray cast iron pumps in a treated water, temperature < 140 °F, low flow environment is managed by the One-Time Inspection, Water Chemistry Control, and Selective Leaching of Materials Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment (Note H).

As to the evaluation of no aging effects for wrought stainless steel bolting in an air environment, the staff requested the applicant, in RAI 3.2-1 dated November 17, 2004, to discuss how cracking and loss of pre-load resulting in loss of mechanical closure integrity are managed for these bolts. In addition, the staff requested that the applicant address how the aging effects are managed for inaccessible bolts.

In its response dated December 21, 2004, and as amended (ALRA) by attachment 1 to NMP1L-1960 letter dated July 14, 2005, the applicant stated:

> The wrought austenitic stainless steel bolting in an air environment in [the original] LRA Table 3.2.2.A-1 is in the NMP1 Containment Spray System. Since the environment was identified in the aging management review (AMR) as air, cracking and loss of preload were not identified as aging effects for wrought

austenitic stainless steel bolting. The maximum typical operating temperature (based on the internal environments assigned to components in this system) is < 140 °F. Loss of preload would not typically be an aging effect requiring management for bolting in low temperature systems. NUREG-1801 only specifies loss of preload as an aging effect requiring management for components in the reactor vessel and internals and reactor coolant pressure boundary. The only mechanisms for cracking affecting wrought austenitic stainless steel bolting are stress corrosion cracking and cyclic loading (fatigue). Stress corrosion cracking and thermal fatigue are not aging effects requiring management for wrought austenitic stainless steel at temperatures less than 140 °F. Therefore, loss of mechanical closure integrity is not an aging effect requiring management for bolting in the NMP1 Containment Spray System.

With respect to inaccessible bolts, there are no bolts in the NMP1 Containment Spray System that are inaccessible for examination. The only aging effect requiring management for any bolting in the Containment Spray System is loss of material for carbon or low alloy steel bolting, yield strengths > 100 ksi, in an air environment. This aging effect is managed by the Systems Walkdown Program (described in [the original] LRA Section B2.1.33), which performs visual examinations of accessible surfaces for loss of material. The inspection criteria of the Systems Walkdown Program require that bolted joints be inspected for corrosion of external surfaces, and will be enhanced to add inspection for evidence of leakage, which does not require the bolted joints to be disassembled. This enhancement is described in [the original] LRA Section B2.1.33 (page B-65), under the "Parameters Monitored/Inspected" heading.

The staff found the applicant's response reasonable and acceptable because the applicant justified the absence of aging effects of wrought austenitic bolting in an air environment in the NMP1 containment spray system. The applicant also satisfactory explained managing the loss of material for carbon or low alloy steel bolting in an air environment in the NMP1 containment spray system, and thus the staff's concern in RAI 3.2-1 is resolved.

The staff's review and evaluation of the applicant's Systems Walkdown Program are documented in SER Section 3.0.3.3.2

As to the loss of material of gray cast iron external surfaces in an air environment managed by the Systems Walkdown Program the applicant stated that this line item is for external surfaces of carbon steel components not in the GALL Report (Note F, 4). The staff found the management of the aging effect for external surfaces of this material in an air environment reasonable and acceptable because the Systems Walkdown Program contains adequate provisions. The staff's review and evaluation of the applicant's Systems Walkdown Program are documented in SER Section 3.0.3.3.2.

As to the evaluation of loss of material for carbon and low alloy steel (yield strength < 100 ksi), filters/strainers in a demineralized untreated water (< 140 °F), low flow environment the applicant proposed to manage this aging effect by the One-Time inspection and the Water Chemistry Control Programs. The staff found these AMPs appropriate and acceptable for managing loss of material in this environment.

The applicant also stated in the NMP letter dated December 21, 2004:

> This item applies to the four (4) Containment Spray Pump Discharge Strainers (STR-80-09, STR-80-1 0, STR-80-29, and STR-80-30). The internals of these strainers were removed as part of the modification to address NRC Bulletin 96-003, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling-Water Reactors." Additionally, the strainer bodies are made of carbon steel. These are ASME Section XI Class 2 components. As such, the bodies of the strainers are subject only to the VT-2 examination under examination category C-H, 'All Pressure Retaining Components.' The VT-2 examination is conducted during the system pressure test during each inspection period. VT-2 examinations are conducted to detect evidence of leakage only. The water source is torus water, so the environment for these strainers is demineralized untreated water, low flow. The chemistry action levels and sampling frequencies for the torus water are specified in NMP1 procedure S-CTP-V666, 'Auxiliary Systems Chemistry'.

The staff found these tests and inspections reasonable and acceptable because they conform to ASME Section XI requirements and industry practice.

The staff's review of the One-Time Inspection and Water Chemistry Control Programs is provided in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

As to loss of material as an aging effect for gray cast iron pumps in a treated water, temperature < 140°F, low flow environment the applicant stated that this aging effect is not in the SRP-LR for this component, material, and environment (Note H). The staff concurred with this statement. This aging effect is managed by the One-Time Inspection, Water Chemistry Control, and Selective Leaching of Materials Programs. The staff's initial evaluation of the management of the aging effects for this component is discussed in RAI 3.4-2.

In RAI 3.4-2, dated November 17, 2004, the staff requested that the applicant discuss the following:

- Bases for visual, VT, or other inspection methods, frequency of inspections, and acceptance criteria
- Bases for sampling of the pumps to detect selective leaching and whether hardness tests will be performed.

In its response by letter dated December 21, 2004, the applicant stated:

> The gray cast iron pumps with an internal environment of treated water (temperature <140 °F), are the two condensate transfer pumps. The aging effect requiring management is loss of material. The aging mechanisms to be managed by the One-Time Inspection Program and the Water Chemistry Control Program include crevice corrosion, general corrosion, and pitting corrosion. The One-Time Inspection Program is a new license renewal (LR) AMP commitment for NMP that is to be implemented prior to the period of extended operation. This commitment was made in the original LRA submittal, as supplemented by NMPNS letter NMP1L 1880 dated October 29, 2004. As such, program

documents or procedures specific to managing the aging mechanisms (i.e. crevice corrosion, general corrosion and pitting corrosion), specific inspection methods and acceptance criteria for the two condensate transfer pumps do not currently exist. The frequency of any future inspections for the aging mechanisms of crevice corrosion, general corrosion and pitting corrosion will be based on the findings of the One-Time Inspection Program. However, as stated in Appendix B2.1.20, the One-Time Inspection Program will be implemented consistent with NUREG-1801, Section XI.M32.

As presented in ALRA Sections A1.1.33 and B2.1.21, the implementation of the Selective Leaching of Materials Program is addressed in the program description for the One-Time Inspection Program (see ALRA Sections A1.1.28 and B2.1.20). The One-Time Inspection Program is a new LR AMP commitment for NMP to be implemented prior to the period of extended operation so program documents or procedures for managing the aging mechanism of selective leaching for the two condensate transfer pumps do not exist; however, as stated in ALRA Section B2.1.21, the Selective Leaching Program will be implemented consistent with GALL AMP XI.M33 (NMP1 Commitment 23 and NMP2 Commitment 21).

A determination of whether hardness tests are necessary will be made at the time of the One-Time Inspection Program implementation. This timing is consistent with ALRA Section B2.1.20, which states that inspection techniques may include a one-time visual inspection and hardness measurement. Hardness testing will be considered as a possible inspection technique if visual examination techniques alone cannot determine whether selective leaching severe enough to affect the component intended function is occurring. The use of field hardness testing will also be contingent on the accessibility of the affected component surfaces.

Hardness testing on components susceptible to selective leaching may be appropriate if the component configuration and geometry allow. Tubing and other components like valves with complex internal geometry do not provide adequate access to internal surfaces requiring examination for accurate measurements.

This above information is reflected in its ALRA, and the staff found the applicant's response reasonable and acceptable because the applicant's tests and inspection methods are consistent with industry practice and the GALL Report guidelines.

The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement.

Based on the above evaluation, the staff found that the applicant had identified the appropriate AMPs for the materials and environment of the NMP1 containment spray system components.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated that the aging effects associated with the containment spray system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.3.2 Engineered Safety Features Systems NMP1 Core Spray System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.A-2

The staff reviewed ALRA Table 3.2.2.A-2, which summarizes the results of AMR evaluations for the core spray system component groups.

The staff reviewed the following original LRA Table 3.2.2.A-2 items in the NMP1 Core Spray System:

- Loss of material of gray cast iron external surfaces in an air environment is managed by the System Walkdown Program. The applicant stated that this material is not in the GALL Report for carbon steel components to which this item applies (Note F,4).
- Cracking of wrought austenitic stainless steel filters/strainers in a treated water, temperature ≥ 140 °F, but < 212 °F, low flow environment is managed by the One-Time Inspection and Water Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Cracking of wrought austenitic stainless steel flow orifices in a treated water, temperature ≥ 140 °F, but < 212 °F, low flow environment is managed by the ASME Section XI (Subsection IWB, IWC, IWD) ISI, Water Chemistry Control, and One-Time Inspection Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Copper Alloy (zinc > 15 percent) and aluminum bronze heat exchangers in a lubricating oil environment for which the applicant has identified no aging effect. The applicant stated that this material is not in the GALL Report for this component (Note F).
- Loss of material of gray cast iron pumps in a treated water, temperature ≥ 140 °F, but < 212 °F, low flow environment is managed by One-Time Inspection, Selective Leaching of Materials, and Water Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The applicant stated that the loss of material of gray cast iron external surfaces in an air environment managed by the Systems Walkdown Program applies to external surfaces of carbon steel components not in the GALL Report (Note F, 4). The staff found the management of the aging effect for external surfaces of this material in an air environment reasonable and acceptable because the Systems Walkdown Program is adequate to manage this aging effect. The staff's review and evaluation of the applicant's Systems Walkdown Program are documented in SER Section 3.0.3.3.2. The staff agreed with the applicant's statement that this item applies to carbon steel components not in the GALL Report (Note F, 4).

The applicant stated that the cracking aging effect of wrought austenitic stainless steel filters/strainers in a treated water, temperature ≥ 140 °F, but < 212 °F, low flow environment managed by the One-Time Inspection and Water Chemistry Control Programs is not in the GALL Report for this component, material and environment combination (Note H). The staff concurred with this statement. The staff's review of the aging management of this component is in RAI 3.2-7.

In RAI 3.2-7 dated November 17, 2004, the staff requested that the applicant address the specific tests and inspections, frequency of inspections, and acceptance criteria for the strainers and filters to ensure performance of their intended function in the identified environment.

In its response by letter dated December 21, 2004, the applicant stated that:

> The components addressed by this AMR line item are the two core spray pump suction strainers located in the torus. Torus water is managed under the Water Chemistry Control Program, which is described in original LRA Section B2.1.2, as supplemented by NMPNS letter NMPIL 1880 dated October 29, 2004. The chemistry action levels and sampling frequencies for the torus water are provided in the response to RAI 3.2-2. These limits are identical to those specified in EPRI TR-103515-R2, 'BWR Water Chemistry Guidelines -2000 Revision.'
>
> The One-Time Inspection Program is described in original LRA Section B2.1.20, as supplemented by NMPNS letter NMP1L 1880 dated October 29, 2004. The One-Time Inspection Program is a new program that will be implemented prior to the period of extended operation. As such, the procedures needed to answer this question have not yet been developed. However, the One-Time Inspection Program will be consistent with NUREG-1801, Section XI.M32 (One-Time Inspection) when implemented. The One-Time Inspection Program Attribute Assessment (PAA) addresses program implementation at NMPNS relative to the requirements of Appendix A of NUREG-1800. The One-Time Inspection PAA is available on-site at NMPNS for review.

The staff found the applicant's response reasonable and acceptable because the applicant's AMPs will be consistent with industry practice and GALL Report requirements.

The staff review and evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively. The staff agreed with the applicant's statement that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The staff concern in RAI 3.2-7 applies also to the component, material, and environment combination of cracking of wrought austenitic stainless steel flow orifices in a treated water, temperature ≥ 140 °F, but < 212 °F, low flow environment managed by the ASME Section XI (Subsections IWB, IWC, IWD) ISI and Water Chemistry Control Programs.

The staff found the applicant's response reasonable and acceptable because the applicant's AMPs will be consistent with industry practice and GALL Report requirements; therefore, the staff's concern described in RAI 3.2-7 is resolved. This information is reflected in the ALRA.

The staff's reviews of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively. The staff agreed with the applicant's statement that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

In RAI 3.2-8 dated November 17, 2004, the staff requested that the applicant discuss its inspection and test activities for the copper alloy (zinc > 15 percent) and aluminum bronze heat exchangers in a lubricating oil environment for which the applicant has identified no aging effect to ensure that the lubricating oil remains free of contaminants and water content.

In its response by letter dated December 21, 2004, the applicant stated that, "Lube oil samples from the NMP1 core spray pump motor cooler (i.e., heat exchanger) oil subsystems are obtained on an annual basis according to site procedure N1-CTP-V520, 'Lube Oil Sampling,' and the oil sample results are evaluated and trended. Any indication of an anomalous condition or adverse trend will result in an investigation under the site CAP."

The staff found the response acceptable because the applicant's inspection and test activities ensure that the lubricating oil remains free of contaminants and water content. The staff also agreed with the applicant's statement that this material is not in the GALL Report for this component (Note F).

In RAI 3.2-10, dated November 17, 2004, the staff requested that the applicant provide additional details relating to test and inspection methods for the loss of material of gray cast iron pumps in a treated water temperature $\geq$ 140 °F, but < 212 °F, low flow environment managed by One-Time Inspection, Selective Leaching of Materials, and Water Chemistry Control Programs. Specifically the staff requested that the applicant provide (a) the basis for selecting a representative sample for the one-time inspection and (b) inspection methods to detect selective leaching. Also the applicant was requested to indicate whether hardness tests would be performed.

In its response by letter dated December 21, 2004, the applicant stated:

> The basis for selecting representative samples for the one-time inspection are stated in original LRA Section B2.1.20, supplemented by NMPNS letter NMP1 L 1880 dated October 29, 2004. The process for identifying the population of potentially affected components will be based upon common characteristics of the components, such as material of construction, fabrication process, operating environment, and aging effects. From the selected population, a sample size will be determined to provide a 90 percent confidence that 90 percent of the population does not have the degradation mechanism present. This terminology and methodology are consistent with EPRI TR107514,'Age Related Degradation Inspection Method and Determination.'
>
> The inspection methods used to detect selective leaching will be consistent with original LRA Section B2.1.20, which states that inspection techniques may include a one-time visual inspection and hardness measurement. Hardness testing will be considered as a possible inspection technique if visual examination techniques alone cannot determine that selective leaching is severe enough to affect the component's intended function. The use of field hardness testing will also be contingent on the accessibility of the affected component surfaces to perform the test. Hardness testing on components susceptible to selective leaching may be appropriate if the component configuration and geometry allows. Tubing and other components such as valves with complex

internal geometry do not provide adequate physical access to internal surfaces requiring examination to allow accurate measurements to be made.

The One-Time Inspection Program is a new program that will be developed and implemented prior to the period of extended operation [NMP1 Commitment 23 and NMP2 Commitment 21]. The One-Time Inspection Program Attribute Assessment (PAA) addresses program implementation at NMPNS relative to the requirements of Appendix A of NUREG-1800.

The staff found the applicant's response reasonable and acceptable because the inspection methods are according to industry practice and NRC requirements. The staff also agreed with the applicant that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H). This information has been incorporated into the ALRA.

The staff's reviews of the Selective Leaching of Materials, One-Time Inspection, and Water Chemistry Control Programs are provided in the SER Sections 3.0.3.1.5, 3.0.3.1.4, and 3.0.3.2.2, respectively.

The staff found that the applicant had identified the appropriate AMPs for the materials and environment associated with the NMP1 core spray system components.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the core spray system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.3.3 Engineered Safety Features Systems NMP1 Emergency Cooling System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.A-3

The staff reviewed ALRA Table 3.2.2.A-3, which summarizes the results of AMR evaluations for the emergency cooling system component groups.

The staff reviewed the following ALRA Table 3.2.2.A-3 items in the NMP1 emergency cooling system:

- Cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting in non-borated water systems with operating temperatures ≥ 212 °F leaking fluid environment managed by TLAA evaluated according to 10 CFR 54.21(c). (By attachment 2 to NMPIL 2005 dated December 1, 2005, the applicant deleted this item from the table)
- Cracking and loss of material of wrought austenitic stainless steel heat exchangers in a moist air, wetting, temperature ≥ 140 °F, environment managed by the ASME Section XI (Subsections IWB, IWC, IWD) ISI and Preventive Maintenance Programs. The applicant stated that this environment is not in the GALL Report for this material and component (Note G).

- Aluminum and aluminum alloyed with manganese, magnesium, and magnesium plus silicon tanks in a treated water, temperature $\geq$ 140°F, environment for which the applicant has identified no aging effect.
- Cracking of aluminum alloy (containing copper or zinc as the primary alloying element) valves in a treated water $\geq$ 140 °F environment managed by ASME Section XI (Subsections IWB, IWC, IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs. The applicant stated that this material is not in the GALL Report for this component (Note F).

The staff found the deletion by attachment 2 to NMPIL 2005 dated December 1, 2005, of the cumulative fatigue damage of carbon or low alloy steel (yield strength $\geq$ 100 ksi) bolting in non-borated water systems with operating temperatures $\geq$ 212 °F leaking fluid environment managed by TLAA evaluated according to 10 CFR 54.21(c) acceptable because cumulative fatigue damage is not an applicable AERM for this component.

In RAI 3.2-12 dated November 17, 2004, the staff requested that the applicant provide information as to cracking and loss of material of wrought austenitic stainless steel heat exchangers in moist air, temperature $\geq$ 140 °F environment managed by the ASME Section XI (Subsections IWB, IWC, IWD) ISI and Preventive Maintenance Programs for these heat exchanger components:

(a) parameters monitored or inspected
(b) methods of detection of aging effects
(c) frequency of inspections including monitoring and trending
(d) acceptance criteria and their bases

In its response by letter dated December 21, 2004, the applicant stated that the subject wrought austenitic stainless steel heat exchangers in a moist air (temperature > 140 °F) environment listed in the original LRA Table 3.2.2.A-3 consist of the four NMP1 emergency condensers and that the aging effects requiring management are cracking and loss of material.

By letter dated December 6, 2004, the applicant submitted supplemental information to the original LRA Section 3.1 including revisions to the AMPs for the NMP1 emergency condensers. Specifically the original LRA Table 3.1.1.A item numbers 3.1.1.A-03 and 3.1.1.A-09 were revised to indicate that the emergency condensers were managed by a combination of the Water Chemistry Control, ASME Section XI (Subsections IWB, IWC, and IWD) ISI, and Preventive Maintenance Programs. The emergency condenser vent is monitored continuously in the control room for radioactivity, and a justification for not performing eddy current testing of the condenser tubes was provided. The applicant stated that because the Water Chemistry Control and ASME Section XI Programs are well established in the industry and credited in the GALL Report and because the applicant's programs are consistent with the GALL Report guidelines with justified exceptions the four categories of information requested were provided for the Preventive Maintenance Program only.

Regarding the Preventive Maintenance Program the applicant stated:

(1) The Preventive Maintenance Program includes temperature monitoring of water in the emergency cooling steam and return lines adjacent to the emergency condensers and in the shell of the emergency condensers. The parameters monitored are water

temperature at the inlet and outlet of the condensers and on the shell side of the condensers.

(2) The methods of detection of cracking and loss of material aging effects are through the potential impacts on system temperatures consistent with GALL Report guidelines.

(3) Temperature monitoring of the emergency condensers is conducted continuously through installed instrumentation with local indications and alarms in the control room. Twice a year the temperature data are collected and analyzed to determine if any detrimental effects have occurred.

(4) The temperature monitoring procedure contains separate acceptance criteria for the steam inlet piping, emergency condenser shell water, and condensate return line piping. The acceptance criteria are based upon design analyses to prevent damage to the piping and condensers.

The staff found the applicant's response reasonable and acceptable because the inspection methods described are according to ASME Section XI requirements and GALL Report guidelines.

The staff evaluation of aluminum and aluminum alloyed with manganese, magnesium, and magnesium plus silicon tanks in a treated water, temperature $\geq$ 140 °F environment for which the applicant has identified no aging effect is in RAI 3.2-14.

In RAI 3.2-14 dated November 17, 2004, the staff requested that the applicant provide the following information about the aging management of the tanks:

(1) ASTM designation or specific alloy content of the material

(2) Bases for the conclusion of no aging effects in this environment (for example, EPRI, ASTM, or similar reference documents with supporting data)

In its response by letter dated December 21, 2004, the applicant stated:

> There are two tanks in the NMP1 emergency cooling system that are made of aluminum alloy with magnesium in a treated water (temperature <140 °F) environment. These tanks (TANK-60-9 and TANK-60-10), provide the demineralized water make-up to the emergency condensers and are in-scope and subject to AMR.
>
> (1) The tanks are made of wrought-aluminum alloy 5052-H34, which is essentially pure aluminum with 2.5 percent magnesium and 0.25 percent chromium.
>
> (2) Aluminum alloyed with magnesium has good corrosion resistance in a treated water (temperature <140 °F) environment and resists stress corrosion cracking. (Reference, Section 2.1.7 and Section 4 of Appendix A of EPRI TR-1 14882, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 3.)

The staff found the applicant's response reasonable and acceptable because the applicant had provided the bases for the conclusion of no aging effects in the alloyed aluminum tanks; therefore, the staff's concern described in RAI 3.2-14 is resolved.

The applicant stated as to cracking of aluminum alloy (containing copper or zinc as the primary alloying elements) valves in a treated water, temperature $\geq$ 140 °F, environment managed by ASME Section XI, (Subsections IWB, IWC, IWD) ISI, One-Time Inspection, and Water Chemistry Control Programs that this material is not in the GALL Report for this component (Note F). The staff concurred with this statement.

In RAI 3.2-15 dated November 17, 2004, the staff requested that the applicant provide the following information:

a) ASTM designation or specific alloy content of the material

b) Bases for the conclusion that cracking is the only aging effect in this environment and EPRI, ASTM, or similar supporting documentary references

In its response dated December 21, 2004 the applicant stated:

> There are six valves in the NMP1 Emergency Cooling System that are made of aluminum alloy (containing copper or zinc as the primary alloying elements) in a treated water (temperature <140 °F) environment. These valves (BV-60-01, BV-60-02, VLV-60-07, VLV-60-08, VLV-6011 and VLV-60-12) are in-scope and subject to AMR.
>
> a) The valves are made of aluminum alloy SB-26 (no grade).
>
> b) Aluminum alloyed with copper or zinc as the primary alloying elements is resistant to general corrosion in a treated water (temperature <140 °F) environment, but is susceptible to stress corrosion cracking, as discussed in EPRI TR-1 14882, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 3.

The staff found the applicant's response reasonable and acceptable because the applicant had provided appropriate bases for the conclusion that stress corrosion cracking is the only AERM in this material-environment combination; therefore, the staff's concern described in RAI 3.2-15 is resolved.

The staff found further that the applicant had identified the appropriate AMPs for the materials and environment of the NMP1 emergency cooling system components and, the staff's concern described in RAI 3.2-15 is resolved. The above information is reflected in the ALRA.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the emergency cooling system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion. On the basis of its review, the staff found that the applicant appropriately evaluated AMR results involving material, environment, AERMs, and AMP combinations that are not evaluated in the GALL Report. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.3 Conclusion

the staff concludes that there is reasonable assurance that the applicant has provided sufficient information to demonstrate that the effects of aging for the NMP1 ESF systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the ESF systems, as required by 10 CFR 54.21(d).

3.2B NMP2 Aging Management of Engineered Safety Features

This section of the SER documents the staff's review of the applicant's AMR results for the ESF systems components and component groups associated with the following NMP2 systems:

- hydrogen recombiner system
- high pressure core spray system
- low pressure core spray system
- reactor core isolation cooling system
- residual heat removal system
- standby gas treatment system

3.2B.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.2, the applicant provided AMR results for the ESF systems components and component groups. In ALRA Table 3.2.1.B, "NMP2 Summary of Aging Management Programs for the Engineered Safety Features Systems Evaluated in Chapter V of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the ESF systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.2B.2 Staff Evaluation

The staff reviewed ALRA Section 3.2 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the ESF systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.2B.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.2.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.2B.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.2B.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.2B.2.3.

Finally, the staff reviewed the AMP summary descriptions in the USAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the ESF systems components.

Table 3.2B-1 below provides a summary of the staff's evaluation of NMP2 components, aging effects/mechanisms, and AMPs listed in ALRA Section 3.2, that are addressed in the GALL Report.

Table 3.2B-1 Staff Evaluation for NMP2 Engineered Safety Features Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Piping, fittings, and valves in emergency core cooling system (Item Number 3.2.1.B-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Piping, fittings, pumps, and valves in emergency core cooling system (Item Number 3.2.1.B-02)	Loss of material due to general corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.2)
Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems (Item Number 3.2.1.B-03)	Loss of material due to general corrosion	Plant specific	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.2)
Piping, fittings, pumps, and valves in emergency core cooling system (Item Number 3.2.1.B-04)	Loss of material due to pitting and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.3)
Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems (Item Number 3.2.1.B-05)	Loss of material due to pitting and crevice corrosion	Plant-specific	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.3)
Containment isolation valves and associated piping (Item Number 3.2.1.B-06)	Loss of material due to microbiologically influenced corrosion	Plant-specific	None	Not applicable (See Section 3.2B.2.2.4)
Seals in standby gas treatment system (Item Number 3.2.1.B-07)	Changes in properties due to elastomer degradation	Plant-specific	None	Not applicable (See Section 3.2B.2.2.5)
High pressure safety injection (charging) pump miniflow orifice (Item Number 3.2.1.B-08)	Loss of material due to erosion	Plant-specific	None	Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Drywell and suppression chamber spray system nozzles and flow orifices (Item Number 3.2.1.B-09)	Plugging of flow orifice and spray nozzles due to general corrosion products	Plant-specific	None	Not applicable (See Section 3.2B.2.2.7)
External surface of carbon steel components (Item Number 3.2.1.B-10)	Loss of material due to general corrosion	Plant-specific	Systems Walkdown Program (B2.1.33)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.2)
Piping and fittings of CASS in emergency core cooling system (Item Number 3.2.1.B-11)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	None	Not applicable There are no CASS piping and fittings with this aging effect/mechanism in NMP2
Components serviced by open-cycle cooling system (Item Number 3.2.1.B-12)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	Open-Cycle Cooling Water System Program (B2.1.10)	Consistent with GALL, which recommends no further evaluation (See Section 3.2B.2.1)
Components serviced by closed-cycle cooling system (Item Number 3.2.1.B-13)	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	None	Not applicable No ESF System components [except RHR HXs] serviced by closed-cycle cooling water system
Emergency core cooling system valves and lines to and from HPCI and RCIC pump turbines (Item Number 3.2.1.B-14)	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow-Accelerated Corrosion Program (B2.1.9)	Consistent with GALL, which recommends no further evaluation (See Section 3.2B.2.1) Not applicable for lines to and from HPCI pump turbine
Pumps, valves, piping, and fittings in containment spray and emergency core cooling systems (Item Number 3.2.1.B-15)	Crack initiation and growth due to SCC	Water chemistry	None	Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Pumps, valves, piping, and fittings in emergency core cooling systems (Item Number 3.2.1.B-16)	Crack initiation and growth due to SCC and IGSCC	Water chemistry and BWR stress corrosion cracking	Water Chemistry Control Program (B2.1.2), BWR Stress Corrosion Cracking Program (B2.1.6), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends no further evaluation (See Section 3.2B.2.1) Not applicable for pumps in emergency core cooling systems
Carbon steel components (Item Number 3.2.1.B-17)	Loss of material due to boric acid corrosion	Boric acid corrosion	None	Not applicable, PWR only

The staff's review of the NMP2 component groups followed one of several approaches. One approach, documented in SER Section 3.2B.2.1, discusses the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.2B.2.2, discusses the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.2B.2.3, discusses the staff's review of the AMR results for components in the ESF systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the ESF systems components is documented in SER Section 3.0.3.

3.2B.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.2.2.B, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the ESF systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Flow-Accelerated Corrosion Program
- Open-Cycle Cooling Water System Program
- One-Time Inspection Program
- Preventive Maintenance Program
- Systems Walkdown Program
- Bolting Integrity Program

Staff Evaluation. In ALRA Tables 3.2.2.B-1 through 3.2.2.B-6, the applicant provided a summary of AMRs for the ESF systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different AMP is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.2B.2.1.1 Cumulative Fatigue Damage

In the discussion section of ALRA Table 3.2.1.B Item 3.2.1.B-01 the applicant stated that piping, fittings, and valves in the emergency core cooling systems may be subject to cumulative fatigue damage and are subject to TLAA. In ALRA Table 3.4.2.B-4 the staff noted that a flexible hose had been included.

As documented in the Audit and Review Report, the applicant explained that the hose is a flexible bellows welded to end fittings of rigid pipe. A braided stainless steel sheath protects the outer diameter of the bellows. The component is designed to absorb movement, and no TLAA has been performed.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that there is reasonable assurance that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.2.2.C of its letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the ESF systems components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general corrosion
- local loss of material due to pitting and crevice corrosion
- local loss of material due to microbiologically influenced corrosion
- changes in properties due to elastomer degradation
- local loss of material due to erosion
- buildup of deposits due to corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.2.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.2B.2.2.1 Cumulative Fatigue Damage

In Section 3.2.2.C.1 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

3.2B.2.2.2 Loss of Material Due to General Corrosion

The staff reviewed Section 3.2.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.2.2.2.2.1.

In Section 3.2.2.C.2 of its letter dated August 19, 2005, the applicant addressed loss of material at locations with stagnant flow conditions due to general corrosion of pumps, valves, piping, and fittings of some of the BWR emergency core cooling systems and lines to the suppression chamber and to the drywell and suppression chamber spray system.

SRP-LR Section 3.2.2.2.2.1 states that the management of loss of material due to general corrosion of pumps, valves, piping, and fittings of some of the BWR emergency core cooling systems and of lines to the suppression chamber and to the drywell and suppression chamber spray system should be evaluated further. The AMP relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation; however, control of primary water chemistry does not prevent loss of material due to general corrosion in stagnant flow conditions. Therefore, the effectiveness of the applicant's Water Chemistry Control Program should be verified to ensure that corrosion does not occur.

The GALL Report recommends further evaluation of programs to manage loss of material due to general corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect and aging effect mechanism is either not occurring or progressing very slowly so that the component's intended function will be maintained during the period of extended operation.

In the letter dated August 19, 2005, the applicant stated that the applicable NMP2 systems are the high pressure core spray, low pressure core spray, reactor core isolation cooling and residual heat removal systems. The aging effect and aging effect mechanism are managed by a combination of the Water Chemistry Control Program and One-Time Inspection Program.

The staff's review and evaluation of the applicant's Water Chemistry Control and One-Time Inspection Programs are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

In addition the staff reviewed Section 3.2.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.2.2.

In Section 3.2.2.C.2 of its letter dated August 19, 2005, the applicant also addressed loss of material due to general corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

SRP-LR Section 3.2.2.2.2.2 states that loss of material due to general corrosion could occur in the drywell and suppression chamber spray systems header and spray nozzle components, standby gas treatment system components, containment isolation valves and associated piping, the automatic depressurization system piping and fittings, emergency core cooling system header piping and fittings and spray nozzles, and the external surfaces of carbon steel components. The GALL Report recommends further plant-specific evaluation to ensure adequate management of the aging effect and aging effect mechanism.

In the letter dated August 19, 2005, the applicant also stated that the applicable NMP2 systems are the hydrogen recombiner, reactor core isolation cooling, standby gas treatment, and main steam (for automatic depressurization) systems. The aging effect and aging effect mechanism for internal surfaces is managed by the One-Time Inspection Program. The aging effect and aging effect mechanism for external surfaces of carbon steel components in ECCS systems is managed by the Systems Walkdown Program.

The staff review and evaluations of the applicant's One-Time Inspection and Systems Walkdown Programs are documented in SER Sections 3.0.3.1.4 and 3.0.3.3.2, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

The staff concludes that the applicant's programs have met the criteria of SRP-LR Section 3.2.2.2.2. For those line items addressed in Section 3.2.2.C.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.2B.2.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion

The staff reviewed Section 3.2.2.C.3 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.3.1.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant addressed loss of material in stagnant flow conditions due to pitting and crevice corrosion of pumps, valves, piping, and fittings of some of the BWR emergency core cooling systems and of lines to the suppression chamber and to the drywell and suppression chamber spray system.

SRP-LR Section 3.2.2.2.3.1 states that the management of local loss of material due to pitting and crevice corrosion of pumps, valves, piping, and fittings of some of the BWR emergency core cooling system piping and fittings and of lines to the suppression chamber and to the drywell and suppression chamber spray system should be evaluated further. The AMP relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation; however, control of coolant water chemistry does not prevent loss of material due to crevice and pitting corrosion in stagnant flow conditions. Therefore, the effectiveness of the applicant's Water Chemistry Control Program should be verified to ensure that corrosion does not occur. The GALL Report recommends further evaluation of programs to manage the loss of material due to pitting and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant stated that the applicable NM2 systems are the high pressure core spray, low pressure core spray, reactor core isolation cooling, and residual heat removal systems. The aging effect and aging effect mechanism are managed by a combination of the Water Chemistry Control Program and the One-Time Inspection Program.

The staff's review and evaluation of the applicant's Water Chemistry Control and One-Time Inspection Programs are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

In addition the staff reviewed Section 3.2.2.C.3 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.3.2.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant also addressed loss of material due to pitting and crevice corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material due to pitting and crevice corrosion could occur in the containment isolation valves and associated piping and automatic depressurization system piping and fittings. The GALL Report recommends further evaluation to ensure adequate management of the aging effect and aging effect mechanism.

In Section 3.2.2.C.3 of its letter dated August 19, 2005, the applicant stated that the applicable NM2 system is the hydrogen recombiner system. The aging effect and aging effect mechanism are managed by the One-Time Inspection Program.

The staff reviewed the applicant's One-Time Inspection Program and its evaluation is documented in SER Section 3.0.3.1.4.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria in the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant's programs have met the criteria of SRP-LR Section 3.2.2.2.3. For those line items addressed in Section 3.2.2.C.3 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.2B.2.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion

The staff reviewed Section 3.2.2.C.4 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.4.

The applicant stated in Section 3.2.2.C.4 of its letter dated August 19, 2005, that for the local loss of material due to microbiologically induced corrosion (MIC) in containment isolation valves and associated piping this aging effect and aging effect mechanism are not applicable to NMP. NMP considers MIC an aging effect and aging effect mechanism for systems with raw water environments. NMP2 has no raw water environment for containment isolation valves or associated piping; therefore, this issue is not applicable for NMP2. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that the local loss of material due to MIC in containment isolation valves and associated piping is not applicable to NMP2.

Because NMP2 has no containment isolation valves subject to this aging effect and aging effect mechanism the staff determined that it is not applicable to NMP2.

3.2B.2.2.5 Changes in Properties Due to Elastomer Degradation

The staff reviewed Section 3.2.2.C.5 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.5.

In Section 3.2.2.C.5 of its letter dated August 19, 2005, the applicant stated that for the seals in the standby gas treatment system this aging effect and aging effect mechanism are not applicable to NMP2. The NMP2 standby gas treatment system contains no seals. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that the standby gas treatment system contains no seals; therefore, this aging effect and aging effect mechanism are not applicable to NMP2.

Because NMP2 has no components subject to this aging effect and aging effect mechanism the staff determined that it is not applicable to NMP2.

3.2B.2.2.6 Local Loss of Material Due to Erosion

The staff reviewed Section 3.2.2.C.6 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.2.2.2.6.

In Section 3.2.2.C.6 of its letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

Because NMP is a BWR the staff found that this aging effect and aging effect mechanism are not applicable to NMP2.

3.2B.2.2.7 Buildup of Deposits Due to Corrosion

The staff reviewed Section 3.2.2.C.7 of the applicant's letter dated August 19, 2005, against the criteria of Section 3.2.2.2.7.

In Section 3.2.2.C.7 of its letter dated August 19, 2005, the applicant addressed the plugging of components due to general corrosion in the spray nozzles and flow orifices of the drywell and suppression chamber spray system.

SRP-LR Section 3.2.2.2.7 states that the plugging of components due to general corrosion could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system. This aging effect and aging effect mechanism and effect will apply because spray nozzles and flow orifices are wetted occasionally even though most of the time this system is on standby. The wetting and drying of these components can accelerate this particular corrosion. The GALL Report recommends further evaluation to ensure adequate management of the aging effect and aging effect mechanism.

In Section 3.2.2.C.7 of its letter dated August 19, 2005, the applicant stated that for NMP2 the containment spray cooling mode of the residual heat removal system contains the subject spray nozzles and flow orifices. The plugging of spray nozzles due to general corrosion is not an applicable aging effect and aging effect mechanism as these components are stainless steel not susceptible to general corrosion. The plugging of flow orifices due to general corrosion is not an applicable aging effect and aging effect mechanism because the lines containing these components are flushed during quarterly testing which prevents the buildup of deposits.

NMP2 spray nozzles are made of stainless steel and the orifices are periodically flushed; therefore; the staff found this aging effect not applicable to NMP2.

3.2B.2.2.8. Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 includes the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.2.2.B-1 through 3.2.2.B-6, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.2.2.B-1 through 3.2.2.B-6, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff's evaluation is discussed in the following sections.

3.2B.2.3.1 Engineered Safety Features Systems NMP2 Hydrogen Recombiner System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.B-1

The staff reviewed ALRA Table 3.2.2.B-1, which summarizes the results of AMR evaluations for the hydrogen recombiner system component groups.

The staff reviewed the following ALRA Table 3.2.2.B-1 item for the NMP2 hydrogen recombiner system.

- Martensitic precipitation hardenable and superferritic stainless steel bolting in an air environment for which the applicant has identified no aging effect.

The staff found the applicant's assessment of no aging effect for this material, environment, and component combination acceptable as supported by industry data and operating experience. (Also refer to staff's evaluation in RAI 3.2-16 discussed in SER Section 3.2B.2.3.6, Standby Gas Treatment Systems, where the aging management in a similar component, material, environment combination is evaluated).

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the hydrogen recombiner system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3.2 Engineered Safety Features Systems NMP2 High Pressure Core Spray System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.B-2

The staff reviewed ALRA Table 3.2.2.B-2, which summarizes the results of AMR evaluations for the high pressure core spray system component groups.

The staff reviewed the following ALRA Table 3.2.2.B-2 items in the NMP2 high pressure core spray system.

- Cumulative fatigue damage of carbon or low alloy steel (yield strength $\geq$ 100 ksi) closure bolting for non-borated water system with operating temperatures $\geq$ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c). The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By attachment 2 of NMPIL 2005 dated December 1, 2005, the applicant deleted this item from the table)

- Cracking and loss of material of martensitic precipitation hardenable and superferritic stainless steel closure bolting for non-borated water systems with temperatures ≥ 212 °F, leaking fluid environment managed by the Bolting Integrity Program. The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G).
- Cumulative fatigue damage in martensitic, precipitation hardenable and superferritic stainless steel bolting for non-borated systems with temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table)
- Cumulative fatigue damage of nickel-based alloy piping and fittings in a treated water or steam environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c). The applicant stated that this material is not in the GALL Report for this component (Note F).
- Cracking of nicked based piping and fittings in a treated water or steam, temperatures > 482 °F low flow environment managed by the One-Time Inspection and Water Chemistry Control Programs The applicant stated that this material is not in the GALL Report for this component (Note F).
- Cracking of wrought austenitic stainless steel restriction orifices in a treated water or steam, temperature >482 °F, low flow environment managed by the One-Time Inspection and Water Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The applicant deleted cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) closure bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) from the table by NMPIL 2005 attachment 2 dated December 1, 2005. The staff found this deletion acceptable because cumulative fatigue damage is not an applicable AERM for this component.

The staff found the management of the aging effects of cracking and loss of material of martensitic precipitation hardenable and superferritic stainless steel closure bolting for non-borated water systems with temperatures ≥ 212 °F, leaking fluid environment managed by the Bolting Integrity Program acceptable as discussed in the evaluation of the program in SER Section 3.0.3.2.23. The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). The staff concurred with this statement.

The applicant deleted cumulative fatigue damage in martensitic, precipitation hardenable and superferritic stainless steel bolting for non-borated systems with temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) from the table by NMPIL 2005 attachment 2 dated December 1, 2005.

The staff found the aging management of cumulative fatigue damage of nickel-based alloy piping and fittings in a treated water or steam environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) reasonable and acceptable. The applicant stated that this material is not in the GALL Report for this component (Note F). The staff concurred with this statement.

The staff found the aging management of cracking of nickel-based piping and fittings in a treated water or steam, temperature > 482 °F, low flow environment by One-Time Inspection and Water Chemistry Control Programs appropriate and acceptable in this environment. The staff evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2 respectively. The applicant stated that this material is not in the GALL Report for this component (Note F). The staff concurred with this statement.

The staff's evaluation of the management of cracking of wrought austenitic stainless steel restriction orifices in a treated water or steam, temperature > 482 °F, low flow environment by One-Time Inspection and Water Chemistry Control Programs is in RAI 3.2-7 (SER Section 3.2A.2.3.2). The staff found these AMPs appropriate and acceptable for this environment. The staff's evaluations of One-Time Inspection and Water Chemistry Control Programs are in SER **Sections** 3.0.3.1.4 and 3.0.3.2.2 respectively. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement.

The staff's evaluations found that the applicant had identified the appropriate AMPs for the materials and environment associated with the components in the NMP2 high pressure core spray system.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the high pressure core spray system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3.3 Engineered Safety Features Systems NMP2 Low Pressure Core Spray System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.B-3

The staff reviewed ALRA Table 3.2.2.B-3, which summarizes the results of AMR evaluations for the low pressure core spray system component groups.

The staff reviewed the following ALRA Table 3.2.2.B-3 items in the NMP2 low pressure core spray system

- Cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table)
- Cracking and loss of material in martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures

≥ 212 °F, leaking fluid environment managed by the Bolting Integrity Program. The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G).

- Cumulative fatigue damage of martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table)
- Cracking in wrought austenitic stainless steel restriction orifices in a treated water, temperature ≥ 140 °F, but < 212 °F, environment managed by the One-Time inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Cracking of wrought austenitic stainless steel restriction orifices in a treated water or steam, temperature ≥ 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The applicant by NMPIL 2005 attachment 2 dated December 1, 2005, deleted from the table cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA.

The staff found management of cracking and loss of material in martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment by the Bolting Integrity Program acceptable as discussed in the evaluation of the Bolting Integrity Program in SER Section 3.0.3.2.23. The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). The staff concurred with this statement.

The applicant by NMPIL 2005 attachment 2 dated December 1, 2005, deleted from the table cumulative fatigue damage of martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).

The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). The staff concurred with this statement.

The applicant stated that cracking in wrought austenitic stainless steel restriction orifices in a treated water, temperature ≥ 140 °F, but < 212 °F, environment managed by the One-Time inspection and Chemistry Control Programs is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement. The staff found these AMPs appropriate and acceptable for managing the aging effect in this environment. The staff evaluations of the One-Time Inspection and Water Chemistry Control Programs are provided in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The applicant stated that cracking of wrought austenitic stainless steel restriction orifices in a treated water or steam, temperature ≥ 482 °F, environment managed by the One-Time

Inspection and Chemistry Control Programs is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement. The staff evaluation of the management of the aging effects is in RAI 3.2-7 (SER Section 3.2A.2.3.2). The staff found these management programs appropriate and acceptable for the aging effect in this environment. The staff evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2 respectively.

The staff's evaluations found that the applicant had identified the appropriate AMPs for the materials and environment associated with the above components in the NMP2 low pressure core spray system

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the low pressure core spray system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3.4 Engineered Safety Features Systems NMP2 Reactor Core Isolation Cooling System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.B-4

The staff evaluated the following items in the NMP2 reactor core isolation cooling system

- Cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table.
- Cumulative fatigue damage of martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c). The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table)
- Cracking and loss of material of martensitic precipitation hardenable and superferritic stainless steel closure bolting for non-borated water systems with temperatures ≥212 °F, leaking fluid environment managed by the Bolting Integrity Program. The applicant stated that this environment is not in the GALL Report for this material-component combination. (Note G).
- Cracking of wrought austenitic stainless steel condensing chambers in a treated water or steam, temperature ≥ 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Cumulative fatigue damage of wrought austenitic stainless steel piping and fittings in a treated water or steam, temperature ≥ 482 °F, environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c). The applicant stated that this material is not in the GALL Report for this component (Note F). (By NMPIL 2005 attachment 2

dated December 1, 2005, the applicant added note 10 stating that this item applies to small bore piping not included in the ISI Testing Program).

- Cracking and loss of strength of polymeric external surfaces in an air environment managed by the Preventive Maintenance Program. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Cracking in wrought austenitic stainless steel restriction orifices in a treated water, temperature ≥ 212 °F, but < 482 °F, environment managed by the One-Time inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Cracking of wrought austenitic stainless steel restriction orifices in a treated water or steam, temperature ≥ 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The applicant deleted cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) by NMPIL 2005 attachment 2 dated December 1, 2005. The staff found the deletion acceptable because cumulative fatigue damage is not an applicable AERM for this component.

The applicant deleted cumulative fatigue damage of martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) by NMPIL 2005 attachment 2 dated December 1, 2005. The staff found the deletion acceptable because cumulative fatigue damage is not an applicable AERM for this component.

The applicant stated that cracking and loss of material of martensitic precipitation hardenable and superferritic stainless steel closure bolting for non-borated water systems with temperatures ≥ 212 °F, leaking fluid environment managed by the Bolting Integrity Program, is not in the GALL Report for this material-component combination (Note G). The staff concurred with this statement. The staff found the management of the aging effects acceptable as stated in the evaluation of the Bolting Integrity Program in SER Section 3.0.3.2.23.

The applicant stated that cracking of wrought austenitic stainless steel condensing chambers in a treated water or steam, temperature ≥ 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement. The staff evaluation of the management of the aging effects is in RAI 3.2-7 (SER Section 3.2A.2.3.2). The staff found these AMPs appropriate and acceptable for the aging effect in this environment. The staff evaluations of the One-Time Inspection and Water Chemistry Control Programs is in SER Sections 3.0.3.1.4 and 3.0.3.2.2 respectively.

The applicant stated that cumulative fatigue damage of wrought austenitic steel piping and fittings in a treated water or steam, temperature ≥ 482 °F, environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) is not in the GALL Report for this component (Note F). The staff concurred with this statement. By NMPIL 2005 attachment 2 dated

December 1, 2005, the applicant added note 10 stating that this item applies to small bore piping not included in the ISI Program. This component also is not evaluated in ALRA Section 4.3. The staff found the aging management of cumulative fatigue damage of small bore piping by TLAA in accordance with 10 CFR 54.21(c) reasonable and acceptable.

The applicant stated that cracking and loss of strength of polymeric external surfaces in an air environment managed by the Preventive Maintenance Program is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement. The staff requested additional information about the Preventive Maintenance Program tests and inspections to manage the aging effects for this component. In its response dated November 15, 2005, the applicant stated:

> The polymer components in the NMP2 RCIC System are expansion joints between RCIC System Piping and the Condensate Storage Tank. They are fabricated of butyl rubber with polyester fabric and metal reinforcement. The PM Program methods of inspection associated with these expansion joints are visual, dimensional, and durometer readings as follows:
>
> - Inspection of the expansion joints is performed every two years.
> - Replacement of the components is scheduled for every 20 years.
>
> The PM Program acceptance criteria for the inspections are the following:
>
> <u>Visual Inspection</u>
>
> - No excessive and deep cracking or cuts of outer cover exposing reinforcing wire, body rings or fabric.
> - No blistering or local areas of deformation or ply separation.
> - No leakage or weeping through bellows or at flange connections.
> - No soft or gummy areas.
> - No mechanical damage due to maintenance or operating activity.
> - If expansion joint has a liner, liner is not damaged.
> - Structural members and attachment hardware are not damaged and maintain structural integrity.
>
> <u>Dimensional Inspection</u>
>
> - Face to face dimensions are within design tolerances.
>
> - Durometer readings between 50 - 80 (Shur scale).
>
> The inspections and acceptance criteria for the expansion joints are based on approved vendor manuals.

The staff found the applicant's response reasonable and acceptable because the Preventive Maintenance Program tests and inspections are consistent with industry practice and vendor recommendations. The staff found the management of the aging effects in polymeric components by the Preventive Maintenance Program acceptable.

The applicant stated that cracking in wrought austenitic stainless steel restriction orifices in a treated water, temperature ≥ 212 °F, but < 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs is not in the GALL Report for this component, material, and environment combination (Note H).The staff concurred with this statement. The staff review of the management of the aging effects is in RAI 3.2-7 (In SER Section 3.2A.2.3.2). The staff found these AMPs appropriate and acceptable for the aging effect in this environment. The staff evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The applicant stated that cracking of wrought austenitic stainless steel restriction orifices in a treated water or steam, temperature ≥ 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs is not in the GALL Report for this component, material, and environment combination (Note H). The staff concurred with this statement. The staff review of the management of the aging effects is in RAI 3.2-7 (In SER Section 3.2A.2.3.2). The staff found these AMPs appropriate and acceptable for managing the aging effect in this environment. The staff evaluations of the One-Time Inspection and Water Chemistry Control Programs are provided in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The staff's evaluations found that the applicant had identified the appropriate AMPs for the materials and environment associated with the NMP2 reactor core isolation cooling system components.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor core isolation cooling system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3.5 Engineered Safety Features Systems NMP2 Residual Heat Removal System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.B-5

The staff reviewed the following ALRA items for the NMP2 residual heat removal system:

- Cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table)
- Cracking and loss of material of martensitic precipitation hardenable and superferritic stainless steel closure bolting for non-borated water systems with temperatures ≥ 212 °F, leaking fluid environment managed by the Bolting Integrity Program. The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G)

- Cumulative fatigue damage of martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).The applicant stated that this environment is not in the GALL Report for this material-component combination (Note G). (By NMPIL 2005 attachment 2 dated December 1, 2005, the applicant deleted this item from the table)

The applicant deleted cumulative fatigue damage of carbon or low alloy steel (yield strength ≥ 100 ksi) bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) by NMPIL 2005 attachment 2 dated December 1, 2005. The staff found the deletion acceptable because cumulative fatigue damage for this component is not an applicable AERM.

The applicant stated that for cracking and loss of material of martensitic precipitation hardenable and superferritic stainless steel closure bolting for non-borated water systems with temperatures ≥ 212 °F, leaking fluid environment managed by the Bolting Integrity Program this environment is not in the GALL Report for this material-component combination (Note G). The staff concurred with this statement. The staff found the management of the aging effects acceptable as discussed in the evaluation of the Bolting Integrity Program in SER Section 3.0.3.2.23.

The applicant deleted cumulative fatigue damage of martensitic precipitation hardenable and superferritic stainless steel bolting for non-borated water systems with operating temperatures ≥ 212 °F, leaking fluid environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) by NMPIL 2005 attachment 2 dated December 1, 2005. The staff found the deletion acceptable because cumulative fatigue damage for this component is not an applicable AERM.

The staff's evaluations found that the applicant had identified the appropriate AMPs for the materials and environment associated with the above components in the NMP2 residual heat removal system.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the residual heat removal system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3.6 Engineered Safety Features Systems NMP2 Standby Gas Treatment System – Summary of Aging Management Evaluation – ALRA Table 3.2.2.B-6

The staff reviewed the following ALRA items for the NMP2 standby gas treatment system

- Martensitic precipitation hardenable and super ferritic stainless steel bolting in an air environment for which the applicant has assigned no aging effect.
- Loss of material for wrought austenitic stainless steel heaters in an air with moisture or wetting temperature < 140 °F environment managed by the One-Time Inspection Program. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

- Loss of material for wrought austenitic stainless steel piping and fittings in an air with moisture or wetting temperature < 140 °F environment managed by the One-Time Inspection Program. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Loss of material for aluminum and aluminum alloyed with manganese, magnesium plus silicon valves in an air with moisture or wetting temperature < 140 °F environment managed by One-Time Inspection Program. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).
- Loss of material for wrought austenitic stainless steel valves in an air with moisture or wetting temperature < 140 °F environment managed by One-Time Inspection Program. The applicant stated that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The staff requested that the applicant justify assigning no aging effect to the martensitic precipitation hardenable and superferritic stainless steel bolting. As addressed in RAI 3.2.16 the applicant stated:

> The material specification for the bolting corresponding to the ALRA line item for martensitic precipitation hardened and superferritic stainless steel bolting in air (temperature < 140 °F) environments is ASTM A193 Grade B6, which has a minimum specified tempering temperature of 1100 °F. Material with this heat treatment would have a yield strength of approximately 100 ksi. The material specification for the bolting corresponding to the ALRA line items for carbon or low allow steel (yield strength > 100 ksi) bolting in a moist air (temperature < 140 °F) environment is ASTM A193 Grade B7, which has a minimum tempering temperature of 1100 °F. Yield strengths for Type 4140 steel bar, which is a steel grade that meets A193 chemical requirements, are below 150 ksi when tempered at 1100 °F. Therefore, for both material types, the material yield strengths will not exceed 150 ksi.

GALL Report Section XI.M18, Bolting Integrity, under the "parameters monitored/inspected" program element states that cracking must be monitored only for bolts with yield strengths exceeding 150 ksi. Therefore, that cracking is not identified as an aging effect for the subject bolts is not inconsistent with the GALL Report.

Loss of preload typically would not be an aging effect requiring management for bolting in low temperature systems. The GALL Report specifies only loss of preload as an aging effect requiring management for components in the reactor vessel and internals and reactor coolant pressure boundary. For closure bolting in ESF systems the GALL Report addresses only carbon and low alloy steel bolting in high-pressure or high temperature systems. The bolting with the material-environment combinations of carbon or low alloy steel (yield strength > 100 ksi) and martensitic precipitation hardened and superferritic stainless steel bolting in air are not in high temperature or high pressure systems. Furthermore, the GALL Report does not identify loss of preload even for ESF bolts in high temperature, high pressure systems. Therefore, the determination that loss of preload does not apply to the subject bolts is consistent with the GALL Report.

The staff found the applicant's assessment reasonable, acceptable, and consistent with the GALL Report.

In a-RAI 3.2.2.B-1 dated November 22, 2005, the staff requested that the applicant provide assurance that a one-time inspection alone is adequate to manage the aging effect of loss of material for wrought austenitic stainless steel heaters in an air with moisture or wetting temperature < 140°F environment managed by the One-Time Inspection Program. In addition the staff requested the applicant to discuss the specifics of the tests and inspections for these components.

In its response, letter dated December 5, 2005, the applicant stated:

> ____As in the response to RAI 3.4.2.B-2, for the identified components fabricated of either stainless steel (SS) or alloyed aluminum (high aluminum, low alloy content) in a low temperature, moist air environment, it is considered unlikely that the loss of material aging effect will occur. SS in this mild air environment (containment environment) where any moisture would have extremely low concentrations of halides would not exhibit aging effects. Aluminum forms a protective passive layer in mild environments that protects the base metal from further corrosion. The One-Time Inspection Program activities will utilize visual, volumetric, and other inspection techniques consistent with industry practices to provide a means of verifying that aging management is not occurring or is progressing at such a slow rate that the intended function of the components would not be adversely affected.

The staff found the applicant's response reasonable and acceptable because the applicant explained that the aging effect is unlikely to occur in this environment for this component. The staff therefore considered the One-Time Inspection Program adequate for managing the aging effect in this environment. The staff's evaluation of the One-Time Inspection Program is in SER Section 3.0.3.1.4. The staff also concurred with the applicant's assessment that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The staff found reasonable and acceptable as stated in a-RAI 3.2.2.B-1 management of loss of material for wrought austenitic stainless steel piping and fittings in an air with moisture or wetting temperature < 140°F environment by the One-Time Inspection Program. The staff's evaluation of the One-Time Inspection Program is in SER Section 3.0.3.1.4. The staff also concurred with the applicant's assessment that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The staff found reasonable and acceptable as stated in a-RAI 3.2.2.B-1 management of loss of material for wrought austenitic stainless steel valves in an air with moisture or wetting temperature < 140°F environment by the One-Time Inspection Program. The staff's evaluation of the One-Time Inspection Program is in SER Section 3.0.3.1.4. The staff also concurred with the applicant's assessment that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The staff's evaluation of loss of material for aluminum and aluminum alloyed with manganese, magnesium plus silicon valves in an air with moisture or wetting temperature < 140°F, environment managed by One-Time Inspection Program is in a-RAI 3.2.2.B-1. The staff's evaluation of the One-Time Inspection Program is in SER Section 3.0.3.1.4. The staff found it reasonable and acceptable. The staff also concurred with the applicant's assessment that this aging effect is not in the GALL Report for this component, material, and environment combination (Note H).

The staff's evaluations found that the applicant had identified the appropriate AMPs for the materials and environment of the NMP2 standby gas treatment system components.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant demonstrated that the aging effects associated with the standby gas treatment system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion. On the basis of its review, the staff found that the applicant appropriately evaluated AMR results involving material, environment, AERMs, and AMP combinations that are not evaluated in the GALL Report. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.3 Conclusion

the staff concludes that there is reasonable assurance that the applicant had provided sufficient information to demonstrate that the effects of aging for the NMP2 ESF systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable USAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the ESF systems, as required by 10 CFR 54.21(d).

3.3 Aging Management of Auxiliary Systems

3.3A NMP1 Aging Management of Auxiliary Systems

This section of the SER documents the staff's review of the applicant's AMR results for the auxiliary systems components and component groups associated with the following NMP1 systems:

- circulating water system
- city water system
- compressed air systems
- containment systems
- control room HVAC system
- diesel generator building ventilation system
- emergency diesel generator system
- fire detection and protection system
- hydrogen water chemistry system
- liquid poison system

- miscellaneous non contaminated vents and drains system
- neutron monitoring system
- radioactive waste disposal building HVAC system
- radioactive waste system
- reactor building closed loop cooling water system
- reactor building HVAC system
- reactor water cleanup system
- sampling system
- service water system
- shutdown cooling system
- spent fuel pool filtering and cooling system
- turbine building closed loop cooling water system
- turbine building HVAC system
- electric steam boiler system
- makeup and demineralizer system

3.3A.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.3, the applicant provided AMR results for the auxiliary systems components and component groups. In ALRA Table 3.3.1.A, "NMP1 Summary of Aging Management Programs for the Auxiliary Systems Evaluated in Chapter VII of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the auxiliary systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.3A.2 Staff Evaluation

The staff reviewed ALRA Section 3.3 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the auxiliary systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.3A.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.3.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.3A.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.3A.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.3A.2.3.

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the auxiliary systems components.

Table 3.3A-1 below provides a summary of the staff's evaluation of NMP1 components, aging effects and mechanisms, and AMPs listed in ALRA Section 3.3, that are addressed in the GALL Report.

Table 3.3A-1 Staff Evaluation for NMP1 Auxiliary Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components in spent fuel pool cooling and cleanup (Item Number 3.3.1.A-01)	Loss of material due to general, pitting, and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.1)
Linings in spent fuel pool cooling and cleanup system; seals and collars in ventilation systems (Item Number 3.3.1.A-02)	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant specific	Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.2)
Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR) (Item Number 3.3.1.A-03)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	No TLAA for components in load handling systems-does not meet TLAA criteria (See Section 3.3A.2.1.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR) (Item Number 3.3.1.A-04)	Crack initiation and growth due to SCC or cracking	Plant specific	Water Chemistry Control Program (B2.1.2), Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.4)
Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components (Item Number 3.3.1.A-05)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant specific	Closed-Cycle Cooling Water System Program (B2.1.11), Fire Water System Program (B2.1.17), One-Time Inspection Program (B2.1.20), 10 CFR 50 Appendix J Program (B2.1.26), Preventive Maintenance Program (B2.1.32), Systems Walkdown Program (B2.1.33)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.5)
Components in reactor coolant pump oil collect system of fire protection (Item Number 3.3.1.A-06)	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	None	Not applicable (See Section 3.3A.2.2.6)
Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system (Item Number 3.3.1.A-07)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Fuel Oil Chemistry Program (B2.1.18), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.7)
Piping, pump casing, and valve body and bonnets in shutdown cooling system (older BWR) (Item Number 3.3.1.A-08)	Loss of material due to pitting and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation. One-Time Inspection Program is used for further evaluation (See Section 3.3A.2.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Heat exchangers in chemical and volume control system (Item Number 3.3.1.A-09)	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and a plant-specific verification program	None	Not applicable (See Section 3.3A.2.2.9)
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1.A-10)	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant specific	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	(See Section 3.3A.2.2.10)
New fuel rack assembly (Item Number 3.3.1.A-11)	Loss of material due to general, pitting, and crevice corrosion	Structures monitoring	None	Not applicable. The new fuel rack assembly is not in scope.
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1.A-12)	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex monitoring	Boraflex Monitoring Program (B2.1.12)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Spent fuel storage racks and valves in spent fuel pool cooling and cleanup (Item Number 3.3.1.A-13)	Crack initiation and growth due to stress corrosion cracking	Water chemistry	Water Chemistry Control Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Closure bolting and external surfaces of carbon steel and low-alloy steel components (Item Number 3.3.1.A-14)	Loss of material due to boric acid corrosion	Boric acid corrosion	Systems Walkdown Program (B2.1.33), Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1.7)
Components in or serviced by closed-cycle cooling water system (Item Number 3.3.1.A-15)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	Closed-Cycle Cooling Water System Program (B2.1.11)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Cranes including bridge and trolleys and rail system in load handling system (Item Number 3.3.1.A-16)	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	Inspection of Overhead Heavy Load and Light Load Handling Systems Program (B2.1.13)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components in or serviced by open-cycle cooling water systems (Item Number 3.3.1.A-17)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	Open-Cycle Cooling Water Program (B2.1.10); One-Time Inspection Program (B2.1.20); Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Buried piping and fittings (Item Number 3.3.1.A-18)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	Buried Piping and Tanks Inspection Program (B2.1.22)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.11)
Components in compressed air system (Item Number 3.3.1.A-19)	Loss of material due to general and pitting corrosion	Compressed air monitoring	Compressed Air Monitoring Program (B2.1.14), Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components (doors and barrier penetration seals) and concrete structures in fire protection (Item Number 3.3.1.A-20)	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	Fire Protection Program (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components in water-based fire protection (Item Number 3.3.1.A- 21)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	Fire Water System Program (B2.1.17)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components in diesel fire system (Item Number 3.3.1.A-22)	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	None	Not applicable. Fuel oil supply lines do not have this aging effect.
Tanks in diesel fuel oil system (Item Number 3.3.1.A-23)	Loss of material due to general, pitting, and crevice corrosion	Aboveground carbon steel tanks	None	Not applicable. Diesel fuel oil tanks are not supported on earthen or concrete foundations
Closure bolting (Item Number 3.3.1.A-24)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components in contact with sodium pentaborate solution in standby liquid control system (BWR) (Item Number 3.3.1.A-25)	Crack initiation and growth due to SCC	Water chemistry	Water Chemistry Control Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components in reactor water cleanup system (Item Number 3.3.1.A-26)	Crack initiation and growth due to SCC and IGSCC	Reactor water cleanup system inspection	Water Chemistry Control Program (B2.1.2), BWR Reactor Water Cleanup System Program (B2.1.15), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components in shutdown cooling system (older BWR) (Item Number 3.3.1.A-27)	Crack initiation and growth due to SCC	BWR stress corrosion cracking and water chemistry	BWR Stress Corrosion Cracking Program (B2.1.6), Water Chemistry Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components in shutdown cooling system (older BWR) (Item Number 3.3.1.A-28)	Loss of material due to pitting and crevice corrosion, and MIC	Closed-cycle cooling water system	Closed-Cycle Cooling Water Program (B2.1.11)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink (Item Number 3.3.1.A-29)	Loss of material due to selective leaching	Selective leaching of materials	Closed-Cycle Cooling Water Program (B2.1.11); Open-Cycle Cooling Water Program (B2.1.10); Selective Leaching of Materials Program (B2.1.21)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Fire barriers, walls, ceilings, and floors in fire protection (Item Number 3.3.1.A-30)	Concrete cracking and spalling due to freeze-thaw, aggressive chemical attack, and reaction with aggregates; loss of material due to corrosion of embedded steel	Fire protection and structures monitoring	None	Not applicable. The plant-specific environment for concrete structures in fire protection does not generate the listed aging effects.

The staff's review of the NMP1 component groups followed one of several approaches. One approach, documented in SER Section 3.3A.2.1, discusses the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.3A.2.2, discusses the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.3A.2.3, discusses the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the auxiliary systems components is documented in SER Section 3.0.3.

3.3A.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.3.2.A, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the auxiliary systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Flow-Accelerated Corrosion Program
- Open-Cycle Cooling Water System Program
- Closed-Cycle Cooling Water System Program
- Compressed Air Monitoring Program
- BWR Reactor Water Cleanup System Program
- Fire Protection Program
- Fire Water System Program
- Fuel Oil Chemistry Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Buried Piping and Tanks Inspection Program
- 10 CFR 50 Appendix J Program
- Preventive Maintenance Program
- Systems Walkdown Program
- Bolting Integrity Program

Staff Evaluation. In ALRA Tables 3.3.2.A-1 through 3.3.2.A-25, the applicant provided a summary of AMRs for the auxiliary systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.3A.2.1.1 Cumulative Fatigue Damage

In ALRA Table 3.3.1.A Item 3.3.1.A-03 the applicant stated that cumulative fatigue damage is managed using a TLAA.

As documented in the Audit and Review Report, the staff asked the applicant to clarify the statement on Table 3.3.1.A (page 3.3-86) of the ALRA that NMP has no TLAA for components in load handling systems. The staff requested the applicant to justify technically why this aging effect and aging effect mechanism was not applied to NMP. In its letter dated December 1, 2005, the applicant stated that this issue has been screened against the six criteria for a TLAA. Furthermore in this letter the applicant stated that the operating cycles for the cranes did not meet the criteria for a TLAA because (1) there were no actual calculations or analyses in the CLB projecting the number of operating cycles and (2) for cranes designed to CMAA-70 an estimate of the number of possible operating cycles in 60 years, a substantial fraction (40-95 percent) of the crane maximum rated load, was a very small percentage of the allowable number of cycles (for the NMP2 reactor building polar crane 1500 cycles versus a minimum allowable number of cycles of 100,000). Therefore, generating a formal calculation of operating cycles for 60 years would not result in any meaningful limitations on the use of the crane (i.e., the calculation would not meet criteria #4 for a TLAA from 10 CFR 54.3 which is, "Were determined to be relevant by the licensee in making a safety determination.")

The staff reviewed the applicant's response and found that it adequately justified having no TLAA for components in load handling systems.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.3A.2.1.2 Crack Initiation and Growth Due to SCC or Cracking

In the discussion section of ALRA Table 3.3.1.A, Item 3.3.1.A-04, the applicant stated that for stainless steel heat exchangers aging management is by the Water Chemistry Control Program and Preventive Maintenance Program; however, as documented in the Audit and Review Report, the staff noted that the applicant has applied ALRA Table 3.3.1, Item 3.3.1.A-04 to manage cracking in wrought austenitic stainless steel in a treated water or steam environment with temperatures $\geq$ 140 °F < 212 °F using its Water Chemistry Control Program and One-Time Inspection Program. The staff asked the applicant to identify the AMPs to be applied. In a letter dated December 1, 2005, the applicant stated that ALRA Table 3.3.1.A, Item 3.3.1.A-04 would be revised to state that further evaluation is documented in Appendices B2.1.2 (Water Chemistry Control Program) and B2.1.20 (One-Time Inspection Program).

The staff reviewed the applicant's response and found it consistent with the GALL Report and therefore acceptable.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.3A.2.1.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

As documented in the Audit and Review Report, the staff noted that the applicant had cited ALRA Table 3.3.1.A, Item 3.3.1.A-15 a number of times and had assigned Notes A, B, C, or D even though no exception to GALL AMP XI.M21, "Closed-Cycle Cooling Water System," had been taken in NMP AMP B2.1.11, "Closed-Cycle Cooling Water System Program." The staff requested the applicant to clarify the basis for the assignment of Notes B and D. In a letter dated December 1, 2005, the applicant stated that the notes are all A unless a GALL Report

Item does not address a specific component type, in which case the Note is C. Also the applicant stated that the notes for pumps, tanks, and valves line items referencing ALRA Table 3.3.1.A-15 (three on pages 3.3-137, 3.3-138, and 3.3-139) had been revised from Note B to Note A. The applicant removed the GALL Report item and Table 1 item, and replaced Note E with Note H for gray cast iron pumps in ALRA Tables 3.2.2.A-1 (page 3.2-38) and 3.3.2.A-21 (page 3.3-197). Finally, the applicant stated in this letter that there is also reference to this Table 1 Item for GCI HXs in ALRA Table 3.3.2.A-7 and that Note D should have been Note C because the component is a heat exchanger (HX) instead of a pump. The staff reviewed the applicant's response and found it acceptable because the applicant had assigned the appropriate notes to the AMR line items.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.3A.2.1.4 Loss of Material Due to General Corrosion and Wear

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.A-4 (page 3.5-74) for component type refueling platform and aging effect and aging effect mechanism loss of material the Table1 line item shown is 3.3.1.B-16. The staff asked the applicant to explain why a NMP2 line item is shown with an NMP1 component type.

In its letter dated December 1, 2005, the applicant stated that the reference is an error. For ALRA Table 3.5.2.A-4 with line item component type refueling platform and aging effect and aging effect mechanism loss of material the Table 1 reference was changed from Item 3.3.1.B-16 to Item 3.3.1.A-16.

The staff reviewed the applicant's response and found the correction of the reference to ALRA Table 3.3.1.A, Item 3.3.1.A-16 acceptable.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.3A.2.1.5 Loss of Material Due to Wear; Hardening and Shrinkage Due to Weathering

In ALRA Table 3.5.2.A-1 the applicant referenced ALRA Table 3.3.1.A, Item 3.3.1.A-20.

As documented in the Audit and Review Report, the staff noted that for component type doors and aging effect and aging effect mechanism loss of material the Note shown is C, indicating that the NMP AMP is consistent with the GALL Report AMP; however, the AMP shown is NMP AMP B2.1.16, "Fire Protection Program," for which the applicant takes some exceptions to the GALL AMP XI.M26, "Fire Protection." The staff asked the applicant to explain why a Note C was shown instead of a Note D. This request also applied to ALRA Table 3.5.2.A-6 (page 3.5-76), ALRA Table 3.5.2.A-7 and ALRA Table 3.5.2.A-11 for component type doors and aging effect/ mechanism loss of material managed by the applicant's Fire Protection Program.

In its letter dated December 1, 2005, the applicant stated that the note entry should be Note D instead of C. Note C was changed to Note D for ALRA Tables 3.5.2.A-11, 3.5.2.A-6, and

3.5.2.A-7 with AMR line item component doors and aging effect and aging effect mechanism loss of material managed by the applicant's Fire Protection Program.

The staff reviewed the applicant's response and found it acceptable because the correction of Note C to Note D assigned the proper note to these AMR line items.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.3A.2.1.6 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and SCC

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.3.2.A-10 (page 3.3-147) for component type bolting and aging effect and aging effect mechanism of loss of material or cracking, the Note shown is B, which indicates that, for the NMP AMP shown, the applicant has taken an exception to the GALL Report AMP; however, the AMP shown is NMP AMP B2.1.36, "Bolting Integrity Program," for which the applicant claimed consistency with GALL AMP XI.M18, "Bolting Integrity." The staff asked the applicant to explain why a Note B was shown instead of a Note A. In its letter dated December 1, 2005, the applicant stated that Note B is appropriate because its letter dated September 15, 2005, had declared an exception for the applicant's Bolting Integrity Program. The staff reviewed the applicant's response and found the applicant correct and the appropriate note assigned to the AMR line items.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.3A.2.1.7 Loss of Material Due to Boric Acid Corrosion

In reviewing ALRA Table 3.3.1.A, Item 3.3.1-14, the staff noted that the applicant had credited the Bolting Integrity Program and Systems Walkdown Program. These AMPs are different from the AMP recommended by the GALL Report, GALL AMP XI.M10, "Boric Acid Corrosion."

The staff review and evaluations of the applicant's Bolting Integrity and Systems Walkdown Programs are documented in Sections 3.0.3.2.23 and 3.0.3.3.2 of this SER, respectively. The staff found that the applicant's System Walkdown Program detects leakage and manages material degradation through visual inspection and that the applicant's Bolting Integrity Program monitors the potential leakage of sodium pentaborate solution on the liquid poison system component bolting. The staff concludes that these AMPs will ensure detection of leakage before a loss of intended function and manage adequately the loss of material due to boric acid corrosion.

The staff's review found that the applicant appropriately addressed the loss of material due to boric acid corrosion for closure bolting and external surfaces of carbon steel components.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL

Report. Therefore, the staff concludes that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.3.2.C of its supplemental letter to the ALRA, dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the auxiliary systems components. The applicant provided information concerning how it will manage the following aging effects:

- loss of material due to general, pitting, and crevice corrosion
- hardening and cracking or loss of strength due to elastomer degradation or loss of material due to wear
- cumulative fatigue damage
- crack initiation and growth due to cracking or stress corrosion cracking
- loss of material due to general, microbiologically influenced, pitting, and crevice corrosion
- loss of material due to general, galvanic, pitting, and crevice corrosion
- loss of material due to general, pitting, crevice, and MIC and biofouling
- crack initiation and growth due to stress corrosion cracking and cyclic loading
- reduction of neutron-absorbing capacity and loss of material due to general corrosion
- loss of material due to general, pitting, crevice, and MIC

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.3.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.3A.2.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion

The staff reviewed Section 3.3.2.C.1 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.3.2.2.1.1.

In Section 3.3.2.C.1 of a letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, and crevice corrosion for components in the spent fuel pool cooling and cleanup system. For NMP1 components in the spent fuel pool cooling systems are managed by the combination of the Water Chemistry Control Program and One-Time Inspection Program.

SRP-LR Section 3.3.2.2.1.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tubesheets of the heat exchanger in the spent fuel pool cooling and cleanup system. The Water Chemistry Program relies on monitoring and control of reactor water chemistry based on the EPRI guidelines of BWRVIP-29, (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material from general, pitting, or crevice corrosion; however, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, the effectiveness of the Water Chemistry Control Program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure no corrosion and that the component's intended function will be maintained during the period of extended operation.

The staff's review and evaluation of the applicant's Water Chemistry Control Program and One-Time Inspection Program are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

In addition the staff reviewed Section 3.3.2.C.1 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.1.2.

In Section 3.3.2.C.1 of its letter dated August 19, 2005, the applicant addressed loss of material due to pitting and crevice corrosion of components in the spent fuel cooling and cleanup system and the shutdown cooling system of older BWRs.

SRP-LR Section 3.3.2.2.1.2 states that loss of material due to pitting and crevice corrosion could occur in the piping, filter housing, valve bodies, and shell and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system and in the piping and pump casing in the shutdown cooling system (older BWR). The Water Chemistry Control Program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material from pitting or crevice corrosion; however, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of The Water Chemistry Control Program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure no corrosion and that the component's intended function will be maintained during the period of extended operation.

In Section 3.3.2.C.1 of its letter dated August 19, 2005, the applicant also stated that for NMP1 the reactor water cleanup and shutdown cooling systems are applicable. The aging effect/ mechanism is managed by the combination of the Water Chemistry Control Program and One-Time Inspection Program.

The staff review and evaluation of the applicant's Water Chemistry Control Program and One-Time Inspection Program are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.1. For those line items that apply to Section 3.3.2.C.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.3A.2.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material due to Wear

The staff reviewed Section 3.3.2.C.2 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.3.2.2.2.

In Section 3.3.2.C.2 of its letter dated August 19, 2005, the applicant addressed aging effects and aging effect mechanisms that could occur for the elastomer lining of some components exposed to the treated water environment of the spent fuel pool cooling system and elastomer seals and collars in the ductwork of certain ventilation systems exposed to a range of atmospheric conditions.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating ventilation systems and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects and aging effects mechanisms are adequately managed.

In Section 3.3.2.C.2 of its letter dated August 19, 2005, the applicant also stated that elastomers are not used in the lining of spent fuel pool system components within the scope of license renewal at NMP.

In addition the applicant stated in its letter dated August 19, 2005, that for NMP1 ventilation systems the aging effects and aging effects mechanisms for seals and collars are managed by the Preventive Maintenance Program. The staff reviewed the applicant's Preventive Maintenance Program and its evaluation is documented in SER Section 3.0.3.3.1.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.2. For those line items that apply to Section 3.3.2.C.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2.3 Cumulative Fatigue Damage

In Section 3.3.2.C.3 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

3.3A.2.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking

The staff reviewed Section 3.3.2.C.4 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.3.2.2.4.

In Section 3.3.2.C.4 of its letter dated August 19, 2005, the applicant addressed cracking due to SCC for the stainless steel reactor water cleanup system regenerative and non-regenerative heat exchangers.

SRP-LR Section 3.3.2.2.4 states that crack initiation and growth due to SCC could occur in the regenerative and non-regenerative heat exchanger components in the reactor water cleanup system. The GALL Report recommends further evaluation to ensure that these aging effects and aging effects mechanisms are adequately managed.

In its August 19, 2005, letter the applicant also stated that for NMP1 this aging effect and aging effects mechanism for the reactor water cleanup system regenerative and non-regenerative heat exchangers is managed by a combination of the Water Chemistry Control Program and One-Time Inspection Program.

The staff's review and evaluation of the applicant's Water Chemistry Control Program and One-Time Inspection Program are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria in the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.4. For those line items that apply to Section 3.3.2.C.4 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion

The staff reviewed Section 3.3.2.C.5 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.3.2.2.5.

In Section 3.3.2.C.5 of its letter dated August 19, 2005, the applicant addressed loss of material from corrosion that could occur on internal and external surfaces of components exposed to a range of atmospheric conditions. Specifically included in the subsection are the ventilation systems, the diesel generator systems' fuel oil, starting air, and combustion air intake and exhaust subsystems, and auxiliary systems' external carbon steel surfaces within the scope of license renewal.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, the auxiliary and radwaste area, the primary containment heating and ventilation systems, in the piping of the diesel generator building ventilation system, in the above-ground piping and fittings, valves, and pumps in the diesel fuel oil system, and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, crevice, and MIC could occur in the duct fittings, access doors and closure bolts, equipment frames, and housing of the duct; due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler; and due to general corrosion could occur on the external surfaces of all carbon steel structures and components, including bolting exposed to operating temperatures < 212°F in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects and aging effects mechanisms are adequately managed. Acceptance criteria are stated in Branch Technical Position RLSB-1.

In Section 3.3.2.C.5 of its letter dated August 19, 2005, the applicant also stated that for NMP1 this aging effect and aging effect mechanism for the applicable systems and components is managed by the Closed-Cycle Cooling Water, Fire Water System, One-Time Inspection , 10 CFR 50 Appendix J, Preventive Maintenance, and Systems Walkdown Programs.

The staff's review and evaluation of the applicant's Closed-Cycle Cooling Water System, Fire Water System, One-Time Inspection, 10 CFR 50 Appendix J, Preventive Maintenance and Systems Walkdown Programs are documented in SER Sections 3.0.3.2.8, 3.0.3.2.14, 3.0.3.1.4, 3.0.3.1.7, 3.0.3.3.1 and 3.0.3.3.2, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria in the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.5. For those line items that apply to Section 3.3.2.C.5 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion

The staff reviewed Section 3.3.2.C.6 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.3.2.2.6.

In Section 3.3.2.C.6 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection.

The applicant stated in Section 3.3.2.C.6 of its letter dated August 19, 2005, that this item is not applicable because NMP has no oil collection systems for its reactor recirculation pumps. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection is not applicable because NMP has no oil collection systems for its reactor recirculation pumps.

Because NMP has no components from this group the staff found this aging effect and aging effect mechanism not applicable to NMP.

3.3A.2.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling

The staff reviewed Section 3.3.2.C.7 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.3.2.2.7.

In Section 3.3.2.C.7 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, crevice, and MIC and biofouling for the internal surfaces of components in the diesel fuel oil system.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, crevice, and MIC and biofouling could occur in the internal surfaces of tanks in the diesel fuel oil system and due to general, pitting, crevice, and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing AMP relies on the Fuel Oil Chemistry Program for monitoring and control of fuel oil contamination according to the guidelines of ASTM Standards D4057, D1796, D2709 and D2276 to manage loss of material due to corrosion or biofouling that may occur where contaminants accumulate. The effectiveness of the chemistry control program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify program effectiveness. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure no corrosion and maintenance of the component's intended function during the period of extended operation.

The applicant also stated in the ALRA that for NMP1 this aging effect and aging effect mechanism are managed by the combination of the Fuel Oil Chemistry Program and One-Time Inspection Program.

The staff's review and evaluation of the applicant's Fuel Oil Chemistry Program and One-Time Inspection Program are documented in SER Sections 3.0.3.2.15 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria in the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.7. For those line items that apply to Section 3.3.2.C.7 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's quality assurance program.

3.3A.2.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading

The staff reviewed Section 3.3.2.C.9 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.3.2.2.9.

In Section 3.3.2.C.9 of its letter dated August 19, 2005, the applicant stated that crack initiation and growth due to SCC and cyclic loading apply to PWRs only and that this aging effect/ mechanism is not applicable to NMP. The staff determined through discussions with the applicant's technical personnel that because this aging effect and aging effect mechanism applies to PWRs only it is not applicable to NMP.

Because NMP has no components from this group the staff determined that this aging effect and aging effect mechanism are not applicable to NMP.

3.3A.2.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion

The staff reviewed Section 3.3.2.C.10 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.3.2.2.10.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

In Section 3.3.2.C.10 of its letter dated August 19, 2005, the applicant stated that reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing (Boral or boron steel) sheets of the spent fuel storage racks are not applicable as it had identified no aging effects and aging effects mechanisms for these components.

In its letter dated November 17, 2005, the applicant revised ALRA to address discussion held during the license renewal audit. In this letter, the applicant credits the Water Chemistry Control and One-Time Inspection Programs for aging management. The Water Chemistry Control and

One Time Inspection Programs manage general corrosion. The Boraflex Monitoring Program manages the effects of reduction of neutron-absorbing capability.

The staff reviewed the applicant's Water Chemistry Control, One-Time Inspection, and Boraflex Monitoring Programs. The staff found this acceptable since its change meets the GALL Report's recommendation. On this basis, the staff found this acceptable.

3.3A.2.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The staff reviewed Section 3.3.2.C.11 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.3.2.2.11.

In Section 3.3.2.C.11 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, crevice, and MIC for buried piping and fittings.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The Buried Piping and Tanks Inspection Program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, crevice, and MIC. The effectiveness of the applicant's Buried Piping and Tanks Inspection Program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components and ensure no loss of material.

In Section 3.3.2.C.11 of its letter dated August 19, 2005, the applicant also stated that this aging effect and aging effect mechanism are managed by the Buried Piping and Tanks Inspection Program for NMP1 diesel generator systems.

The staff's review and evaluation of the applicant's Buried Piping and Tanks Inspection Program are documented in SER Section 3.0.3.1.6.

As documented in the Audit and Review Report, the staff asked the applicant to clarify its position on opportunistic inspections prior to the period of extended operation. In its letter dated December 1, 2005, the applicant stated that the ALRA had been revised to include the following in its Buried Piping and Tanks Inspection Program:

> Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of extended operation, NMP will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, NMP will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.

After a review of the applicant's clarification of its visual inspection position and its further evaluation the staff concludes that the program meets the criteria of the SRP-LR.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.11. For those line items that apply to Section 3.3.2.C.11 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In the original LRA Tables 3.3.2.A-1 through 3.3.2.A-25, the staff reviewed additional details of the results of the NMP1 AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report, or not addressed in the GALL Report.

In the original LRA Tables 3.3.2.A-1 through 3.3.2.A-25, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and aging effect requiring management does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicated that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicated that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicated that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicated that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicated that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether it had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.3A.2.3.0 General RAIs on AMR Issues

By letter dated November 2, 2005, the staff requested that the applicant provide additional information on issues described in the general RAI (a-RAI 3.3.2-1) for the ALRA applicable to more than one system in both NMP1 and NMP2. By letter dated November 30, 2005, the applicant responded. The following describes a-RAI 3.3.2-1, the applicant's response, and the staff's evaluation of the applicant's response.

Adequacy of the Use of One-Time Inspection (a-RAI 3.3.2-1). One-time inspection is appropriate where either an aging effect is not expected to occur but there is insufficient data to rule it out completely or the aging effect is expected to occur very slowly and not affect the component intended function. The applicant proposed to use the One-Time Inspection Program to manage aging effects for various materials exposed to various environments for a majority of the components in two systems: (a) ALRA Table 3.3.2.A-14, NMP1 radioactive waste system and (b) ALRA Table 3.3.2.B-14, NMP2 floor and equipment drains system.

In a-RAI 3.3.2-1 dated November 2, 2005, the staff requested that the applicant:

(1) Explain from system characteristics why the One-Time Inspection Program rather than periodic inspections is proposed as the sole AMP for these two systems to manage aging effects of material-environment combinations

(2) Justify the use of the One-Time Inspection Program for the following cases:

 (a) In Table 3.3.2.A-14 AERM of cracking for wrought austenitic stainless steel (WASS) Heat Exchangers exposed to air, moisture, or wetting, temperature ≥ 140 °F and for WASS valves exposed to treated water temperature ≥ 140 °F < 212 °F.

 (b) In Table 3.3.2.A-14 AERM of loss of material (LOM) for carbon or low alloy steel (yield strength < 100 ksi) or WASS valves, piping, and fittings exposed to demineralized untreated water (DUW).

 (c) In Table 3.3.2.A-14 AERM of LOM for carbon or low alloy steel (yield strength < 100 ksi) valves exposed to either DUW, low flow, or treated water, temperature ≥ 140 °F < 212 °F.

 (d) In Table 3.3.2.B-14 AERM of cracking for WASS drainers exposed to treated water, temperature ≥ 140 °F < 212 °F.

 (e) In Table 3.3.2.B-14 AERM of LOM for aluminum pump or carbon or low alloy steel (yield strength < 100 ksi) strainers exposed to raw water.

In its letter dated November 30, 2005, the applicant responded:

(1) The NMP1 radwaste and NMP2 floor and equipment drains systems include the following subsystems:

- equipment drains in various building
- floor drains in various buildings
- the piping, pumps, tanks, and valves in these subsystems

The components in these systems are fabricated predominantly of carbon steel and the environment is generally water; however, exposure to water is not continuous. When tanks or sumps reach pre-set levels the pumps automatically start to empty them and expose the downstream components to water.

The applicant stated that for this non-continuous exposure the One Time Inspection Program was chosen to manage aging because the identified aging effects were judged to occur at such a slow rate that the component intended functions would not be impacted during the period of extended operation. After further evaluation, including review of the guidance from the most recent industry aging management documentation, the applicant concluded that the Preventative Maintenance Program manages the aging of the carbon steel and gray cast iron components in these systems more effectively than the One Time Inspection Program. The Preventive Maintenance Program was, therefore, substituted for the One Time Inspection Program to manage the aging of the carbon steel and gray cast iron components in these systems with the exception of the carbon steel piping and fittings and valves subjected to an internal fuel oil environment. As these components are exposed to fuel oil drainage loss of material from water contamination is possible. This possibility is considered unlikely because there would be an oil film on the inside of these components; however, the One Time Inspection Program will ascertain whether loss of material occurs. Through its CAP, the applicant will document and correct the anomaly. The cast and wrought austenitic stainless steel, nickel-based alloy, and copper alloy (zinc ≤ 15 percent) components will continue to be managed by the One Time Inspection Program.

The applicant further stated that an extent of condition review had been performed for the other NMP1 and NMP2 mechanical systems to determine if similar changes were needed in the application of the One Time Inspection Program for aging management. As a result of this review, there were two other changes identified: (1) for the NMP1 miscellaneous non-contaminated vents and drains system the AMP for managing the internals of the system components (carbon steel piping and fittings in a demineralized untreated water or raw water environment) was changed to the Preventive Maintenance Program and (2) for the NMP2 standby liquid control system the line item on Table 3.3.2.B-30 (page 3.3-288) of the ALRA for WASS valves in the air, moisture or wetting, temperature < 140°F environment was deleted (line with Note H). The valves identified as in that environment are actually wetted and covered by the other wetted WASS valve environments already included in the ALRA.

For the specific instances questioned the applicant provided the following response:

(2)(a) The heat exchangers that are addressed by the line item in the ALRA are associated with the Radwaste System Concentrator 12. This Concentrator, and hence its associated components, are infrequently (less than once per operating cycle) used since other preferable methods for liquid waste processing are normally utilized (see USAR Section XII.2.2. 1). As shown on Drawing LR- 18045-C, Sheet 5, the heat exchangers associated with Concentrator 12 are the Concentrator Heat Exchanger, the Concentrator Distillate Sub-Cooler, the Concentrator Vent Condenser, and the Concentrator Vapor Condenser. The One- Time Inspection Program is considered to be the appropriate aging management program for these components since they are normally exposed to air and the rate of aging is judged to be so slow that their intended functions would not be impacted during the period of extended operation.

The valves in this system that are WASS in Treated Water ≥ 140°F, but < 212°F are all 3/4" valves (mostly ball valves) in either instrument lines or drain lines. As such, the applicable AERM of cracking was considered to be unlikely since there is normally no flow through these lines and it is very improbable that the water temperature is sustained at the high end of the indicated range. For this reason, the One Time

Inspection Program was considered to be adequate for aging management of these valves, so it was credited.

(2)(b-d) As discussed in the response to the first part of this RAI, the aging management of the carbon steel and gray cast iron components within the NMPI Radioactive Waste System is changed from the One Time Inspection Program to the PM Program. For the stainless steel components within the system, it is considered to be unlikely that they will experience the AERMs that have been identified for them. For this reason, the One Time Inspection Program is retained as the AMP.

(2)(e) These pumps are the sump pumps in the Control Building floor drain sump (see Drawing LR-66C-0). These pumps are non-safety-related pumps that are in scope for 10 CFR 54.4(a)(2) because they are located in the Control Building and there is safety-related equipment in the vicinity. Even though the Environment for these pumps has been identified as Raw Water, the water that enters the sump is treated or demineralized water that has leaked onto the floor and drained to the sump. Since there is no chemistry control of this water, it has been identified as Raw Water. The One Time Inspection Program has been credited for aging management since it is considered unlikely that the AERM of LOM would ever occur to the extent such that the loss of the intended function of the pumps would be lost.

For the carbon steel strainers, as discussed in the response to the first part of this RAI, the AMP is to be changed to the PM Program.

The staff reviewed the applicant's response and found it reasonable and acceptable because the applicant has revised the aging management strategy for carbon steel components in the radioactive waste system, the auxiliary NMP2 floor and equipment drains system, and the other systems to ensure detection of aging effects prior to loss of intended function.

The staff's system-specific evaluations are discussed below.

3.3A.2.3.1 Auxiliary Systems NMP1 Circulating Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-1

The staff reviewed ALRA Table 3.3.2.A-1, which summarizes the results of AMR evaluations for the circulating water system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Note F through J in ALRA Table 3.3.2.A-1 as revised in the applicant's letter NMP1L 1996 dated November 17, 2005. The staff verified that the applicant had identified all AERMs and credited appropriate AMPs for managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe them.

Aging Effects. ALRA Table 2.3.3.A.2-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, valves, and traveling screens and rakes.

For these component types the applicant identified the following materials, environments, and AERMs:

- gray cast iron exposed to air subject to loss of material
- gray cast iron exposed to raw water subject to loss of material
- fiberglass exposed to raw water subject to cracking and loss of strength

The staff reviewed the information in ALRA Section 2.3.3.A.2, Table 2.3.3.A.2-1, Section 3.3.2.A.1, and Table 3.3.2.A-1.

The staff's review of the information provided in the ALRA found the aging effects of the circulating water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments associated with the above components in the circulating water system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the above components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement contains an adequate description of the program.

ALRA Table 3.3.2.A-1 identifies the following AMPs for managing the aging effects for the circulating water system components not addressed by the GALL Report:

- System Walkdown Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.3.2, 3.0.3.2.7, and 3.0.3.1.5.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the circulating water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.2 Auxiliary Systems NMP1 City Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-2

The staff reviewed ALRA Table 3.3.2.A-2, which summarizes the results of AMR evaluations for the city water system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use note F through J in ALRA Table 3.3.2.A-2 as revised by the applicant's letters NMP1L 1996 dated November 17, 2005, and NMP1L 2007 dated December 5, 2005. The staff reviewed these supplemental letters and verified that the applicant had identified all AERMs and credited appropriate AMPs for managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe them.

Aging Effects. ALRA Table 2.3.3.A.3-1 lists individual system components within the scope of license renewal subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, valves, and traveling screens and rakes.

For these component types the applicant identified the following materials, environments, and AERMs:

- gray cast iron exposed to air subject to loss of materia.
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material
- copper alloys (zinc < 15 percent) exposed to demineralized untreated water subject to loss of material
- gray cast iron exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.3, Table 2.3.3.A.3-1, Section 3.3.2.A.2, and Table 3.3.2.A-2. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. The general RAI applicable to this system is a-RAI 3.3.2-1.

In a-RAI 3.3.2-1 dated November 2, 2005, the staff requested that the applicant provide additional information and by letter dated November 30, 2005, the applicant responded. The RAI, the applicant's response, and the staff's evaluation of the response are described in SER Section 3.3A.2.3.0. There are no relevant system-specific RAIs associated with this system.

The staff's review of the information provided in the ALRA and the additional information in the applicant's response to the RAI the staff found the aging effects of the city water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the city water system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement adequately describes the program.

ALRA Table 3.3.2.A-2 identifies the following AMPs for managing aging effects for the city water system components not addressed by the GALL Report:

- System Walkdown Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

In the applicant's response to general RAI a-RAI 3.3.2-1, as described in SER Section 3.3A.2.3.0, the applicant revised its management strategy for the aging effects of some components in this system by replacing the One-Time Inspection Program with the Preventive

Maintenance Program. The staff's detailed review of the Preventive Maintenance Program is in SER Section 3.0.3.3.1.

The staff's detailed review of System Walkdown Program and Selective Leaching of Materials Program is in SER Sections 3.0.3.3.2 and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the city water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d)

3.3A.2.3.3 Auxiliary Systems NMP1 Compressed Air Systems – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-3

The staff reviewed ALRA Table 3.3.2.A-3, which summarizes the results of AMR evaluations for the compressed air systems component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-3 as revised by the applicant's letter NMP1L 1996 dated November 17, 2005. The staff reviewed this supplemental letter and verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.4-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include drain traps, external surfaces, filters/strainers, heat exchangers, piping and fittings, separators, and valves.

For these component types the applicant identified the following materials, environments, and AERMs:

- copper alloys (zinc $\leq$ 15 percent) exposed to demineralized untreated water, low flow, subject to loss of material
- gray cast iron exposed to air subject to loss of material
- gray cast iron exposed to demineralized untreated water, or demineralized untreated water, low flow, subject to loss of material
- polymers exposed to air subject to cracking, hardening and shrinkage, and loss of strength
- red brass cold worked exposed to air subject to cracking
- wrought austenitic stainless steel exposed to demineralized untreated water, low flow, subject to loss of material

- copper alloys (zinc > 15 percent) and aluminum bronze exposed to air subject to loss of heat transfer
- copper alloys (zinc > 15 percent) and aluminum bronze exposed to demineralized untreated water or demineralized untreated water, low flow, subject to loss of heat transfer and loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water or demineralized untreated water, low flow, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.4, Table 2.3.3.A.4-1, Section 3.3.2.A.3, and Table 3.3.2.A-3.

The staff's review of the information provided in the ALRA found the aging effects of the compressed air systems component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the compressed air systems.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the program adequately.

ALRA Table 3.3.2.A-3 identifies the following AMPs for managing the aging effects for the compressed air systems components not addressed by the GALL Report:

- System Walkdown Program
- Compressed Air Monitoring Program
- Selective Leaching of Materials Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.3.2, 3.0.3.2.11, and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the compressed air systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d)

3.3A.2.3.4 Auxiliary Systems NMP1 Containment Systems – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-4

The staff reviewed ALRA Table 3.3.2.A-4, which summarizes the results of AMR evaluations for the containment systems component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-4. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.5-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include heat exchanger, piping and fittings, valves, and vaporizers. .

For these component types the applicant identified the following materials, environments, and AERMs.

- copper alloys (zinc $\leq$ 15 percent) exposed to air subject to loss of heat transfer
- copper alloys (zinc $\leq$ 15 percent) exposed to air, moisture or wetting, temperature $\geq$ 140 °F, subject to loss of heat transfer
- copper alloys (zinc $\leq$ 15 percent) exposed to demineralized untreated water subject to loss of material
- wrought austenitic stainless steel exposed to air, moisture or wetting, temperature $\geq$ 140 °F, subject to cracking
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water, low flow, subject to loss of material
- wrought austenitic stainless steel exposed to demineralized untreated water, low flow, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.5, Table 2.3.3.A.5-1, Section 3.3.2.A.4 and Table 3.3.2.A-4.

The staff's review of the information provided in the ALRA found the aging effects of the containment systems component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the containment systems.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-4 identifies the following AMPs for managing the aging effects for the containment systems components not addressed by the GALL Report:

- One-Time Inspection Program
- Preventive Maintenance Program
- Closed-Cycle Cooling Water System Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.1.4, 3.0.3.3.1, and 3.0.3.2.8.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the containment systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.5 Auxiliary Systems NMP1 Control Room HVAC System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-5

The staff reviewed ALRA Table 3.3.2.A-5, which summarizes the results of AMR evaluations for the control room HVAC system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-5. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.6-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include expansion tank, external surfaces, filters/strainers, flow elements, heat exchanger, piping and fittings, pumps, seals and gaskets, and valves and dampers.

For these component types the applicant identified the following materials, environments, and AERMs:

- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water, low flow, subject to loss of material
- gray cast iron exposed to air subject to loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to air subject to loss of heat transfer
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water subject to loss of heat transfer
- wrought austenitic stainless steel exposed to demineralized untreated water subject to loss of heat transfer and loss of material
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water subject to loss of material
- polymers exposed to air subject to loss of sealing
- gray cast iron exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.6, Table 2.3.3.A.6-1, Section 3.3.2.A.5, and Table 3.3.2.A-5.

In a-RAI 3.3.2.A-5-1 dated November 2, 2005, the staff requested that the applicant clarify the Note "K" for heat exchangers and valves and dampers in Table 3.3.2.A-5 and explain why the LOM was not identified as an AERM for wrought austenitic stainless (WASS) steel heat exchangers exposed to demineralized untreated water (DUW) similar to the WASS heat exchangers in Table 3.3.2.A-14.

In its response by letter dated November 30, 2005, the applicant stated that as part of the recovery effort which led to the submittal of the ALRA it chose to convert the lettered plant-specific notes to the standard industry-lettered notes. As discussed with the staff, the applicant agreed that Note H should be substituted for Note K. For those two cited locations in Table 3.3.2.A-5 each Note K is, therefore, changed to Note H.

The applicant further stated that there is a similar Notes anomaly in ALRA Table 3.3.2.B-6 (page 3.3-217). For the component type piping and fittings the indicated Notes column entry of 'J' should be 'None' consistent with the other Notes column entries in this table and is changed accordingly.

As to the second question in the RAI the applicant agreed that the AERM of LOM should be applied to the WASS heat exchangers in DUW environments. Therefore, the applicant made the following changes:

(a) Consistent with Table 3.3.2.A-14, the HT and PB function for the WASS heat exchangers in Table 3.3.2.A-5 should have a line item for the AERM of LOM which is added. For this line item, the AMP is the Closed Cycle Cooling Water System Program with the Note of H. Additionally, the Note 9 for the LOHT AERM line item is removed.

(b) In Table 3.3.2.A-15, for the WASS heat exchangers with HT and PB intended functions in a DUW environment, a line item for the AERM of LOM is added. For this line item, the AMP is the Closed Cycle Cooling Water System Program with the Note of H. The Note 9 for the LOHT intended function line item is removed (additionally, for the LOHT line item, the One Time Inspection Program was removed in NMP letter NMP1L 1996, dated November 17, 2005).

(c) In Table 3.3.2.A-17, for the WASS heat exchangers in a DUW environment, the AERM is changed from None to LOM, the AMP is changed from None to the Closed Cycle Cooling Water System Program, and the Note is changed from None to H.

(d) In Table 3.3.2.A-21, for WASS heat exchangers in a DUW environment, a line item for the AERM of LOM is added with the AMP of the Closed Cycle Cooling Water System Program, and Note H. Additionally, the Note 9 in the LOHT AERM line item is removed.

(e) In Table 3.3.2.B-27, for the WASS heat exchangers with the HT and PB intended functions in a DUW environment, a line item for the AERM of LOM is added with the AMP of the Closed Cycle Cooling Water System Program, and Note H. Additionally, the Note 9 in the LOHT AERM line item is removed.

The staff's review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI found the aging effects of the control room

HVAC system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the control room HVAC system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-5 identifies the following AMPs for managing the aging effects for the control room HVAC system components not addressed by the GALL Report:

- Closed-Cycle Cooling Water System Program
- System Walkdown Program
- Preventive Maintenance Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.2.8, 3.0.3.3.2, 3.0.3.3.1, 3.0.3.1.4, and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the control room HVAC system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d)

3.3A.2.3.6 Auxiliary Systems NMP1 Diesel Generator Building Ventilation System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-6

The staff reviewed ALRA Table 3.3.2.A-6, which summarizes the results of AMR evaluations for the diesel generator building ventilation system component groups.

This auxiliary system is listed here for information and completeness. The AMR results for the NMP1 diesel generator building ventilation system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3A.2.2.5

3.3A.2.3.7 Auxiliary Systems NMP1 Emergency Diesel Generator System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-7

The staff reviewed ALRA Table 3.3.2.A-7, which summarizes the results of AMR evaluations for the emergency diesel generator system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA

Table 3.3.2.A-7. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.8-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, filters/strainers, heat exchangers, and pumps.

For these component types the applicant identified the following materials, environments, and AERMs:

- gray cast iron exposed to air subject to loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to treated water, temperature < 140°F, subject to loss of heat transfer
- gray cast iron exposed to treated water, temperature < 140°F, subject to loss of heat transfer
- wrought austenitic stainless steel exposed to raw water subject to loss of heat transfer
- gray cast iron exposed to raw water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.8, Table 2.3.3.A.8-1, Section 3.3.2.A.7, and Table 3.3.2.A-7.

The staff's review of the information provided in the ALRA found the aging effects of the emergency diesel generator system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the emergency diesel generator system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-7 identifies the following AMPs for managing the aging effects for the emergency diesel generator system components not addressed by the GALL Report:

- System Walkdown Program
- One-Time Inspection Program
- Closed-Cycle Cooling Water System Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.3.2, 3.0.3.1.4, 3.0.3.2.8, 3.0.3.2.7, and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the emergency diesel generator system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.8 Auxiliary Systems NMP1 Fire Detection and Protection System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-8

The staff reviewed the ALRA Table 3.3.2.A-8, which summarizes the results of AMR evaluations for the fire detection and protection system component groups.

The staff initially reviewed ALRA Table 3.3.2.A-8 (only those line items that are not consistent with the GALL Report or component aging effects for material/environment was not listed in the GALL Report), which summarizes the results of AMR evaluations for the NMP1 fire detection and protection system component groups.

In ALRA Section 3.3.2.A.8 and Table 3.3.2.A-8, the applicant identified the materials, environments, and AERMs. The materials identified include carbon steel or low alloy steel, concrete, copper alloy (zinc $\leq$ 15%), copper alloy (zinc > 15%) and aluminum bronze, gray cast iron, and wrought austenitic stainless steel.

The applicant identified the environments to which these materials could be exposed as air, dried air or gas, exhaust, fuel oil without water contamination, lubricating oil, raw water low flow, soil above the water table, and soil below the water table as the environments associated with the fire detection and protection system. The applicant identified AERMs from cracking and loss of material associated with the fire detection and protection system.

The applicant proposed to manage the fire protection system aging effects by using the Fire Protection Program, Fire Water System Program, Preventive Maintenance Program, Systems Walkdown Program, Bolting Integrity Program, One-Time Inspection Program, and Selective Leaching of Materials Program. The staff's evaluations of these programs are documented in SER Sections 3.0.3.2.13, 3.0.3.2.14, 3.0.3.3.1, 3.0.3.3.2, 3.0.3.3.23, 3.0.3.1.4, and 3.0.3.1.5 respectively.

The staff reviewed ALRA Section 3.3.2.A.8 and Table 3.3.2.A-8, to determine whether the applicant demonstrated that it will adequately manage the effects of aging for the fire protection system during the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff conducted its review, described below, in accordance with SRP-LR Section 3.3 and the GALL Report.

In RAI 2.3.3.A.9-8 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment. ALRA Table 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the ALRA table includes a note indicating that the prescribed AMP has been modified for use or that the applicant will use another aging management program.

For the combination of fire hydrants, gray cast iron, raw water, low flow, a table note indicates that the Selective Leaching Program is being used in addition to the Fire Water System Program to manage loss of material.

To complete its review, the staff required further information regarding the use of the Selective Leaching Program to manage loss of material. Therefore, in the RAI 2.3.3.A.9-8, the staff requested that the applicant supply the portions of the Selective Leaching Program that are applicable to the combination of fire hydrants, gray cast iron, raw water, low flow. The staff also requested that the applicant include program documents and procedures credited for managing the loss of material for this combination.

In its response by letter dated December 17, 2004, the applicant stated that as presented in ALRA Sections A1.1.33 and B2.1.21, the implementation of the selective leaching of materials program is discussed in the program description for the One-Time Inspection Program (see ALRA Section B2.1.20). The One-Time Inspection Program is a new license renewal aging management program commitment for NMPNS (NMP1 Commitment 23 and NMP2 Commitment 21) that is to be implemented prior to the period of extended operation. This commitment was made in the original LRA submittal, as supplemented by the NMP letter NMP1L 1880 dated October 29, 2004. As such, NMP does not currently have any program documents or procedures specific to managing selective leaching for fire hydrants

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-8 acceptable because it adequately describes how the Selective Leaching Program would be used to manage loss of material components in question. Therefore, the staff's concern described in RAI 2.3.3.A.9-8 is resolved.

In RAI 2.3.3.A.9-9 dated November 17, 2004, the staff stated that the GALL Report describes requirements for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of flow elements, wrought austenitic stainless steel, raw water, low flow, a table note indicates that the Fire Water System Program has been modified to manage cracking in addition to loss of material.

Additionally, another note of the original LRA table indicates that flow elements are not specifically identified in GALL Report Chapter VII for the fire protection system.

Therefore, to complete its review, the staff required further information regarding the use of the Fire Water System Program to manage cracking and loss of material. In the RAI, the staff requested that the applicant supply the Fire Water System Program documents and procedures that are applicable to the combination of flow elements, wrought austenitic stainless steel, raw water, low flow that are credited with managing cracking and loss of material.

In its response by letter dated December 17, 2004, the applicant stated that the AERM of material cracking resulting from SCC for wrought austenitic stainless steel components (including the flow elements) in low flow, raw water will be reassigned to the One-Time Inspection Program for aging management. As presented in the original LRA Sections A1.1.28 and B2.1.20, the One-Time Inspection Program is a new AMP, documented as commitments (NMP1 Commitment 23 and NMP2 Commitment 21) to be implemented prior to the period of extended operation. These commitments were made in the original LRA submittal, as supplemented by the NMP correspondence NMP1L 1880 dated October 29, 2004. As such, NMP does not currently have any program documents or procedures specific to manage cracking of flow elements.

The above flow elements are also susceptible to loss of material from galvanic, general, pitting, and MIC mechanisms. The applicant credits fire system flow test and a site chemistry procedure with managing the aging along with a new inspection activity yet to be generated. These credited activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement adds procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling. This enhancement will include inspections for loss of material in the flow elements above and will be implemented prior to the period of extended operation. As such, there are no existing program documents or procedures implementing these inspections.

- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure provides guidance for sampling and analysis of raw water systems for the presence of bacteria. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. Additionally, as presented in the original LRA Sections A1.1.18 and B2.1.17, the fire water system program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N1-FST-FPW-3A001, "FPW System Flow Test," is credited with managing corrosion, biofouling, and MIC of the fire protection water distribution system. The testing actiivity provides full flow testing of the system in accordance with the NFPA Fire Protection Handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies the system is capable of retaining pressure and is not obstructed or degraded by corrosion or fouling.

The applicant revised AMR original LRA Table 3.3.2.A-8 to replace Fire Water System Program with One-Time Inspection Program for the management of material cracking for wrought austenitic stainless steel components (flow elements and orifices) in a raw water, low flow environment.

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-9 acceptable because it adequately describes how the aging effects requiring management of material cracking resulting from SCC for wrought austenitic stainless steel components, galvanic, general, pitting, MIC, and selective leaching would be managed for the components in question. The applicant also revised the AMR original LRA table for the component types in question to show the One-Time Inspection Program for the management of cracking. Therefore, the staff's concern described in RAI 2.3.3.A.9-9 is resolved.

In RAI 2.3.3.A.9-10 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the aging management program for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of heat exchangers, carbon or low alloy steel (yield strength < 100 Ksi), raw water, and low flow, a table note indicates that the Fire Water System Program has been modified to manage loss of material in heat exchangers which are not specifically identified in GALL Report Chapter VII for the fire protection system.

To complete its review, the staff required further information regarding the use of the Fire Water System Program to manage loss of material for heat exchangers. The staff asked the applicant to supply the Fire Water System Program documents and procedures that are applicable to the combination of heat exchangers, carbon or low alloy steel (yield strength < 100 Ksi), raw water, and low flow that are credited with managing loss of material in heat exchangers.

In its response by letter dated December 17, 2004, the applicant stated that the heat exchangers in question are susceptible to loss of material from galvanic, general, pitting, and MIC mechanisms. A new inspection activity (see NMP1 Commitment 20 and NMP2 Commitment 18), for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/ inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement adds procedural guidance for performing visual inspections to monitor internal corrosion and to detect biofouling. This new activity will include inspections for loss of material in the heat exchangers in question and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.
- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The

procedure provides guidance for sampling and analysis of raw water systems for the presence of bacteria. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N1-FST-FPW-3A001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and MIC of the fire protection water distribution system. The procedure provides for full flow testing of the system in accordance with the NFPA Fire Protection Handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies that the system is capable of retaining pressure and is not obstructed or adversely affected by degradation such as corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-10 acceptable because it adequately describes how the aging effects requiring management of loss of material resulting from galvanic, general, pitting, and MIC mechanisms for carbon or low alloy steel combinations would be managed for the components in question. Therefore, the staff's concern described in RAI 2.3.3.A.9-10 is resolved. The above information is reflected in the ALRA.

In RAI 2.3.3.A.9-11 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the aging management program for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of orifices, carbon or low alloy steel (yield strength < 100 Ksi), cast iron, raw water, and low flow, a table note indicates that the Fire Water System Program has been modified to manage loss of material in orifices which are not specifically identified in GALL Report Chapter VII for the fire protection system.

Therefore, to complete its review, the staff required further information regarding the use of the Fire Water System Program to manage loss of material for orifices. The staff requested that the applicant supply the Fire Water System Program documents and procedures that are applicable to the combination of orifices, carbon or low alloy steel (yield strength < 100 Ksi), raw water, and low flow that are credited with managing loss of material in orifices.

In its response by letter dated December 17, 2004, the applicant stated that the population of orifices satisfying the criteria above is limited to flow orifice FO_R-100-509 (diesel fire pump to EDG cooling). This orifice is susceptible to loss of material from galvanic, general, pitting, and microbiologically influenced corrosion mechanisms. A fire system flow test and a site chemistry procedure are credited with managing the aging along with a new inspection activity yet to be generated. As stated in the response by the applicant, these credited activities are as follows:

The new site activity (see NMP1 Commitment 20 and NMP2 Commitment 18) is identified as an enhancement in "parameters monitored/inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement adds procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling. This new activity will include inspections for loss of material in the above orifice and will be implemented prior to the period of extended operation.

Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. This procedure provides guidance for sampling and analysis of raw water systems for the presence of bacteria. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to include periodic sampling of water-based fire protection systems.

Site procedure N1-FST-FPW-3A001, "FPW System Flow Test," is credited with managing corrosion, biofouling, and microbiologically influenced corrosion of the fire protection water distribution system. The testing actiivity provides full flow testing of the system in accordance with the NFPA Fire Protection Handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies the system is capable of retaining pressure and is not obstructed or degraded by corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-11 acceptable because it adequately describes how the aging effects requiring management for orifices would be managed for the combination in question. Therefore, the staff's concern described in RAI 2.3.3.A.9-11 is resolved. The above information is reflected in the ALRA.

In RAI 2.3.3.A.9-12 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of orifices, wrought austenitic stainless steel, raw water, low flow, a table note indicates that the Fire Water System Program has been modified to manage cracking in addition to loss of material.

Another table note indicates that orifices are not specifically identified in GALL Report Chapter VII for the fire protection system.

Therefore, to complete its review, the staff required further information regarding the use of the Fire Water System Program to manage cracking and loss of material. The staff requested that the applicant supply the Fire Water System Program documents and procedures that are applicable to the combination of orifices, wrought austenitic stainless steel, raw water, and low flow that are credited with managing cracking and loss of material.

In its response by letter dated December 17, 2004, the applicant stated that identification of the Fire Water System Program as the aging management program for cracking of wrought austenitic stainless steel orifices in raw water with low flow (original LRA Table 3.3.2.A-8) was an error. The Fire Water System Program is focused on managing loss of material rather than cracking. The One-Time Inspection Program should have been designated as the aging management program for the subject flow orifices. Use of the One-Time Inspection Program to manage cracking is appropriate because the aging mechanism that can cause cracking of wrought austenitic stainless steel in raw water with low flow is SCC. While SCC is possible in non-brackish fresh water, it is unlikely. Therefore, a one-time inspection is sufficient to verify that SCC is not occurring. As presented in original LRA Sections A1.1.28 and B2.1.20, the One-Time Inspection Program is a new AMP for NMP that is to be implemented prior to the period of extended operation. Development of the new program is a commitment made with the original LRA submittal (see NMP1 Commitment 23 and NMP2 Commitment 21), as supplemented by NMP Nuclear Station letter (NMP1L 1880) dated October 29, 2004. As such, NMP does not currently have any program documents or procedures specific to managing cracking of flow orifices in the fire water system. The One-Time Inspection Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.

The subject orifices are also susceptible to loss of material from galvanic, general, pitting, and microbiologically influenced corrosion mechanisms. A new inspection activity, for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These credited activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/ inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement adds procedural guidance for performing visual inspections to monitor internal corrosion and to detect biofouling. This new activity will include inspections for loss of material in the subject orifices and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A

- Site pProcedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure provides guidance for sampling and analysis of raw water systems for the presence of bacteria. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N1-FST-FPW-3A001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and MICof the fire protection water distribution system. The testing activity provides full flow testing of the system in accordance with the NFPA fire protection handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure, therefore, verifies the system is capable of retaining pressure and is not obstructed or degraded by corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-12 acceptable because it adequately describes how the aging effects requiring management for orifices would be managed for the combination in question. The applicant also revised the original LRA AMR table for the component type in question to show the One-Time Inspection Program for the management of cracking. Therefore, the staff's concern described in RAI 2.3.3.A.9-12 is resolved.

In RAI 2.3.3.A.9-13 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

Original LRA Section 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of sluice gate for motor driven fire pump, carbon or low alloy steel (yield strength < 100 Ksi), raw water, and low flow, a table note indicates that the Fire Water System Program has been modified to manage loss of material in the sluice gate for motor driven fire pump which is not specifically identified in GALL Report Chapter VII for the fire protection system.

Therefore, to complete its review, the staff required further information regarding the use of the Fire Water System Program to manage loss of material for the sluice gate for the motor driven fire pump. The staff requested that the applicant supply the Fire Water System Program documents and procedures that are applicable to the combination of sluice gate for motor driven fire pump, carbon or low alloy steel (yield strength < 100 Ksi), raw water, and low flow that are credited with managing loss of material in the sluice gate for motor driven fire pump.

In its response by letter dated December 17, 2004, the applicant stated that the sluice gate for the motor-driven fire pump is susceptible to loss of material from galvanic, general, pitting, and MIC mechanisms. A new inspection activity (see NMP Commitment 20 and NMP2 Commitment 21), for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement includes performing visual inspections to monitor component corrosion and to detect biofouling. This new activity will include inspections for loss of material in the sluice gates identified above and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.
- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure includes sampling and analysis of raw water systems for the presence of bacteria. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. Additionally, as presented in original LRA Sections A1.1.18

and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N1-FST-FPW-3A001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and microbiologically influenced corrosion of the fire protection water distribution system. The procedure provides for full flow testing of the system in accordance with the NFPA fire protection handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies that the system is capable of retaining pressure and is not obstructed or adversely affected by degradation such as corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-13 acceptable because it adequately describes how the aging effects requiring management for sluice gates would be managed for the combination in question. Therefore, the staff's concern described in RAI 2.3.3.A.9-13 is resolved. The above information is reflected in the ALRA.

In RAI 2.3.3.A.9-14 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.A-8 for the auxiliary systems for the NMP1 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of spray nozzles, copper alloys (zinc $\leq$ 15%), raw water, and low flow, a table note indicates that the Fire Water System Program has been modified to manage loss of material in the spray nozzles which are not specifically identified in GALL Report Chapter VII for the fire protection system.

To complete its review, the staff required further information regarding the use of the Fire Water System Program to manage loss of material for spray nozzles. The staff asked the applicant to supply the Fire Water System Program documents and procedures that are applicable to the combination of spray nozzles, copper alloys (zinc $\leq$15%), raw water, low flow, that are credited with managing loss of material in spray nozzles.

In its response by letter dated December 17, 2004, the applicant stated that the spray nozzles fabricated from copper alloys (zinc $\leq$ 15%), in an environment of raw water and low flow, are susceptible to loss of material. A new inspection activity (NMP1 Commitment 20 and NMP2 Commitment 18), for which a procedure must be generated, a site chemistry procedure, and a fire system functional test are credited with managing aging. These activities are discussed below:

The new site activity is identified as an enhancement in "parameters monitored/inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement includes performing visual inspections to monitor component corrosion and to detect biofouling. This new activity will include inspections for loss of material in the sluice gates identified above and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.

Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure includes sampling and analysis of raw water systems for the presence of bacteria. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

Site procedure N1-FST-FPW-C003, "Fire Protection Preaction, Deluge and Automatic Sprinkler Test," verifies the operability of the fire protection preaction, deluge, and automatic systems by performing a system functional test which includes simulated automatic actuation of the system and a visual inspection of the sprinkler heads and system piping to verify their integrity and verify no blockage. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met.

Based on its review, the staff found the applicant's response to RAI 2.3.3.A.9-14 acceptable because it adequately describes how the aging effects requiring management for spray nozzles would be managed for the combination in question. Therefore, the staff's concern described in RAI 2.3.3.A.9-14 is resolved.

By supplemental letter dated November 17, 2005, the applicant stated that an additional item will be added to Table 3.3.2.A-8. This being an external surfaces item for "gray cast iron in soil, above the water table" environment with the AERM of LOM, the AMP of Buried Piping and Tanks Inspection Program, the GALL Report Item of VII.C2.1-b, the Type 1 Table Item of 3.3.1.A-18, and Note F. This item is added based on the determination that the barrel of the gray cast iron fire hydrants is partially buried. The staff reviewed this change and found it acceptable.

As documented in the Audit and Review Report, the staff requested that the applicant describe the aging management of the fire hose reel supports to capture the stated changes to the Assessment Summary of the Fire Water Program Basis Document. The applicant subsequently described the procedures used to test hose stations and standpipe. The applicant also stated that when reviewing the AMR Reports and the ALRA, it was found that NMP2 credits the Fire Protection Program for hose reels, while this "hose reels" was not included as a component type for the NMP1 fire detection and protection system.

By supplemental letter dated December 1, 2005, the applicant stated an additional item will be added to ALRA Table 3.3.2.A-8. This component being "hose reels" with the intended function of pressure boundary. The aging management information for this item will be the same shown for hose reels in ALRA Table 3.3.2.B-13. The staff reviewed this change made to the ALRA and found that it is acceptable for the aging management of hose reels.

By letter dated December 20, 2005, the applicant submitted a summary of the CLB changes that have occurred during the staff review of the application that materially affects the contents of the application. The summary included an additional item added to ALRA Table 3.3.2.A-8.

This being a valve item for "gray cast iron in raw water, low flow table" environment with the AERM of LOM, the AMP of Fire Water System and Selective Leaching of Materials Programs, the GALL Report Items of VII.G.6-b, VII.C1.5-a, the Type 1 Table Items of 3.3.1.A-21 3.3.1.A-29, and Note A, C respectively. The applicant stated that the changes were made as a result of replacing the carbon steel pressure safety valve that serves as the air release valve for the NMP1 diesel-driven fire pump with a cast iron model. The staff reviewed these changes and found that it is acceptable for the aging management of cast iron pressure safety valve.

An addition to the letters mentioned above, the staff also reviewed the applicant's letter, dated July 14, 2005. This letter detailed changes that were made to the LRA, and found in the ALRA. The staff reviewed the changes to ALRA Table 3.3.2.A-8, and found that they are acceptable.

In its letter dated December 1, 2005, the applicant stated that the note for bolting will be modified from A to B in Table 3.3.2.A-8. This change is due to an exception found in the Bolting Integrity Program, which is the AMP for bolting. The staff evaluation for this exception is documented in Section 3.0.3.2.23. This staff reviewed the change in note, and found that it is acceptable.

3.3A.2.3.9 Auxiliary Systems NMP1 Hydrogen Water Chemistry System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-9

The staff reviewed ALRA Table 3.3.2.A-9, which summarizes the results of AMR evaluations for the hydgrogen water chemistry system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-9. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.10-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include flow element, piping and fittings, and valves.

For these component types the applicant identified the following materials, environments, and AERMs:

- wrought austenitic stainless steel exposed to treated water or steam, temperature ≥ 212 °F, but < 482 °F, subject to cracking

The staff reviewed the information In ALRA Section 2.3.3.A.10, Table 2.3.3.A.10-1, Section 3.3.2.A.9, and Table 3.3.2.A-9.

The staff's review of the information provided in the ALRA found the aging effects of the hydrogen water chemistry system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the hydrogen water chemistry system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-9 identifies the following AMPs for managing the aging effects for the hydrogen water chemistry system components not addressed by the GALL Report:

- One-Time Inspection Program
- Water Chemistry Control Program

The staff's detailed review of these AMPs is found in Sections 3.0.3.1.4 and 3.0.3.2.2 of this SER.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the hydgrogen water chemistry system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.10 Auxiliary Systems NMP1 Liquid Poison System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-10

The staff reviewed ALRA Table 3.3.2.A-10, which summarizes the results of AMR evaluations for the liquid poison system component groups.

This auxiliary system is listed here for information and completeness. The AMR results for the NMP1 liquid poison system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3A.2.2.5

3.3A.2.3.11 Auxiliary Systems NMP1 Miscellaneous Non Contaminated Vents and Drains System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-11

The staff reviewed ALRA Table 3.3.2.A-11, which summarizes the results of AMR evaluations for the miscellaneous non contaminated vents and drains system of those AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-11. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.12-1lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include piping and fittings.

For these component types, the applicant identified the following materials, environments, and AERMs:

- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.12, Table 2.3.3.A.12-1, Section 3.3.2.A.11, and Table 3.3.2.A-1. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. The general RAI applicable to this system is a-RAI 3.3.2-1

In a-RAI 3.3.2-1 dated November 2, 2005, the staff requested that the applicant provide additional information on the system aging effects. By letter dated November 30, 2005, the applicant responded. The RAI, the applicant's response, and the staff's evaluation of the response are described in SER Section 3.3A.2.3.0.

There are no relevant system-specific RAIs associated with this system.

The staff's review of the information provided in the ALRA and the additional information in the applicant's response to the RAI found the aging effects of the miscellaneous noncontaminated vents and drains system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the miscellaneous noncontaminated vents and drains system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-11 identifies the following AMPs for managing the aging effects for the miscellaneous noncontaminated vents and drains system components not addressed by the GALL Report:

- One-Time Inspection Program

In the applicant's response to general RAI a-RAI 3.3.2-1, dated November 30, 2005, as described in SER Section 3.3A.2.3.0 the applicant revised its management strategy for the aging effects of some components in this system by replacing the One-Time Inspection Program with the Preventive Maintenance Program. The staff's detailed review of the Preventive Maintenance Program is in SER Section 3.0.3.3.1.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the miscellaneous non contaminated vents and drains system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.12 Auxiliary Systems NMP1 Neutron Monitoring System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-12

This auxiliary system is listed here for information and completeness. The AMR results for the NMP1 neutron monitoring system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3A.2.2.5

3.3A.2.3.13 Auxiliary Systems NMP1 Radioactive Waste Solidification and Storage Building HVAC System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-13

This auxiliary system is listed here for information and completeness. The AMR results for the NMP1 radioactive waste solidification and storage building HVAC system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3A.2.2.5

3.3A.2.3.14 Auxiliary Systems NMP1 Radioactive Waste System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-14

The staff reviewed ALRA Table 3.3.2.A-14, which summarizes the results of AMR evaluations for the radioactive waste system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-14 as revised in the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.16-1 lists individual system components within the scope of license renewal and subject to AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, filters/strainers, flow element, heat exchangers, piping and fittings, pumps, separator, tanks, and valves.

For these component types the applicant identified the following materials, environments, and AERMs:

- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material
- gray cast iron exposed to air subject to loss of material
- wrought austenitic stainless steel exposed to demineralized untreated water subject to loss of material
- wrought austenitic stainless steel exposed to air, moisture or wetting, temperature ≥ 140 °F, subject to loss of material

- nickel based alloys exposed to demineralized untreated water subject to loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to loss of material
- gray cast iron exposed to demineralized untreated water subject to loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to treated water, temperature < 140 °F, subject to loss of material
- cast austenitic stainless steel exposed to demineralized untreated water subject to loss of material
- wrought austenitic stainless steel exposed to treated water, temperature < 140 °F, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water, low flow, subject to loss of material
- copper alloys (zinc < 15 percent) exposed to demineralized untreated water subject to loss of material
- wrought austenitic stainless steel exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to cracking

The staff reviewed the information in ALRA Section 2.3.3.A.16, Table 2.3.3.A.16-1, Section 3.3.2.A.14, and Table 3.3.2.A-14. During its review, the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. The general RAI applicable to this system is a-RAI 3.3.2-1 as discussed below:

By letter dated November 2, 2005, the staff requested that the applicant provide additional information on the issue addressed in a-RAI 3.3.2-1. By letter dated November 30, 2005, the applicant responded. The RAI, the applicant's response, and the staff's evaluation of the response are described in SER Section 3.3A.2.3.0.

There are no relevant system-specific RAIs for this system.

The staff's review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI found the aging effects of the radioactive waste system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the radioactive waste system.

<u>Aging Management Programs</u>. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-14 identifies the following AMPs for managing the aging effects for the radioactive waste system components not addressed by the GALL Report:

- One-Time Inspection Program
- Selective Leaching of Materials Program
- System Walkdown Program

In the applicant's response to general RAI a-RAI 3.3.2-1 as described in SER Section 3.3A.2.3.0, the applicant revised its strategy for managing the aging effects of some components in this system by replacing the One-Time Inspection Program with the Preventive Maintenance Program. The staff's detailed review of the Preventive Maintenance Program is in SER Section 3.0.3.3.1.

The staff's detailed review of Selective Leaching of Materials Program and System Walkdown Program is in SER Sections 3.0.3.1.5 and 3.0.3.3.2.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the radioactive waste system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.15 Auxiliary Systems NMP1 Reactor Building Closed Loop Cooling Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-15

The staff reviewed ALRA Table 3.3.2.A-15, which summarizes the results of AMR evaluations for the reactor building closed loop cooling water system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-15 as revised by the applicant's letter NMPIL 1996 dated November 17, 2005, the applicant's response to a-RAI 3.3.2.A-5-1 dated November 30, 2005, and the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.17-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, filters/strainers, flow elements, heat exchangers, orifices, piping and fittings, pumps, temperature elements, and valves.

For these component types, the applicant identified the following materials, environments, and AERMs:

- gray cast iron exposed to air subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water subject to loss of material
- gray cast iron exposed to demineralized untreated water, or demineralized untreated water, low flow, subject to loss of material
- wrought austenitic stainless steel exposed to demineralized untreated water subject to loss of material
- carbon or low alloy steel (yield strength < 100 ksi) exposed to demineralized untreated water subject to loss of heat transfer
- copper alloys (zinc > 15 percent) and aluminum bronze exposed to demineralized untreated water subject to loss of heat transfer and loss of material
- copper alloys (zinc > 15 percent) and aluminum bronze exposed to raw water, low flow, subject to loss of heat transfer and loss of material
- copper alloys (zinc > 15 percent) and aluminum bronze exposed to treated water, temperature < 140 °F, subject to loss of heat transfer
- wrought austenitic stainless steel exposed to demineralized untreated water subject to loss of heat transfer
- wrought austenitic stainless steel exposed to raw water subject to loss of heat transfer
- wrought austenitic stainless steel exposed to treated water, temperature ≥ 482 °F, subject to cracking
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to raw water, low flow, subject to loss of material
- wrought austenitic stainless steel exposed to demineralized untreated water, low flow, subject to loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to air, Moisture or wetting, temperature < 140 °F, subject to loss of material
- carbon or low alloy steel (Yield strength < 100 Ksi) exposed to demineralized untreated water, low flow, subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water, low flow, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.17, Table 2.3.3.A.17-1, Section 3.3.2.A.15, and Table 3.3.2.A-15. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. There are no general RAIs associated with this system. System-specific a-RAI 3.3.2.A-5-1 is applicable to this system. The staff's detailed review of the applicant's response to a-RAI 3.3.2.A-5-1 is in SER Section 3.3A.2.3.5.

The staff's review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI found the aging effects of the reactor building closed loop cooling water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the reactor building closed loop cooling water system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the program adequately.

ALRA Table 3.3.2.A-15 identifies the following AMPs for managing the aging effects for the reactor building closed loop cooling water system components not addressed by the GALL Report:

- System Walkdown Program
- Closed-Cycle Cooling Water System Program
- Selective Leaching of Materials Program
- One-Time Inspection Program
- Water Chemistry Control Program

The staff's detailed review of the AMPs is in SER Sections 3.0.3.3.2, 3.0.3.2.8, 3.0.3.1.5, 3.0.3.1.4, and 3.0.3.2.2.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor building closed loop cooling water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.16 Auxiliary Systems NMP1 Reactor Building HVAC System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-16

The staff reviewed ALRA Table 3.3.2.A-16, which summarizes the results of AMR evaluations for the reactor building HVAC system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-16. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.18-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces and flow elements.

For these component types the applicant identified the following materials, environments, and AERMs:

- gray cast iron exposed to air subject to loss of material
- gray cast iron exposed to air, moisture or wetting, temperature < 140°F, subject to loss of material
- polymers exposed to air subject to cracking, hardening and shrinkage, and loss of strength

The staff reviewed the information in ALRA Section 2.3.3.A.18, Table 2.3.3.A.18-1, Section 3.3.2.A.16, and Table 3.3.2.A-16.

The staff's review of the information provided in the ALRA found the aging effects of the reactor building HVAC system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the reactor building HVAC system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-16 identifies the following AMPs for managing the aging effects for the reactor building HVAC system components not addressed by the GALL Report:

- System Walkdown Program
- One-Time Inspection Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.3.2 and 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor building HVAC system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.17 Auxiliary Systems NMP1 Reactor Water Cleanup System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-17

The staff reviewed ALRA Table 3.3.2.A-17, which summarizes the results of AMR evaluations for the reactor water cleanup system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-17 as revised by the applicant's letter NMPIL 1996 dated November 17, 2005, the applicant's response to a-RAI 3.3.2.A-5-1 dated November 30, 2005, and the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.19-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include bolting, heat exchangers, piping and fittings, and pumps.

For these component types the applicant identified the following materials, environments, and AERMs:

- carbon or low alloy steel (yield strength ≤ 100 Ksi) exposed to demineralized untreated water, low flow, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water or steam, temperature ≥ 212 °F, but < 482 °F, subject to cumulative fatigue damage and loss of material
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water subject to loss of material
- wrought austenitic stainless steel exposed to demineralized untreated water subject to loss of material
- gray cast iron exposed to treated water, temperature < 140 °F, subject to loss of material

The staff reviewed the information in Section 2.3.3.A.19, Table 2.3.3.A.19-1, Section 3.3.2.A.17, and Table 3.3.2.A-17 of the ALRA. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. There are no general RAIs associated with this system. System-specific a-RAI 3.3.2.A-5-1 is applicable to this system. The staff's detailed review of the applicant's response to a-RAI 3.3.2.A-5-1 is in SER Section 3.3A.2.3.5.

The staff's review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI found the aging effects of the reactor water cleanup system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the reactor water cleanup system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the program adequately.

ALRA Table 3.3.2.A-17 identifies TLAA and the following AMPs for managing the aging effects for the reactor water cleanup system components not addressed by the GALL Report:

- Closed-Cycle Cooling Water System Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Water Chemistry Control Program
- Selective Leaching of Materials Program

The staff's evaluation of the TLAA is in SER Section 4.3. The staff's detailed review of the AMPs is in SER Sections 3.0.3.2.8, 3.0.3.13, 3.0.3.1.4, 3.0.3.2.2, and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor water cleanup system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.18 Auxiliary Systems NMP1 Sampling System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-18

The staff reviewed ALRA Table 3.3.2.A-18, which summarizes the results of AMR evaluations for the sampling system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-18 as revised by the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.20-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include heat exchangers, piping and fittings, and rupture disc.

For these component types the applicant identified the following materials, environments, and AERMs:

- elastomer exposed to raw water subject to hardening and shrinkage
- wrought austenitic stainless steel exposed to treated water or steam, temperature $\geq$ 482 °F, low flow, subject to cracking

The staff reviewed the information in ALRA Section 2.3.3.A.20, Table 2.3.3.A.20-1, Section 3.3.2.A.18, and Table 3.3.2.A-18.

The staff's review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI found the aging effects of the sampling system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the sampling system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the program adequately.

ALRA Table 3.3.2.A-18 identifies the following AMPs for managing the aging effects for the sampling system components not addressed by the GALL Report :

- One-Time Inspection Program
- Water Chemistry Control Program
- Preventive Maintenance Program

The staff's detailed review of the above AMPs is in SER Sections 3.0.3.1.4, 3.0.3.2.2, and 3.0.3.3.1.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the sampling system component components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.19 Auxiliary Systems NMP1 Service Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-19

The staff reviewed ALRA Table 3.3.2.A-19, which summarizes the results of AMR evaluations for the service water system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-19. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.21-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces and filters/strainers.

For these component types, the applicant identified the following materials, environments, and AERMs:

- copper alloys (zinc > 15 percent) and aluminum bronze exposed to air subject to loss of material
- gray cast iron exposed to air subject to loss of material
- gray cast iron exposed to raw water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.21, Table 2.3.3.A.21-1, Section 3.3.2.A.19, and Table 3.3.2.A-19.

The staff's review of the information provided in the ALRA found the aging effects of the service water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the service water system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-19 identifies the following AMPs for managing the aging effects for the service water system components not addressed by the GALL Report :

- System Walkdown Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.3.2, 3.0.3.2.7, and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the service water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.20 Auxiliary Systems NMP1 Shutdown Cooling System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-20

The staff reviewed ALRA Table 3.3.2.A-20, which summarizes the results of AMR evaluations for the shutdown cooling system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA

Table 3.3.2.A-20. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.22-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include heat exchangers.

For these component types the applicant identified the following materials, environments, and AERMs:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature < 140 degree F, subject to loss of heat transfer

The staff reviewed the information in ALRA Section 2.3.3.A.22, Table 2.3.3.A.22-1, Section 3.3.2.A.20, and Table 3.3.2.A-20.

The staff's review of the information provided in the ALRA found the aging effects of the shutdown cooling system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the shutdown cooling system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing them. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-20 identifies the following AMP for managing the aging effects for the shutdown cooling system components not addressed by the GALL Report:

- Open-Cycle Cooling Water System Program

The staff's detailed review of this AMP is in SER Sections 3.0.3.2.7.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the shutdown cooling system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.21 Auxiliary Systems NMP1 Spent Fuel Pool Filtering and Cooling System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-21

The staff reviewed ALRA Table 3.3.2.A-21, which summarizes the results of AMR evaluations for the spent fuel pool filtering and cooling system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-21 as revised by the applicant's response to a-RAI 3.3.2.A-5-1 dated November 30, 2005 and the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.23-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, filters/strainers, heat exchangers, pump, and valves.

For these component types the applicant identified the following materials, environments, and AERMs:

- gray cast iron exposed to air subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature < 140 °F, oxygenated, subject to loss of material
- wrought Austenitic stainless steel exposed to demineralized untreated water subject to loss of heat transfer and loss of material
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to treated water, temperature < °F, oxygenated, subject to loss of material
- gray cast iron exposed to treated water, temperature < 140 °F, oxygenated, subject to loss of material
- aluminum alloys containing copper or zinc as the primary alloying elements exposed to treated water, temperature < 140 °F, oxygenated, subject to cracking
- aluminum alloys containing copper or zinc as the primary alloying elements exposed to treated water, temperature < 140 °F, low flow, oxygenated, subject to cracking
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature < 140 °F, low flow, oxygenated, subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to treated water, temperature < 140 °F, low flow, oxygenated, subject to loss of material
- aluminum, and aluminum alloyed with manganese, magnesium, and magnesium plus silicon exposed to treated water, temperature < 140 °F, oxygenated, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.23, Table 2.3.3.A.23-1, Section 3.3.2.A.21, and Table 3.3.2.A-21. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. There are no general RAIs associated with this system. System-specific a-RAI 3.3.2.A-5-1 is applicable to this system. The staff's detailed review of the applicant's response to a-RAI 3.3.2.A-5-1 is in SER Section 3.3A.2.3.5.

The staff's review of the information provided in the ALRA and the additional information in the applicant's response to the RAI found the aging effects of the spent fuel pool filtering and cooling system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the spent fuel pool filtering and cooling system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-21 identifies the following AMPs for managing the aging effects for the spent fuel pool filtering and cooling system components not addressed by the GALL Report:

- System Walkdown Program
- One-Time Inspection Program
- Water Chemistry Control Program
- Closed-Cycle Cooling Water System Program

The staff's detailed review of the AMPs is in SER Sections 3.0.3.3.2, 3.0.3.1.4, 3.0.3.2.2, and 3.0.3.2.8.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the spent fuel pool filtering and cooling system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.22 Auxiliary Systems NMP1 Turbine Building Closed Loop Cooling Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-22

The staff reviewed ALRA Table 3.3.2.A-22, which summarizes the results of AMR evaluations for the turbine building closed loop cooling water system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-22 as revised by the applicant's letter NMPIL 1996, dated November 17, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.25-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include heat exchangers, piping and fittings, pumps, strainers, tanks, and valves.

For this component type the applicant identified the following materials, environments, and AERMs:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.25, Table 2.3.3.A.25-1, Section 3.3.2.A.22, and Table 3.3.2.A-22.

The staff's review of the information provided in the ALRA found the aging effects of the turbine building closed loop cooling water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the turbine building closed loop cooling water system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-22 identifies the following AMPs for managing the aging effects for the turbine building closed loop cooling water system components not addressed by the GALL Report:

- One-Time Inspection Program
- Preventive Maintenance Program
- Water Chemistry Control Program

The staff's detailed review of this AMP is found in SER Sections 3.0.3.1.4, 3.0.3.3.1, and 3.0.3.2.2.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the turbine building closed loop cooling water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.23 Auxiliary Systems NMP1 Turbine Building HVAC System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-23

The staff reviewed ALRA Table 3.3.2.A-23, which summarizes the results of AMR evaluations for the turbine building HVAC system component-material-environment AERM combinations not addressed in the GALL Report. These combinations use Notes F through J in ALRA Table 3.3.2.A-23 as revised by the applicant's letter NMPIL 1996 dated November 17, 2005. The staff verified that the applicant had identified all AERMs and had credited appropriate AMPs with managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.A.26-1lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include ducting, external surfaces, and valves and dampers.

For these component types the applicant identified the following materials, environments, and AERMs:

- fiberglass exposed to air with vibratory motion subject to cracking, loss of material, and loss of strength
- fiberglass exposed to air subject to cracking and loss of strength
- gray cast iron exposed to air subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.A.26, Table 2.3.3.A.26-1, Section 3.3.2.A.23, and Table 3.3.2.A-23.

On the basis of its review, the staff found the aging effects of the turbine building HVAC system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the components in the turbine building HVAC system.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.A-23 identifies the following AMPs for managing the aging effects for the turbine building HVAC system components not addressed by the GALL Report:

- Preventive Maintenance Program
- System Walkdown Program
- One-Time Inspection Program

The staff's detailed review of these AMPs is in SER Sections 3.0.3.3.1, 3.0.3.3.2, and 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the turbine building HVAC system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3A.2.3.24 Auxiliary Systems NMP1 Electric Steam Boiler System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-24

This auxiliary system is listed here for information and completeness. The AMR results for the NMP1 electric steam boiler system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3A.2.2.2

3.3A.2.3.25 Auxiliary Systems NMP1 Makeup and Demineralizer System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.A-25

This auxiliary system is listed here for information and completeness. The AMR results for the NMP1 makeup and demineralizer system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3A.2.2.5.

3.3A.3 Conclusion

The staff concludes that there is reasonable assurance that the applicant provided sufficient information to demonstrate that the effects of aging for the NMP1 auxiliary systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging these auxiliary systems, as required by 10 CFR 54.21(d).

3.3B NMP2 Aging Management of Auxiliary Systems

This section of the SER documents the staff's review of the applicant's AMR results for the auxiliary systems components and component groups associated with the following NMP2 systems:

- air startup standby diesel generator system
- alternate decay heat removal system
- auxiliary service building HVAC system
- compressed air systems
- containment atmosphere monitoring system
- containment leakage monitoring system
- control building chilled water system
- control building HVAC system
- diesel generator building ventilation system

- domestic water system
- engine-driven fire pump fuel oil system
- fire detection and protection system
- floor and equipment drains system
- generator standby lube oil system
- hot water heating system
- makeup water system
- neutron monitoring system
- primary containment purge system
- process sampling system
- reactor building closed loop cooling water system
- reactor building HVAC system
- reactor water cleanup system
- service water system
- spent fuel pool cooling and cleanup system
- standby diesel generator fuel oil system
- standby diesel generator protection (generator) system
- standby liquid control system
- yard structures ventilation system
- radiation monitoring system
- auxiliary boiler system
- circulating water system
- makeup water treatment system
- radioactive liquid waste management system
- roof drainage system
- sanitary drains and disposal system
- service water chemical treatment system
- turbine building closed loop cooling water system

3.3B.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.3, the applicant provided AMR results for the auxiliary systems components and component groups. In ALRA Table 3.3.1.B, "NMP2 Summary of Aging Management Programs for the Auxiliary Systems Evaluated in Chapter VII of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the auxiliary systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.3B.2 Staff Evaluation

The staff reviewed ALRA Section 3.3 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the auxiliary systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.3B.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.3.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.3B.2.2

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.3B.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.3B.2.3.

Finally, the staff reviewed the AMP summary descriptions in the USAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the auxiliary systems components.

Table 3.3B-1 below provides a summary of the staff's evaluation of NMP2 components, aging effects and aging effects mechanisms, and AMPs listed in ALRA Section 3.3, that are addressed in the GALL Report.

Table 3.3B-1 Staff Evaluation for NMP2 Auxiliary Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components in spent fuel pool cooling and cleanup (Item Number 3.3.1.B-01)	Loss of material due to general, pitting, and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20), Closed-Cycle Cooling Water System Program (B2.1.11)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Linings in spent fuel pool cooling and cleanup system; seals and collars in ventilation systems (Item Number 3.3.1.B-02)	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant-specific	Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.2)
Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR) (Item Number 3.3.1.B-03)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis
Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR) (Item Number 3.3.1.B-04)	Crack initiation and growth due to SCC or cracking	Plant-specific	None	Not applicable (See Section 3.3B.2.2.4)
Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components (Item Number 3.3.1.B-05)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant-specific	Water Chemistry Control Program (B2.1.2), Fire Protection Program (B2.1.16), One-Time Inspection Program (B2.1.20), Preventive Maintenance Program (B2.1.32), Systems Walkdown Program (B2.1.33), Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.5)
Components in reactor coolant pump oil collect system of fire protection (Item Number 3.3.1.B-06)	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	None	Not applicable (See Section 3.3B.2.2.6)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system (Item Number 3.3.1.B-07)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Fuel Oil Chemistry Program (B2.1.18), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.7)
Piping, pump casing, and valve body and bonnets in shutdown cooling system (older BWR) (Item Number 3.3.1.B-08)	Loss of material due to pitting and crevice corrosion	Water chemistry and one-time inspection	None	Not applicable (no shutdown cooling system)
Heat exchangers in chemical and volume control system (Item Number 3.3.1.B-09)	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and a plant-specific verification program	None	Not applicable (See Section 3.3B.2.2.9)
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1.B-10)	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2) One-Time Inspection Program (B2.1.20),	(See Section 3.3B.2.2.10)
New fuel rack assembly (Item Number 3.3.1.B-11)	Loss of material due to general, pitting, and crevice corrosion	Structures monitoring	None	Not applicable The new fuel storage racks are addressed in ALRA Table 3.5.2.B-7.
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1.B-12)	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex monitoring	None	Not applicable Boraflex panels to be replaced with Boral
Spent fuel storage racks and valves in spent fuel pool cooling and cleanup (Item Number 3.3.1.B-13)	Crack initiation and growth due to stress corrosion cracking	Water chemistry	Water Chemistry Control Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1.9)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Closure bolting and external surfaces of carbon steel and low-alloy steel components (Item Number 3.3.1.B-14)	Loss of material due to boric acid corrosion	Boric acid corrosion	None	Not applicable This aging effect/ mechanism does not exist at NMP2 because NMP2 has no liquid poison system
Components in or serviced by closed-cycle cooling water system (Item Number 3.3.1.B-15)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	Closed-Cycle Cooling Water System Program (B2.1.11), Selective Leaching of Materials Program (B2.1.21)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Cranes including bridge and trolleys and rail system in load handling system (Item Number 3.3.1.B-16)	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	Inspection of Overhead Heavy Load and Light Load Handling Systems Program (B.2.1.13)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1.8)
Components in or serviced by open-cycle cooling water systems (Item Number 3.3.1.B-17)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	Open-Cycle Cooling Water System Program (B2.1.10), One-Time Inspection Program (B2.1.20), Preventive Maintenance Program (B2.1.32)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Buried piping and fittings (Item Number 3.3.1.B-18)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	Buried Piping and Tanks Inspection Program (B2.1.22)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.11)
Components in compressed air system (Item Number 3.3.1.B-19)	Loss of material due to general and pitting corrosion	Compressed air monitoring	Fire Protection Program (B2.1.16), Fire Water System Program (B2.1.17), One-Time Inspection Program (B2.1.20), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1.5)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components (doors and barrier penetration seals) and concrete structures in fire protection (Item Number 3.3.1.B-20)	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	Fire Protection Program (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1.7)
Components in water-based fire protection (Item Number 3.3.1.B-21)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	Fire Water System Program (B2.1.17), Selective Leaching of Materials Program (B2.1.21)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Components in diesel fire system (Item Number 3.3.1.B-22)	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	None	Not applicable Fuel oil supply lines do not have this aging effect
Tanks in diesel fuel oil system (Item Number 3.3.1.B-23)	Loss of material due to general, pitting, and crevice corrosion	Aboveground carbon steel tanks	None	Not applicable
Closure bolting (Item Number 3.3.1.B-24)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Components in contact with sodium pentaborate solution in standby liquid control system (BWR) (Item Number 3.3.1.B-25)	Crack initiation and growth due to SCC	Water chemistry	Water Chemistry Control Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Components in reactor water cleanup system (Item Number 3.3.1.B-26)	Crack initiation and growth due to SCC and IGSCC	Reactor water cleanup system inspection	None	Not applicable RWCU system components with this aging effect/ mechanism are evaluated in row 3.1.1.B-07 (See Section 3.1B.2.2.4)
Components in shutdown cooling system (older BWR) (Item Number 3.3.1.B-27)	Crack initiation and growth due to SCC	BWR stress corrosion cracking and water chemistry	None	Not applicable NMP Unit 2 has no shutdown cooling system

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Components in shutdown cooling system (older BWR) (Item Number 3.3.1.B-28)	Loss of material due to pitting and crevice corrosion, and MIC	Closed-cycle cooling water system	None	Not applicable NMP Unit 2 has no shutdown cooling system
Components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink (Item Number 3.3.1.B-29)	Loss of material due to selective leaching	Selective leaching of materials	Selective Leaching of Materials Program (B2.1.21)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Fire barriers, walls, ceilings, and floors in fire protection (Item Number 3.3.1.B-30)	Concrete cracking and spalling due to freeze-thaw, aggressive chemical attack, and reaction with aggregates; loss of material due to corrosion of embedded steel	Fire protection and structures monitoring	None	Not applicable The plant-specific environment for concrete structures in fire protection does not generate the listed aging effects

The staff's review of the NMP2 component groups followed one of several approaches. One approach, documented in SER Section 3.3B.2.1, discusses the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.3B.2.2, discusses the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.3B.2.3, discusses the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the auxiliary systems components is documented in SER Section 3.0.3.

3.3B.2.1 AMR Results That Are Consistent with the GALL Report

<u>Summary of Technical Information in the Amended Application</u>. In ALRA Section 3.3.2.B, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the auxiliary systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Flow-Accelerated Corrosion Program
- Open-Cycle Cooling Water System Program
- Closed-Cycle Cooling Water System Program
- Fire Protection Program

- Fire Water System Program
- Fuel Oil Chemistry Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Buried Piping and Tanks Inspection Program
- 10 CFR 50 Appendix J Program
- Preventive Maintenance Program
- Systems Walkdown Program
- Bolting Integrity Program

Staff Evaluation. In ALRA Tables 3.3.2.B-1 through 3.3.2.B-40, the applicant provided a summary of AMRs for the auxiliary systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the

AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.3B.2.1.1 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.3.2.B-5 for component type bolting the applicant manages the aging effect and aging effect mechanism loss of material with the Bolting Integrity Program. In its letter dated September 15, 2005, the applicant identified an exception to this program based upon the ASME code edition in use. The staff asked the applicant to clarify why a Note A was assigned to this line item.

In its letter dated December 1, 2005, the applicant stated that the assignment was an error. The ALRA will be revised for each AMR line item crediting the applicant's Bolting Integrity Program to change the note from Note A to Note B.

The staff reviewed the applicant's response and found it acceptable because with the correction of Note A to Note B the proper note is assigned to these AMR line items.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.3B.2.1.2 Loss of Material Due to General, Pitting, and Crevice Corrosion, MIC, and Fouling

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.3.2.B-28 for component type tanks the applicant manages the aging effect and aging effect mechanism of loss of material with the Fuel Oil Chemistry Program. The staff asked the applicant to clarify why a Note A was assigned to this line item as its Fuel Oil Chemistry Program takes an exception to GALL AMP XI.M30, "Fuel Oil Chemistry."

In its letter dated December 1, 2005, the applicant stated that the assignment was an error. The ALRA will be revised so that for this AMR line item the note will be changed from Note A to Note B.

The staff reviewed the applicant's response and found it acceptable because, with the correction of Note A to Note B, the proper note is assigned to the AMR line item.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.3B.2.1.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.3.2.B-29 for component type heat exchangers and aging effect and aging effect mechanism of loss of material, the applicant manages this aging effect and aging effect mechanism with Open-Cycle Cooling Water System Program. The staff asked the applicant to clarify why ALRA Table 3.3.1.B, Item 3.3.1.B-15 was applied which is for closed-cycle cooling water environments.

In its letter dated December 1, 2005, the applicant stated that the occurrence is an error. The ALRA will be revised so that the Table 1 reference will be changed from ALRA Table 3.3.1.B, Item 3.3.1.B-15 to ALRA Table 3.3.1.B, Item 3.3.1.B-17.

The staff's review of the applicant's response found the correction of the Table 1 reference acceptable because it is for an open-cycle cooling water environment.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.3B.2.1.4 Loss of Material Due to General, Pitting, and Crevice Corrosion

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.3.2.B-28 (page 3.3-279) for component type tanks the applicant manages the aging effect and aging effect mechanism of loss of material with the Preventive Maintenance Program. The staff asked the applicant to confirm that all surfaces of the tank are accessible for visual inspection. The applicant provided documentation confirming that all external surfaces of the tank are accessible for visual inspection. Furthermore, in response to this question the applicant noted that the tank line item for the air environment should have been removed from the ALRA.

In its letter dated December 1, 2005, the applicant stated that the ALRA had been revised to delete the line item for loss of material addressed by its Preventive Maintenance Program. The applicant further stated in this letter that ALRA Table 3.3.2.B-28 has a carbon steel component type of external surfaces aging management line item managed by the Systems Walkdown Program and the references to its Preventive Maintenance Program should have been removed. The staff reviewed the applicant's Systems Walkdown Program and its evaluation is documented in SER Section 3.0.3.3.2.

On the basis of the staff's review of the applicant's response, the staff found it consistent with the GALL Report and, therefore, acceptable.

On the basis of the staff's review, the staff found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.3B.2.1.5 Loss of Material Due to General and Pitting Corrosion

In reviewing ALRA Table 3.3.1.B, Item 3.3.1.B-19 the staff noted that the applicant credited the Fire Protection, Fire Water System, One-Time Inspection, and Appendix J Programs. These AMPs are different from the AMP recommended by the GALL Report GALL AMP XI.M24, "Compressed Air Monitoring."

The staff reviewed the applicant's Fire Protection, Fire Water System, One-Time Inspection, and Appendix J Programs and its evaluations are documented in SER Sections 3.0.3.2.13, 3.0.3.2.14, 3.0.3.1.4, and 3.0.3.1.7, respectively. The staff found that the applicant's Fire Protection and Fire Water System Programs manage loss of material degradation by visual inspection of piping and valves in the fire detection and protection system. Also the staff found that the applicant's One-Time Inspection and Appendix J Programs manage loss of material degradation through visual inspection of carbon steel piping and valves in the compressed air system. The staff concludes that these AMPs will assure detection of material degradation before the loss of intended function and that these AMPs will manage the loss of material due to general and pitting corrosion adequately.

The staff's review found that the applicant appropriately addressed the loss of material due to general and pitting corrosion for carbon steel piping and fitting and valves exposed to an air environment.

3.3B.2.1.6 Loss of Material Due to General, Pitting, and Crevice Corrosion

In reviewing ALRA Table 3.3.1.B, Item 3.3.1-23 the staff noted that the applicant credited the Preventive Maintenance Program. This AMP is different from the AMP recommended by the GALL Report GALL AMP XI.M29, "Aboveground Carbon Steel Tanks."

The staff reviewed the applicant's Preventive Maintenance Program and its evaluation is documented in SER Section 3.0.3.3.1. The staff found that the applicant's Preventive Maintenance Program manages material degradation by visual inspection and examination of component surfaces for evidence of defects and age-related degradation. The staff concludes that there is reasonable assurance that this AMP will assure detection of material degradation before the loss of intended function and that this AMP will manage the loss of material due to general, pitting, and crevice corrosion adequately.

The staff's review found that the applicant appropriately addressed the loss of material due to general, pitting, and crevice corrosion for the external surfaces of carbon steel tanks in the diesel fuel oil system.

3.3B.2.1.7 Loss of Material Due to Wear; Hardening and Shrinkage Due to Weathering

The staff reviewed ALRA Table 3.5.2.B-1 as referenced in SER Table 3.3B-1, Item 3.3.1.B-20.

In ALRA Table 3.3.1.B, Item 3.3.1.B-20, the applicant states that fire rated doors for the NMP2 reactor building, auxiliary building, control room building, diesel generator building, essential yard structures, radwaste building, screenwell building, standby gas treatment building and turbine building are consistent with the GALL Report. Additionally, in the ALRA, the applicant included some doors in the reactor building, control room building, essential yard structures, radwaste building, and standby gas treatment building that are not addressed in the GALL Report.

The applicant also states, in the Item 3.3.1.B-20 that loss of material is not applicable for concrete structures in fire protection because the plant-specific environment is not conducive to the listed aging effects. Nonetheless, the specified AMP is implemented for these components.

The staff reviewed Table 3.3.2.B related to this item, and finds that the applicant will credit the Fire Protection Program to mange the doors type components and credits the Structures Monitoring Program to mange concrete structures. The staff reviewed the applicant's Fire Protection Program and its evaluation is documented in SER Section 3.0.3.2.13. The staff accepted that the applicant's Fire Protection Program does adequately manage material degradation. The staff concludes that there is reasonable assurance that this AMP will assure detection of material degradation before the loss of intended function. The staff also determined that concrete structures will be adequately managed by the structure monitoring program.

On the basis of its review, the staff found that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3B.2.1.8 Loss of Material Due to General Corrosion and Wear

The staff reviewed ALRA Table 3.5.2.B-1 as referenced in SER Table 3.3B-1, Item 3.3.1.B-16.

In ALRA Tables 3.5.2.B-7 & 3.5.2.B-9, the applicant credits the Inspection of Overhead Heavy Load and Light Load Handling Systems Program to manage the aging effect of loss of material due to general corrosion and wear for refueling crane and platform equipment of fuel handling systems, polar crane, handling crane, and hoists of material handling systems

The staff reviewed and accepted the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program and its evaluation is documented in SER Section 3.0.3.2.10. On the basis of its review, the staff concluded that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3B.2.1.9 Crack Initiation and Growth Due to Stress Corrosion Cracking

The staff reviewed ALRA Table 3.5.2.B-1 as referenced in SER Table 3.3B-1, Item 3.3.1.B-13.

In ALRA Table 3.5.2.B-7, the applicant credits Water Chemistry Control Program to manage the aging effect of the crack initiation and growth due to stress corrosion cracking for the storage racks and frame under treated water environment.

The staff reviewed and accepted the applicant's Water Chemistry Control Program and its evaluation is documented in SER Section 3.0.3.2.2. The staff reviewed its related AMR item in ALRA Table 3.5.2.B-7 and found this acceptable since this is consistent with GALL Report's recommendation. On this basis, the staff concludes this is acceptable.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.2 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.3.2.C of its letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the auxiliary systems components. The applicant provided information concerning how it will manage the following aging effects:

- loss of material due to general, pitting, and crevice corrosion
- hardening and cracking or loss of strength due to elastomer degradation or loss of material due to wear
- cumulative fatigue damage
- crack initiation and growth due to cracking or stress corrosion cracking
- loss of material due to general, microbiologically influenced, pitting, and crevice corrosion
- loss of material due to general, galvanic, pitting, and crevice corrosion
- loss of material due to general, pitting, crevice, and MIC and biofouling
- crack initiation and growth due to stress corrosion cracking and cyclic loading
- reduction of neutron-absorbing capacity and loss of material due to general corrosion
- loss of material due to general, pitting, crevice, and MIC

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.3.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.3B.2.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion

The staff reviewed Section 3.3.2.C.1 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.3.2.2.1.1.

In Section 3.3.2.C.1 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, and crevice corrosion for spent fuel pool cooling and cleanup system components.

SRP-LR Section 3.3.2.2.1.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tubesheets of the heat exchanger in the spent fuel pool cooling and cleanup. The Water Chemistry Control Program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material from general, pitting, or crevice corrosion. However, high concentrations of impurities at crevices and stagnant flow locations could cause general, pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure no corrosion and maintenance of the component's intended function during the period of extended operation.

In Section 3.3.2.C.1 of its letter dated August 19, 2005, the applicant stated that NMP2 spent fuel pool cooling system components are managed by the combination of the Water Chemistry Control and One-Time Inspection Programs.

The staff reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

In addition the staff reviewed Section 3.3.2.C.1 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.1.2.

In Section 3.3.2.C.1 of its letter dated August 19, 2005, the applicant stated that the aging effect and aging effect mechanism of loss of material due to general, pitting, and crevice corrosion of spent fuel pool cooling and cleanup system components is not applicable to NMP2 because it has no shutdown cooling system. Therefore, the staff agreed that this aging effect and aging effect mechanism is not applicable to NMP2.

Because NMP has no components from this group the staff found this aging effect and aging effect mechanism not applicable to NMP.

The staff concludes that there is reasonable assurance that the applicant's programs met the criteria of SRP-LR Section 3.3.2.2.1. For those line items addressed by Section 3.3.2.C.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application was consistent with the GALL Report and that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material due to Wear

The staff reviewed Section 3.3.2.C.2 of the applicant's letter dated August 19, 2005 against the criteria of SRP-LR Section 3.3.2.2.2.

In Section 3.3.2.C.2 of its letter dated August 19, 2005, the applicant addressed aging effects and aging effects mechanisms that could occur for the elastomer lining of some components exposed to the treated water environment of the spent fuel pool cooling system and elastomer seals and collars in the ductwork of certain ventilation systems exposed to a range of atmospheric conditions.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating ventilation systems and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects and aging effects mechanisms are adequately managed.

In Section 3.3.2.C.2 of its letter dated August 19, 2005, the applicant also stated that elastomers are not used in the lining of spent fuel pool system components within the scope of license renewal.

In addition the applicant stated that for NMP2 ventilation systems the aging effects and aging effects mechanisms for seals and collars are managed by the NMP AMP B2.1.32, "Preventive Maintenance Program." The staff reviewed the applicant's Preventive Maintenance Program and its evaluation is documented in SER Section 3.0.3.3.1.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

The staff concludes that the applicant's programs met the criteria of SRP-LR Section 3.3.2.2.2. For those line items that apply to Section 3.3.2.C.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application was consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.3B.2.2.3 Cumulative Fatigue Damage

In Section 3.3.2.C.3 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

3.3B.2.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking

The staff reviewed Section 3.3.2.C.4 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.3.2.2.4.

In Section 3.3.2.C.4 of its letter dated August 19, 2005, the applicant addressed cracking due to SCC for the stainless steel reactor water cleanup system regenerative and nonregenerative heat exchangers.

In the ALRA, the applicant states that for NMP2 this aging effect and aging effect mechanism are not applicable to the reactor water cleanup system regenerative and nonregenerative heat exchangers because only the carbon steel shells are within the scope of license renewal and subject to an AMR cracking is not an applicable aging effect and aging effect mechanism for this material in the system environment. The staff determined through discussions with the applicant's technical personnel that this aging effect or aging effect mechanism is (1) not applicable to NMP2 based on the use of carbon steel in the heat exchanger shells and (2) not susceptible to SCC.

Because NMP2 has no regenerative or nonregenerative heat exchanger reactor water cleanup system components susceptible to SCC within the scope of license renewal the staff found these aging effect and aging effect mechanism not applicable to NMP2.

3.3B.2.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion

The staff reviewed Section 3.3.2.C.5 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.5.

In Section 3.3.2.C.5 of its letter dated August 19, 2005, the applicant addressed loss of material from corrosion that could occur on internal and external surfaces of components exposed to a range of atmospheric conditions. Specifically included were the ventilation systems, the diesel generator systems' fuel oil, starting air, and combustion air intake and exhaust subsystems, and auxiliary systems' external carbon steel surfaces within the scope of license renewal.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, the auxiliary and radwaste area, the primary containment heating and ventilation systems, in the piping of the diesel generator building ventilation system, in the aboveground piping and fittings, valves, and pumps in the diesel fuel oil system, and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, crevice, and MIC could occur in the duct fittings, access doors, and closure bolts, equipment frames, and housing of the duct; loss due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler heating/cooling; and los due to general corrosion could occur on the external surfaces of all carbon steel structures and components, including bolting exposed to operating temperatures < 212°F in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects and aging effects mechanisms are adequately managed.

In Section 3.3.2.C.5 of its letter dated August 19, 2005, the applicant stated that for NMP2 this aging effect and aging effect mechanism are managed by the Fire Water System Program, One-Time Inspection Program, Preventive Maintenance Program, Systems Walkdown Program, and Bolting Integrity Program for the applicable systems and components.

The staff reviewed the applicant's Fire Water System, One-Time Inspection, Preventive Maintenance, Systems Walkdown, and Bolting Integrity Programs and its evaluations are documented in SER Sections 3.0.3.2.14, 3.0.3.1.4, 3.0.3.3.1, 3.0.3.3.2, and 3.0.3.2.23, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria in the SRP-LR.

The staff concludes that there is reasonable assurance that the applicant's programs met the criteria of SRP-LR Section 3.3.2.2.5. For those line items addressed by Section 3.3.2.C.5 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application was consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion

The staff reviewed Section 3.3.2.C.6 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.6.

The applicant stated in the ALRA that loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection is not applicable because NMP has no oil collection systems for its reactor recirculation pumps. The staff determined through discussions with the applicant's technical personnel that loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection is not applicable because NMP has no oil collection systems for its reactor recirculation pumps.

Because NMP has no components from this group the staff found this aging effect and aging effect mechanism not applicable.

3.3B.2.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling

The staff reviewed Section 3.3.2.C.7 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.7.

In Section 3.3.2.C.7 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, crevice, and MIC and biofouling for the internal surfaces of diesel fuel oil system components.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and due to general, pitting, crevice, and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing AMP relies on the Fuel Oil Chemistry Program for monitoring and control of fuel oil contamination according to the guidelines of ASTM Standards D4057, D1796, D2709 and D2276 to manage loss of material due to corrosion or biofouling that may occur where contaminants accumulate. The effectiveness of the chemistry control program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify effectiveness. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure no corrosion and maintenance of the component's intended function during the period of extended operation.

The applicant stated in Section 3.3.2.C.7 of its letter dated August 19, 2005, that for NMP2 this aging effect and aging effect mechanism are managed by the combination of the Fuel Oil Chemistry Program and the One-Time Inspection Program.

The staff reviewed the applicant's Fuel Oil Chemistry Program and One-Time Inspection Program and its evaluations are documented in Sections 3.0.3.2.15 and 3.0.3.1.4, respectively.

The staff reviewed the applicant's further evaluation and concludes that it meets the criteria of the SRP-LR.

The staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.3.2.2.7. For those line items that apply to Section 3.3.2.C.7 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application was consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.3B.2.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components

SER Section 3.0.4 includes the staff's evaluation of the applicant's quality assurance program.

3.3B.2.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading

The staff reviewed Section 3.3.2.C.9 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.9.

In Section 3.3.2.C.9 of its letter dated August 19, 2005, the applicant stated that because crack initiation and growth due to SCC and cyclic loading apply to PWRs only this aging effect and aging effect mechanism are not applicable to NMP. The staff determined through discussions with the applicant's technical personnel that this aging effect and aging effect mechanism applies to PWRs only and not to NMP.

Because NMP has no components from this group the staff found this aging effect and aging effect mechanism not applicable.

3.3B.2.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion

The staff reviewed Section 3.3.2.C.10 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.10.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

In Section 3.3.2.C.10 of its letter dated August 19, 2005, the applicant stated that reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing (Boral or boron steel) sheets of the spent fuel storage racks are not applicable as NMP identified no aging effects and aging effects mechanisms for these components.

In its letter dated November 17, 2005, the applicant revised ALRA to address NMP management decisions to have all Boraflex removed from the NMP2 spent fuel pool prior to entry into the NMP2 period of extended operation. In this letter, the applicant credits the Water Chemistry Control and One-Time Inspection Programs for aging management. The Water Chemistry Control and One Time Inspection Programs manage general corrosion. The applicant's Commitment 36 of NMP2 states that prior to the period of extended operation for NMP2, the spent fuel rack design that currently utilizes Boraflex for reactivity control in the spent fuel pool will be replaced by a design that utilizes Boral for this function. Therefore, the new design will utilizes Boral for neutron absoption. The reduction of neutron-absorbing capacity will be adequately managed with this new design.

The staff reviewed the Applicant's Water Chemistry Control and One Time Inspection Programs and Commitment 36. The staff found this acceptable since its change provides adequate aging management for the aging effects. On this basis, the staff found this acceptable.

3.3B.2.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The staff reviewed Section 3.3.2.C.11 of the applicant's letter dated August 19, 2005, against the criteria of SRP-LR Section 3.3.2.2.11.

In Section 3.3.2.C.11 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, crevice, and MIC for buried piping and fittings.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The Buried Piping and Tanks Inspection Program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, crevice and MIC. The effectiveness of the applicant's Buried Piping and Tanks Inspection Program should be verified to evaluate inspection frequency and operating experience with buried components to ensure no loss of material.

In the ALRA, the applicant stated that this aging effect and aging effect mechanism are managed by the Buried Piping and Tanks Inspection Program for NMP2 fire detection and protection systems. The staff reviewed the applicant's Buried Piping and Tanks Inspection Program and its evaluation is documented in SER Section 3.0.3.1.6.

As documented in the Audit and Review Report, the staff asked the applicant to clarify its position on opportunistic inspections prior to the period of extended operation. In its letter dated December 1, 2005, the applicant stated that the ALRA will be revised to include the following in its Buried Piping and Tanks Inspection Program:

> Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of extended operation, NMPNS will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, NMPNS will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.

The staff reviewed the applicant's clarification of its visual inspection position and the applicant's further evaluation and staff concludes that they met the criteria of the SRP-LR.

The staff concludes that there is reasonable assurance that the applicant's programs met the criteria of SRP-LR Section 3.3.2.2.11. For those line items addressed in Section 3.3.2.C.11 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application was consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.3.2.B-1 through 3.3.2.B-40, the staff reviewed additional details of the results of the NMP2 AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.3.2.B-1 through 3.3.2.B-40, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and aging effect requiring management does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicated that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicated that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicated that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicated that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicated that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.3B.2.3.1 Auxiliary Systems NMP2 Air Startup Standby Diesel Generator System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-1

The staff reviewed ALRA Table 3.3.2.B-1, which summarizes the results of AMR evaluations for the air startup standby diesel generator system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.1-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include piping and fittings and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- wrought austenitic stainless steel exposed to exhaust environment subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.1, Table 2.3.3.B.1-1, Section 3.3.2.B.1, and Table 3.3.2.B-1.

The staff's review of the information provided in the ALRA found the aging effects of the air startup standby diesel generator system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments associated with the air startup standby diesel generator system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the UFSAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-1 identifies the following AMP for managing the aging effects for the air startup standby diesel generator system components that are not addressed by the GALL Report:

- Preventive Maintenance Program

The staff's detailed review of this AMP is found in SER Sections 3.0.3.3.1.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated that the aging effects associated with the air startup standby diesel generator system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.3.2 Auxiliary Systems NMP2 Alternate Decay Heat Removal System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-2

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 alternate decay heat removal system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.1

3.3B.2.3.3 Auxiliary Systems NMP2 Auxiliary Service Building HVAC System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-3

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 auxiliary service building HVAC system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5

3.3B.2.3.4 Auxiliary Systems NMP2 Chilled Water Ventilation System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-4

This auxiliary system is listed here for information and completeness. This system has been removed from the scope of license renewal by the applicant in its ALRA dated July 14, 2005.

3.3B.2.3.5 Auxiliary Systems NMP2 Compressed Air Systems – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-5

This auxiliary system Is listed here for information and completeness. The AMR results for the NMP2 compressed air systems are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5

3.3B.2.3.6 Auxiliary Systems NMP2 Containment Atmosphere Monitoring System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-6

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 containment atmosphere monitoring system are consistent with the GALL Report. The environment is air and therefore there is no AMP that requires staff evaluation.

3.3B.2.3.7 Auxiliary Systems NMP2 Containment Leakage Monitoring System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-7

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 containment leakage monitoring system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5

3.3B.2.3.8 Auxiliary Systems NMP2 Control Building Chilled Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-8

The staff reviewed ALRA Table 3.3.2.B-8, which summarizes the results of AMR evaluations for the control building chilled water system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.8-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include chillers and external surfaces.

For these component types the applicant identified the following materials, environments, and AERMS:

- copper alloys (zinc ≤ 15 percent) exposed to raw water subject to loss of heat transfer and loss of material
- copper alloys (zinc ≤ 15 percent) exposed to treated water, temperature < 140 °F, subject to loss of heat transfer
- gray cast iron exposed to air subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.8, Table 2.3.3.B.8-1, Section 3.3.2.B.8, and Table 3.3.2.B-8.

The staff's review of the information provided in the ALRA found the aging effects of the control building chilled water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the control building chilled water system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-8 identifies the following AMPs for managing the aging effects for the control building chilled water system components not addressed by the GALL Report:

- Open-Cycle Cooling Water System Program
- Closed-Cycle Cooling Water System Program
- System Walkdown Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.2.7, 3.0.3.2.8 and 3.0.3.3.2.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the control building chilled water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.9 Auxiliary Systems NMP2 Control Building HVAC system – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-9

The staff reviewed ALRA Table 3.3.2.B-9, which summarizes the results of AMR evaluations for the control building HVAC system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.9-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, heat exchangers, and valves and dampers (including fire dampers).

For these component types the applicant identified the following materials, environments, and AERMS:

- gray cast iron exposed to air subject to loss of material
- copper alloys (zinc $\leq$ 15 percent) exposed to air, moisture or wetting, temperature $<$ 140 °F, subject to loss of heat transfer
- copper alloys (zinc $\leq$ 15 percent) exposed to demineralized untreated water subject to loss of heat transfer

The staff reviewed the information in ALRA Section 2.3.3.B.9, Table 2.3.3.B.9-1, Section 3.3.2.B.9, and Table 3.3.2.B-9.

The staff's review of the information provided in the ALRA found the aging effects of the control building HVAC system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the control building HVAC system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-9 identifies the following AMPs for managing the aging effects for the control building HVAC system components not addressed by the GALL Report :

- System Walkdown Program
- Preventive Maintenance Program
- Closed-Cycle Cooling Water System Program
- One-Time Inspection Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.2, 3.0.3.3.1, 3.0.3.2.8, and 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the control building HVAC system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.10 Auxiliary Systems NMP2 Diesel Generator Building Ventilation System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-10

The staff reviewed ALRA Table 3.3.2.B-10, which summarizes the results of AMR evaluations for the diesel generator building ventilation system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. Table 2.3.3.B.10-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include unit coolers.

For this component type the applicant identified the following materials, environments, and AERMS:

- copper alloys (zinc ≤ 15 percent) exposed to raw water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.10, Table 2.3.3.B.10-1, Section 3.3.2.B.10, and Table 3.3.2.B-10.

The staff's review of the information provided in the ALRA found the aging effects of the control building HVAC system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the control building HVAC system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for the component the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-10 identifies the following AMP for managing the aging effects for the control building HVAC system components not addressed by the GALL Report :

- Open-Cycle Cooling Water System Program

The staff's detailed review of this AMP is found in SER Section 3.0.3.2.7.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the diesel generator building ventilation system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.11 Auxiliary Systems NMP2 Domestic Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-11

The staff reviewed ALRA Table 3.3.2.B-11, which summarizes the results of AMR evaluations for the domestic water system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 1996 dated November 17, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them.

The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.11-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include piping and fittings, tanks, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- copper alloys (zinc $\leq$ 15 percent) exposed to demineralized untreated water subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.11, Table 2.3.3.B.11-1, Section 3.3.2.B.11, and Table 3.3.2.B-11.

The staff's review of the information provided in the ALRA found the aging effects of the domestic water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the domestic water system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-11 identifies the following AMP for managing the aging effects for the domestic water system components not addressed by the GALL Report:

- One-Time Inspection Program

The staff's detailed review of the AMP is found in SER Section 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the domestic water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.12 Auxiliary Systems NMP2 Engine-Driven Fire Pump Fuel Oil System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-12

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 engine-driven fire pump fuel oil system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5.

3.3B.2.3.13 Auxiliary Systems NMP2 Fire Detection and Protection System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-13

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 fire detection and protection system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5.

The staff reviewed original LRA Table 3.3.2.B-13 (only those line items that are not consistent with GALL or component aging effects for material/environment was not listed in GALL), which summarizes the results of AMR evaluations for the NMP2 fire detection and protection system component groups.

In original LRA Section 3.3.2.B.13 and Table 3.3.2.B-13, the applicant identified the materials, environments, and AERMs. The materials identified include brass, carbon steel or low alloy steel (yield strength < 100 Ksi), carbon steel or low alloy steel (yield strength > 100 Ksi) polymers, copper alloy (zinc < 15%), copper alloy (zinc > 15%) and aluminum bronze, gray cast iron, and wrought austenitic stainless steel.

The applicant identified the environments to which these materials could be exposed as air, air moisture or wetting temperature < 140 °F, dried air or gas, exhaust, liquid foam concentrate, liquid foam concentrate/raw water/low flow, raw water low flow, soil above the water table and soil below the water table as the environments associated with the fire detection and protection system. The applicant identified aging effects requiring management from cracking, harding and shrinkage, loss of material, and loss strength associated with the fire water system.

The applicant proposed to manage the fire protection system aging effects by using the Fire Protection Program, Fire Water System Program, Preventive Maintenance Program, Systems Walkdown Program, Bolting Integrity Program, One-Time Inspection Program, Selective Leaching of Materials Program, and Buried Piping and Tank Inspection Program. The staff's evaluations of these programs are documented in SER Sections 3.0.3.2.13, 3.0.3.2.14, 3.0.3.3.1, 3.0.3.3.2, 3.0.3.3.23, 3.0.3.1.4, 3.0.3.1.5, and 3.0.3.1.6, respectively.

The staff reviewed original LRA Section 3.3.2.B-13 and Table 3.3.2.2-13, to determine whether the applicant demonstrated that it will adequately manage the effects of aging for the fire protection system during the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff conducted its review, described below, in accordance with SRP-LR Section 3.3 and the GALL Report.

In RAI 2.3.3.B.13-28 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.B-13 for the NMP2 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of flow elements, gray cast iron, raw water, and low flow, Note Q indicates that the Selective Leaching Program is being used in addition to the Fire Water System Program to manage loss of material.

Additionally, Note 11 indicates that flow elements are not specifically identified in GALL Report Chapter VII for the fire protection system. Therefore, the staff requested that the applicant describe how the Selective Leaching Program would be used to manage loss of material.

In its response by letter dated December 17, 2004, the applicant stated that for the combination of flow elements, gray cast iron, raw water, and low flow, the applicable portion of the Selective Leaching Program is a new activity for inspection for selective leaching of fire protection water system components. The Selective Leaching Program for NMP is implemented under the One-Time Inspection Program. The details of the inspections to be performed for particular components have not been determined. As presented in original LRA Sections A2.1.28 and B2.1.20, the One-Time Inspection Program is a new AMP for NMP, which are commitments (NMP1 Commitment 23 and NMP2 Commitment 21) made with the original LRA submittal, as supplemented by the NMP letter NMP1L 1880 dated October 29, 2004. As such, NMP does not currently have any program documents or procedures specific to managing selective leaching of fire protection water system components.

Based on its review, the staff found the applicant's response to RAI 2.3.3.B.13-28 acceptable because it adequately describes how the Selective Leaching Program would be used to manage loss of material components in question. Therefore, the staff's concern described in RAI 2.3.3.B.13-28 is resolved.

In RAI 2.3.3.B.13-29 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.B-13 for the NMP2 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of heat exchangers, carbon or low alloy steel (yield strength < 100 Ksi), raw water, and low flow, Note 6 indicates that the Fire Water System Program has been modified to manage loss of material in heat exchangers which are not specifically identified in GALL Report Chapter VII for the fire protection system. Therefore, the staff requested that the applicant describe how the Fire Water System Program would be used to manage loss of material for heat exchangers.

In its response by letter dated December 17, 2004, the applicant stated that heat exchangers fabricated from carbon or low alloy steel (yield strength < 100 Ksi) in an environment of raw water and low flow, are susceptible to loss of material from galvanic, general, pitting, and MIC mechanisms. A new inspection activity, for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These credited activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/ inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement includes performing visual inspections to monitor internal corrosion and to detect biofouling. This new activity will include inspections for loss of material in the subject heat exchangers and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.

- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure provides for sampling and analysis of raw water systems for the presence of bacteria. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N2-FSP-FPW-5Y001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and microbiologically influenced corrosion of the fire protection water distribution system. The procedure provides for full flow testing of the system in accordance with the NFPA fire protection handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies that the system is capable of retaining pressure and is not obstructed or adversely affected by degradation such as corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.B.13-29 acceptable because it adequately describes how the Fire Water System Program would be used to manage loss of material for the heat exchangers in question. Therefore, the staff's concern described in RAI 2.3.3.B.13-29 is resolved.

In RAI 2.3.3.B.13-30 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

Original LRA Table 3.3.1.B-13 for the NMP2 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another aging management program is being used.

For the combination of manifold, carbon or low alloy steel (yield strength < 100 Ksi), cast iron, raw water, and low flow, Note 26 indicates that the Fire Water System Program has been modified to manage loss of material in manifolds which are not specifically identified in GALL Report Chapter VII for the fire protection system.

The staff requested the applicant to describe how the Fire Water System Program would be used to manage loss of material for manifolds.

In its response by letter dated December 17, 2004, the applicant stated that manifolds fabricated from carbon or low alloy steel (yield strength < 100 Ksi) in an environment of raw water and low flow, are susceptible to loss of material from galvanic, general, pitting, and microbiologically influenced corrosion mechanisms. A new inspection activity, for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These credited activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/ inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement includes performing visual inspections to monitor internal corrosion and to detect biofouling. This new activity will include inspections for loss of material in the manifolds identified above and will be implemented prior to the period of extended operation (Commitments No. 20 for NMP 1 and No. 18 for NMP2). As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.
- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure provides for sampling and analysis of raw water systems for the presence of bacteria. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.
- Site procedure N2-FSP-FPW-5Y001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and MIC of the fire protection water distribution system. The procedure provides for full flow testing of the system in accordance with the NFPA fire protection handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies that the system is capable of retaining pressure and is not obstructed or adversely affected by degradation such as corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.B.13-30 acceptable because it adequately describes how the Fire Water System Program would be used to manage loss of material for the manifolds in question. Therefore, the staff's concern described in RAI 2.3.3.B.13-30 is resolved. The above information is reflected in the ALRA.

In RAI 2.3.3.B.13-31 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.2.3.2.B-13 for the NMP2 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another aging management program is being used.

For the combination of orifices, copper alloys (zinc ≤ 15%), raw water, low flow, Note "7" indicates that the Fire Water System Program has been modified to manage loss of material in manifolds which are not specifically identified in GALL Report Chapter VII for the fire protection system.

Therefore, the staff requested that the applicant describe how the Fire Water System Program would be used to manage loss of material for manifolds.

In its response by letter dated December 17, 2004, the applicant stated that orifices fabricated from copper alloys (zinc ≤ 15%), in an environment of raw water and low flow, are susceptible to loss of material. A new inspection activity, for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These credited activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/ inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement includes performing visual inspections to monitor internal corrosion and to detect biofouling. This new activity will include inspections for loss of material in the subject orifices and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.

- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure provides guidance for sampling and analysis of raw water systems for the presence of bacteria. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N2-FSP-FPW-5Y001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and MIC of the fire protection water distribution system. The procedure provides for full flow testing of the system in accordance with the NFPA fire protection handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies that the system is capable of retaining pressure and is not obstructed or adversely affected by degradation such as corrosion or fouling.

Based on its review, the staff found the applicant's response to RAI 2.3.3.B.13-31 acceptable because it adequately describes how the Fire Water System Program would be used to manage loss of material for the orifices in question. Therefore, the staff's concern described in RAI 2.3.3.B.13-31 is resolved. The above information is reflected in the ALRA.

In RAI 2.3.3.B.13-32 dated November 17, 2004, the staff stated that the GALL Report describes recommendations for aging management of the fire protection water system based on the combination of component type, material, and environment.

The original LRA Table 3.3.2.B-13 for the NMP2 fire detection and protection system summarizes the AMP for each of the combinations mentioned above. When the combinations do not exactly match the requirements of the GALL Report, the original LRA table includes a note indicating that the prescribed AMP has been modified for use or that another AMP is being used.

For the combination of orifices, wrought austenitic stainless steel, raw water, low flow, Note H indicates that the Fire Water System Program has been modified to manage cracking in addition to loss of material.

Additionally, Note 7 indicates that orifices are not specifically identified in GALL Report Chapter VII for the fire protection system.

The staff requested the applicant to describe how the Fire Water System Program would be used to manage cracking and loss of material.

In its response by letter dated December 17, 2004, the applicant stated that the aging effect requiring management of material cracking resulting from SCC for wrought austenitic stainless steel components (including the orifices) in low flow, raw water is reassigned to the One-Time Inspection Program for aging management. As presented in original LRA Sections A1.1.28 and B2.1.20, the One-Time Inspection Program is a new AMP for NMPNS that is to be implemented prior to the period of extended operation. This commitment (NMP1 Commitment 23 and NMP2 Commitment 21) was made in the original LRA submittal, as supplemented by NMPNS letter NMP1L 1880 dated October 29, 2004. As such, there are no existing program procedures specific to the One-Time Inspection Program. The One-Time Inspection Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A. The subject orifices are also susceptible to loss of material from galvanic, general, pitting, and MIC mechanisms. A new inspection activity, for which a procedure must be generated, a site chemistry procedure, and a fire system flow test are credited with managing aging. These credited activities are discussed below:

- The new site activity is identified as an enhancement in "parameters monitored/ inspected" in original LRA Sections A1.1.18 and B2.1.17. The enhancement includes performing visual inspections to monitor internal corrosion and to detect biofouling. This new activity will include inspections for loss of material in the orifices identified above and will be implemented prior to the period of extended operation. As such, there are no existing procedures implementing these inspections at this time. The Fire Water System Program attribute assessment addresses program implementation at NMP relative to the requirements of SRP-LR Appendix A.

- Site procedure S-CTP-V632, "Sampling and Analysis of Water Systems for Bacteria," is credited with managing loss of material as a result of microbiological activity. The procedure provides for sampling and analysis of raw water systems for the presence of bacteria. Additionally, as presented in original LRA Sections A1.1.18 and B2.1.17, the Fire Water System Program will be enhanced prior to the period of extended operation to add specific requirements for periodic sampling of water-based fire protection systems.

- Site procedure N2-FSP-FPW-5Y001, "FPW System Flow Test," is credited with the possible discovery of corrosion, biofouling, and MIC of the fire protection water distribution system. The procedure provides for full flow testing of the system in accordance with the NFPA fire protection handbook. Acceptance criteria are defined and the site corrective action process is utilized when the criteria are not met. The procedure verifies that the system is capable of retaining pressure and is not obstructed or adversely affected by degradation such as corrosion or fouling.

The applicant revised original LRA Table 3.3.2.B-13 (pages 3.3-218 and 3.3-222) to replace Fire Water System Program with One-Time Inspection Program for the management of material cracking for wrought austenitic stainless steel components (valves and orifices) in a raw water, low flow environment.

Based on its review, the staff found the applicant's response to RAI 2.3.3.B.13-32 acceptable because it adequately describes how the one-time inspection and Fire Water System Programs would be used to manage cracking and loss of material, respectively, for the components in question. The applicant also revised the original LRA AMR table for the component types in question to show the One-Time Inspection Program for the management of cracking. Therefore, the staff's concern described in RAI 2.3.3.B.13-32 is resolved. The above information is reflected in the ALRA.

By supplemental letter dated November 17, 2005, the applicant stated that two changes will be made to Table 3.3.2.B-13. The first being an external surfaces item for "gray cast iron in soil, above the water table" environment with the AERM of LOM, the AMP of Buried Piping and Tanks Inspection Program, the GALL Item of VII.C1.1-b, the Type 1 Table Item of 3.3.1.B-18, and Note F. This item is added based on the determination that the barrel of the gray cast iron fire hydrants is partially buried. The staff reviewed this change and found it acceptable. The second change will be modifying the AMP for carbon steel sprinklers in an internal air environment from Fire Protection Program to the Fire Water System Program. This change was made for GALL Report consistency. The applicant further stated that the Fire Protection Program was inadvertently credited for aging management of the sprinklers instead of the Fire Water System Program. Based on the above staff review of this change, the staff found it acceptable.

An addition to the letters mentioned above, the staff also reviewed the applicant's letter, dated July 14, 2005. This letter detailed changes that were made to the LRA, and are found in the ALRA. The staff reviewed the changes to Table 3.3.2.B-13 (page 3-321 to 3-336), the staff found these changes had addressed appropriately programs for management of loss of material aging effect, and that they are acceptable.

In its letter dated December 1, 2005, the applicant stated that the note for bolting will be modified from A to B in Table 3.3.2.B-13. This change is due to an exception found in the Bolting Integrity Program, which is the AMP for bolting. The staff evaluation for this exception is documented in Section 3.0.3.2.23. This staff reviewed the change in note, and found that it is acceptable.

3.3B.2.3.14 Auxiliary Systems NMP2 Floor and Equipment Drains System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-14

The staff reviewed ALRA Table 3.3.2.B-14, which summarizes the results of AMR evaluations for the floor and equipment drains system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant identified all applicable AERMs and credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.14-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include drain tanks, external surfaces, flow elements, heat exchanger, piping and fittings, pumps, orifices, spray nozzle, stainers, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- wrought austenitic stainless steel exposed to treated water, temperature < 140 °F, subject to loss of material
- wrought austenitic stainless steel exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to cracking
- gray cast iron exposed to air subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to raw water subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to loss of material
- gray cast iron exposed to air, moisture or wetting, temperature < 140 °F, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature < 140 °F, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to air, moisture or wetting, temperature ≥ 140 °F, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to fuel oil subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature ≥ 140 °F, but < 212 °F, low flow, subject to loss of material
- wrought austenitic stainless steel exposed to air, moisture or wetting, temperature < 140 °F, subject to loss of material
- wrought austenitic stainless steel exposed to air, moisture or wetting, temperature ≥ 140 °F, subject to loss of material
- aluminum exposed to raw water subject to loss of material

- cast austenitic stainless steel exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to cracking
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water, temperature < 140 °F, low flow, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to air, moisture or wetting, temperature < 140 °F, subject to loss of material
- cast austenitic stainless steel exposed to air, moisture or wetting, temperature ≥ 140 °F, subject to loss of material
- gray cast iron exposed to raw water is subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.14, Table 2.3.3.B.14-1, Section 3.3.2.B.14, and Table 3.3.2.B-14. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. The general RAI that is applicable to this system is a-RAI 3.3.2-1.

By letter dated November 2, 2005, the staff requested that the applicant provide additional information on the issue addressed in a-RAI 3.3.2-1. By letter dated November 30, 2005, the applicant responded to this RAI. The RAI, the applicant's response, and the staff's evaluation of the response are described in Section 3.3.2.3.0.

There are no other relevant system-specific RAIs associated with this system.

On the basis of its review of the information provided in the ALRA and the additional information included in the applicant's response to the above RAI, the staff found the aging effects of the floor and equipment drains system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the floor and equipment drains system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-14 identifies the following AMPs for managing the aging effects for the floor and equipment drains system components not addressed by the GALL Report :

- One-Time Inspection Program
- System Walkdown Program
- 10 CFR 50 Appendix J Program

In the applicant's response to General a-RAI 3.3.2-1, as described in SER Section 3.3.2.3.0, the applicant revised its strategy for managing the aging effects of some components in this system by replacing the One-Time Inspection Program with the Preventive Maintenance

Program. The staff's detailed review of the Preventive Maintenance Program is found in SER Section 3.0.3.3.1. In addition, the applicant credits the Selective Leaching of Material Program to manage the loss of cast iron pump exposed to mineral water.

The staff's detailed reviews of the One-Time Inspection, System Walkdown Program and 10 CFR Part 50 Appendix J Program are found in SER Sections 3.0.3.1.4, 3.0.3.3.2, and 3.0.3.1.7, respectively.

Conclusion: On the basis of its review, as discussed above, there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the floor and equipment drains system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.15 Auxiliary Systems NMP2 Generator Standby Lube Oil System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-15

The staff reviewed ALRA Table 3.3.2.B-15, which summarizes the results of AMR evaluations for the generator standby lube oil system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.15-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces and heat exchangers.

For these component types the applicant identified the following materials, environments, and AERMS:

- gray cast iron exposed to air subject to loss of material
- wrought austenitic stainless steel exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to cracking

The staff reviewed the information in ALRA Section 2.3.3.B.15, Table 2.3.3.B.15-1, Section 3.3.2.B.15, and Table 3.3.2.B-15.

The staff's review of the information provided in the ALRA found the aging effects of the generator standby lube oil system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the generator standby lube oil system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-15 identifies the following AMPs for managing the aging effects for the generator standby lube oil system components not addressed by the GALL Report :

- System Walkdown Program
- Closed-Cycle Cooling Water System Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.2 and 3.0.3.2.8, respectively.

Conclusion: On the basis of its review, as discussed above, there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the generator standby lube oil system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.16 Auxiliary Systems NMP2 Glycol Heating System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-16

This auxiliary system is listed here for information and completeness. The applicant removed the NMP2 glycol heating system has been removed from the scope of license renewal in the ALRA dated July 14, 2005.

3.3B.2.3.17 Auxiliary Systems NMP2 Hot Water Heating System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-17

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 hot water heating system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5

3.3B.2.3.18 Auxiliary Systems NMP2 Makeup Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-18

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 makeup water system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5

3.3B.2.3.19 Auxiliary Systems NMP2 Neutron Monitoring System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-19

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 neutron monitoring system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5.

3.3B.2.3.20 Auxiliary Systems NMP2 Primary Containment Purge System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-20

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 primary containment purge system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5

3.3B.2.3.21 Auxiliary Systems NMP2 Process Sampling System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-21

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 process sampling system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Section 3.3B.2.2.5.

3.3B.2.3.22 Auxiliary Systems NMP2 Reactor Building Closed Loop Cooling Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-22

The staff reviewed ALRA Table 3.3.2.B-22, which summarizes the results of AMR evaluations for the reactor building closed loop cooling water system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.23-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include flow elements, heat exchangers, piping and fittings, unit coolers, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material
- carbon or low alloy steel (yield strength < to 100 Ksi) exposed to demineralized untreated water, low flow, subject to loss of material
- carbon or low alloy steel (yield strength ≥ to 100 Ksi) exposed to air subject to loss of material
- wrought austenitic stainless steel exposed to demineralized untreated water, low flow, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.23, Table 2.3.3.B.23-1, Section 3.3.2.B.22, and Table 3.3.2.B-22.

The staff's review of the information provided in the ALRA found the aging effects of the reactor building closed loop cooling water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the reactor building closed loop cooling water system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-22 identifies the following AMPs for managing the aging effects for the reactor building closed loop cooling water system components not addressed by the GALL Report :

- Closed-Cycle Cooling Water System Program
- One-Time Inspection Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.2.8 and 3.0.3.1.4, respectively.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor building closed loop cooling water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.23 Auxiliary Systems NMP2 Reactor Building HVAC System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-23

The staff reviewed ALRA Table 3.3.2.B-23, which summarizes the results of AMR evaluations for the reactor building HVAC system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through as revised by the applicant's letter NMPIL 1996 dated November 17, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.24-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, piping and fittings, and unit coolers.

For these component types the applicant identified the following materials, environments, and AERMS:

- fiberglass exposed to air subject to cracking and loss of material
- copper alloys (zinc ≤ 15 percent) exposed to air subject to loss of heat transfer
- copper alloys (zinc ≤ 15 percent) exposed to raw water subject to loss of heat transfer
- copper alloys (zinc ≤ 15 percent) exposed to raw water, low flow, subject to loss of heat transfer

The staff reviewed the information in ALRA Section 2.3.3.B.24, Table 2.3.3.B.24-1, Section 3.3.2.B.23, and Table 3.3.2.B-23.

The staff's review of the information provided in the ALRA found the aging effects of the reactor building HVAC system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the reactor building HVAC system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-23 identifies the following AMPs for managing the aging effects for the reactor building HVAC system components not addressed by the GALL Report :

- Preventive Maintenance Program
- Open-Cycle Cooling Water System Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.1 and 3.0.3.2, respectively.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor building HVAC system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.24 Auxiliary Systems NMP2 Reactor Water Cleanup System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-24

The staff reviewed ALRA Table 3.3.2.B-24, which summarizes the results of AMR evaluations for the reactor water cleanup system relating to those component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.25-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include bolting, heat exchanger, piping and fittings, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water or steam, temperature $\geq$ 482 °F, subject to cumulative fatigue damage
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to treated water or steam, temperature $\geq$ 482 °F, low flow, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.25, Table 2.3.3.B.25-1, Section 3.3.2.B.24, and Table 3.3.2.B-24.

On the basis of its review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI the staff found the aging effects of the reactor water cleanup system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the reactor water cleanup system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-24 identifies TLAA and the following AMPs for managing the aging effects for the reactor water cleanup system components not addressed by the GALL Report :

- One-Time Inspection Program
- Water Chemistry Control Program

The staff's evaluation of the TLAA is addressed in SER Section 4.3. The staff's detailed review of the AMPs is found in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor water cleanup system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.25 Auxiliary Systems NMP2 Seal Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-25

This auxiliary system is listed here for information and completeness. The NMP2 process sampling system has been removed from the scope of license renewal by the ALRA dated July 14, 2005.

3.3B.2.3.26 Auxiliary Systems NMP2 Service Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-26

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 service water system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.3B.2.2.5 and 3.3B.2.1

3.3B.2.3.27 Auxiliary Systems NMP2 Spent Fuel Pool Cooling and Cleanup System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-27

The staff reviewed ALRA Table 3.3.2.B-27, which summarizes the results of AMR evaluations for the spent fuel pool cooling and cleanup system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 1996 dated November 17, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.28-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include heat exchangers.

For these component types the applicant identified the following materials, environments, and AERMS:

- wrought austenitic stainless steel exposed to demineralized untreated water, subject to loss of heat transfer and loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.28, Table 2.3.3.B.28-1, Section 3.3.2.B.27, and Table 3.3.2.B-27. During its review the staff determined that additional information was needed.

The RAIs are organized in two groups, general and system-specific. There are no general RAIs associated with this system. System-specific a-RAI 3.3.2.A-5-1 is applicable to this system. The staff's detailed review of the applicant's response to a-RAI 3.3.2.A-5-1 is found in SER Section 3.3A.2.3.5.

On the basis of its review of the information provided in the ALRA and the additional information included in the applicant's response to the RAI the staff found the aging effects of the spent fuel pool cooling and cleanup system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the spent fuel pool cooling and cleanup system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-27 identifies the following AMP for managing the aging effects for the spent fuel pool cooling and cleanup system components not addressed by the GALL Report :

- Closed-Cycle Cooling Water System Program

The staff's detailed review of the AMP is found in SER Section 3.0.3.2.8.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the spent fuel pool cooling and cleanup system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.28 Auxiliary Systems NMP2 Standby Diesel Generator Fuel Oil System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-28

The staff reviewed ALRA Table 3.3.2.B-28, which summarizes the results of AMR evaluations for the standby diesel generator fuel oil system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.29-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include piping and fittings.

For these component types the applicant identified the following materials, environments, and AERMS:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to air subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.29, Table 2.3.3.B.29-1, Section 3.3.2.B.28, and Table 3.3.2.B-28.

The staff's review of the information provided in the ALRA found the aging effects of the standby diesel generator fuel oil system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the standby diesel generator fuel oil system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-28 identifies the following AMP for managing the aging effects for the standby diesel generator fuel oil system components not addressed by the GALL Report :

- One-Time Inspection Program

The staff's detailed review of the AMP is found in SER Section 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the standby diesel generator fuel oil system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.29 Auxiliary Systems NMP2 Standby Diesel Generator Protection (Generator) System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-29

The staff reviewed ALRA Table 3.3.2.B-29, which summarizes the results of AMR evaluations for the standby diesel generator protection (generator) system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.30-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, heat exchangers, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- gray cast iron exposed to air subject to loss of material
- copper alloys (zinc ≤ 15 percent) exposed to raw water subject to loss of heat transfer and loss of material
- copper alloys (zinc ≤ 15 percent) exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to loss of heat transfer
- wrought austenitic stainless steel exposed to treated water, temperature ≥ 140 °F, but < 212 °F, subject to cracking

The staff reviewed the information in ALRA Section 2.3.3.B.30, Table 2.3.3.B.30-1, Section 3.3.2.B.29, and Table 3.3.2.B-29.

The staff's review of the information provided in the ALRA found the aging effects of the standby diesel generator protection (generator) system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the standby diesel generator protection (generator) system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components, the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-29 identifies the following AMPs for managing the aging effects for the standby diesel generator protection (generator) system components not addressed by the GALL Report:

- System Walkdown Program
- Open-Cycle Cooling Water System Program
- Closed-Cycle Cooling Water System Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.2, 3.0.3.2.7, and 3.0.3.2.8, respectively.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the standby diesel generator protection (generator) system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.30 Auxiliary Systems NMP2 Standby Liquid Control System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-30

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 standby liquid control system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.3B.2.2.1, 3.3B.2.2.2, and 3.3B.2.2.5

3.3B.2.3.31 Auxiliary Systems NMP2 Yard Structures Ventilation System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-31

The staff reviewed ALRA Table 3.3.2.B-31, which summarizes the results of AMR evaluations for the yard structures ventilation system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.32-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include unit coolers.

For this component type the applicant identified the following materials, environments, and AERMS:

- copper alloys (zinc $\leq$ 15 percent) exposed to air, moisture or wetting, temperature < 140 °F, subject to loss of heat transfer
- copper alloys (zinc $\leq$ 15 percent) exposed to raw water subject to loss of heat transfer and loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.32, Table 2.3.3.B.32-1, Section 3.3.2.B.31, and Table 3.3.2.B-31.

The staff's review of the information provided in the ALRA found the aging effects of the yard structures ventilation system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the yard structures ventilation system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for the component the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-31 identifies the following AMPs for managing the aging effects for the yard structures ventilation system components not addressed by the GALL Report :

- Preventive Maintenance Program
- Open-Cycle Cooling Water System Program

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the yard structures ventilation system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.32 Auxiliary Systems NMP2 Radiation Monitoring System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-32

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 radiation monitoring system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.3B.2.1 and 3.3B.2.2.5.

3.3B.2.3.33 Auxiliary Systems NMP2 Auxiliary Boiler System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-33

The staff reviewed ALRA Table 3.3.2.B-33, which summarizes the results of AMR evaluations for the auxiliary boiler system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.33-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces, filters, pumps, tanks, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- gray cast iron exposed to air subject to loss of material
- wrought austenitic stainless steel exposed to treated water or steam, temperature $\geq$ 212 °F, but < 482 °F, subject to cracking
- gray cast iron exposed to treated water, temperature $\geq$ 140 °F, but < 212 °F, low flow, subject to loss of material
- gray cast iron exposed to disodium phosphate solution, sodium sulfite solution, subject to loss of material
- carbon or low alloy steel (yield strength < 100 Ksi) exposed to disodium phosphate solution, sodium sulfite solution, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.33, Table 2.3.3.B.33-1, Section 3.3.2.B.33, and Table 3.3.2.B-33.

The staff's review of the information provided in the ALRA found the aging effects of the auxiliary boiler system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the auxiliary boiler system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-33 identifies the following AMPs for managing the aging effects for the auxiliary boiler system components not addressed by the GALL Report :

- System Walkdown Program
- One-Time Inspection Program
- Water Chemistry Control Program
- Selective Leaching of Materials Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.2, 3.0.3.1.4, 3.0.3.2.2, and 3.0.3.1.5.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the auxiliary boiler system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.34 Auxiliary Systems NMP2 Circulating Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-34

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 circulating water system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.3B.2.1 and 3.3B.2.2.5.

3.3B.2.3.35 Auxiliary Systems NMP2 Makeup Water Treatment System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-35

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 makeup water treatment system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.3B.2.2.2 and 3.3B.2.2.5

3.3B.2.3.36 Auxiliary Systems NMP2 Radioactive Liquid Waste Management System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-36

This auxiliary system is listed here for information and completeness. The AMR results for the NMP2 radioactive liquid waste management system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.3B.2.2.2 and 3.3B.2.2.

3.3B.2.3.37 Auxiliary Systems NMP2 Roof Drainage System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-37

The staff reviewed ALRA Table 3.3.2.B-37, which summarizes the results of AMR evaluations for the roof drainage system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 2005 dated December 1, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.37-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include piping and fittings.

For these component types the applicant identified the following materials, environments, and AERMS:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to air, moisture or wetting, temperature < 140°F, subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.37, Table 2.3.3.B.37-1, Section 3.3.2.B.37, and Table 3.3.2.B-37.

The staff's review of the information provided in the ALRA found the aging effects of the roof drainage system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the roof drainage system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-37 identifies the following AMP for managing the aging effects for the roof drainage system components not addressed by the GALL Report :

- One-Time Inspection Program

The staff's detailed review of this AMP is found in SER Sections 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the roof drainage system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.38 Auxiliary Systems NMP2 Sanitary Drains and Disposal System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-38

The staff reviewed ALRA Table 3.3.2.B-38, which summarizes the results of AMR evaluations for the sanitary drains and disposal system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 1996 dated November 17, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.38-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include external surfaces and piping and fittings.

For these component types the applicant identified the following materials, environments, and AERMS:

- gray cast iron exposed to air subject to loss of material
- copper alloys (zinc $\leq$ 15 percent) exposed to demineralized untreated water subject to loss of material
- gray cast iron exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.38, Table 2.3.3.B.38-1, Section 3.3.2.B.38, and Table 3.3.2.B-38.

The staff's review of the information provided in the ALRA found the aging effects of the sanitary drains and disposal system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the sanitary drains and disposal system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-38 identifies the following AMPs for managing the aging effects for the sanitary drains and disposal system components not addressed by the GALL Report:

- System Walkdown Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.2, 3.0.3.1.4, and 3.0.3.1.5, respectively.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the sanitary drains and disposal system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.39 Auxiliary Systems NMP2 Service Water Chemical Treatment System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-39

The staff reviewed ALRA Table 3.3.2.B-39, which summarizes the results of AMR evaluations for the service water chemical treatment system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.39-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include piping and fittings and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- wrought austenitic stainless steel exposed to service water chemical treatment water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.39, Table 2.3.3.B.39-1, Section 3.3.2.B.39, and Table 3.3.2.B-39.

The staff's review of the information provided in the ALRA found the aging effects of the service water chemical treatment system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the service water chemical treatment system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-39 identifies the following AMP for managing the aging effects for the service water chemical treatment system components not addressed by the GALL Report :

- One-Time Inspection Program

The staff's detailed review of the AMP is found in SER Section 3.0.3.1.4.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the service water chemical treatment system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.2.3.40 Auxiliary Systems NMP2 Turbine Building Closed Loop Cooling Water System – Summary of Aging Management Evaluation – ALRA Table 3.3.2.B-40

The staff reviewed ALRA Table 3.3.2.B-40, which summarizes the results of AMR evaluations for the turbine building closed loop cooling water system component-material-environment-AERM combinations not addressed in the GALL Report. These combinations use Notes F through J as revised by the applicant's letter NMPIL 1996, dated November 17, 2005. The staff verified that the applicant had identified all applicable AERMs and had credited appropriate AMPs for managing them. The staff also reviewed the applicable USAR supplements for the AMPs to ensure that the program descriptions describe them adequately.

Aging Effects. ALRA Table 2.3.3.B.40-1 lists individual system components within the scope of license renewal and subject to an AMR. The component types that do not rely on the GALL Report for an AMR include heat exchangers, piping and fittings, and valves.

For these component types the applicant identified the following materials, environments, and AERMS:

- carbon or low alloy steel (yield strength < 100 Ksi) exposed to demineralized untreated water subject to loss of material

The staff reviewed the information in ALRA Section 2.3.3.B.40, Table 2.3.3.B.40-1, .3.2.B.40, and Table 3.3.2.B-40.

The staff's review of the information provided in the ALRA found the aging effects of the turbine building closed loop cooling water system component types not addressed by the GALL Report consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments of the turbine building closed loop cooling water system components.

Aging Management Programs. After evaluating the applicant's identification of aging effects for each of the components the staff evaluated the AMPs to determine whether they are appropriate for managing the identified aging effects. The staff also verified that the USAR supplement describes the programs adequately.

ALRA Table 3.3.2.B-40 identifies the following AMPs for managing the aging effects for the turbine building closed loop cooling water system components not addressed by the GALL Report:

- Preventive Maintenance Program
- Water Chemistry Control Program

The staff's detailed review of the AMPs is found in SER Sections 3.0.3.3.1 and 3.0.3.2.2.

Conclusion: On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the turbine building closed loop cooling water system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program descriptions and concludes that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging of these components, as required by 10 CFR 54.21(d).

3.3B.3 Conclusion

The staff concludes that there is reasonable assurance that the applicant provided sufficient information to demonstrate that the effects of aging for the NMP2 auxiliary systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable USAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the auxiliary systems, as required by 10 CFR 54.21(d).

3.4 Aging Management of Steam and Power Conversion Systems

3.4A NMP1 Aging Management of Steam and Power Conversion Systems

This section of the SER documents the staff's review of the applicant's AMR results for the steam and power conversion systems components and component groups associated with the following NMP1 systems:

- condensate and condensate transfer system
- feedwater/high pressure coolant injection system
- main generator and auxiliary system
- main steam system
- condenser air removal and off-gas system
- main turbine and auxiliary system
- moisture separator reheater steam system

3.4A.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.4, the applicant provided AMR results for the steam and power conversion systems components and component groups. In ALRA Table 3.4.1.A, "NMP1 Summary of Aging Management Programs for the Steam and Power Conversion Systems Evaluated in Chapter VIII or NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the steam and power conversion systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.4A.2 Staff Evaluation

The staff reviewed ALRA Section 3.4 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the steam and power conversion systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.4A.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.4.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.4A.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.4A.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.4A.2.3.

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the steam and power conversion systems components.

Table 3.4A-1 below provides a summary of the staff's evaluation of NMP1 components, aging effects and aging effects mechanisms, and AMPs listed in ALRA Section 3.4, that are addressed in the GALL Report.

Table 3.4A-1 Staff Evaluation for NMP1 Steam and Power Conversion Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Piping and fittings in main feedwater line, steam line and AFW piping (PWR only) (Item Number 3.4.1.A-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis
Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head and shell (except main steam system) (Item Number 3.4.1.A-02)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.4A.2.2.2)
Auxiliary feedwater (AFW) piping (Item Number 3.4.1.A-03)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Plant-specific	None	Not applicable, PWR only

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Oil coolers in AFW system (lubricating oil side possibly contaminated with water (Item Number 3.4.1.A-04)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion and MIC	Plant specific		Not applicable, PWR only
External surface of carbon steel components (Item Number 3.4.1.A-05)	Loss of material due to general corrosion	Plant specific	Systems Walkdown Program (B2.1.33)	Consistent with GALL, which recommends further evaluation (See Section 3.4A.2.2.4)
Carbon steel piping and valve bodies (Item Number 3.4.1.A-06)	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow-Accelerated Corrosion Program (B2.1.9)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1)
Carbon steel piping and valve bodies in main steam system (Item Number 3.4.1.A-07)	Loss of material due to pitting and crevice corrosion	Water chemistry	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1.1)
Closure bolting in high-pressure or high-temperature systems (Item Number 3.4.1.A-08)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1)
Heat exchangers and coolers/condensers serviced by open-cycle cooling water (Item Number 3.4.1.A-09)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	None	Not applicable (condenser hotwell evaluated in 3.4.1.A-02 and all other heat exchangers do not have this aging effect/mechanism (See Section 3.4A.2.3.1)
Heat exchangers and coolers/condensers serviced by closed-cycle cooling water (Item Number 3.4.1.A-10)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed-cycle cooling water system	None	Not applicable (condenser hotwell evaluated in 3.4.1.A-02 and all other heat exchangers do not have this aging effect/mechanism (See Section 3.4A.2.3.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
External surface of aboveground condensate storage tank (Item Number 3.4.1.A-11)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Aboveground carbon steel tanks	None	Not applicable (external surfaces of carbon steel components evaluated in 3.4.1.A-05)
External surface of buried condensate storage tank and AFW piping (Item Number 3.4.1.A-12)	Loss of material due to general, pitting, and crevice corrosion and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	None	Not applicable (See Section 3.4A.2.2.5) Not applicable (See Section 3.4A.2.2.5)
External surface of carbon steel components (Item Number 3.4.1.A-13)	Loss of material due to boric acid corrosion	Boric acid corrosion		Not applicable, PWR only

The staff's review of the NMP1 component groups followed one of several approaches. One approach, documented in SER Section 3.4A.2.1, discusses the staff's review of the AMR results for components in the steam and power conversion systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.4A.2.2, discusses the staff's review of the AMR results for components in the steam and power conversion systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.4A.2.3, discusses the staff's review of the AMR results for components in the steam and power conversion systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the steam and power conversion systems components is documented in SER Section 3.0.3.

3.4A.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.4.2.A, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the steam and power conversion systems components:

- ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program
- Water Chemistry Control Program
- Flow-Accelerated Corrosion Program
- Closed-Cycle Cooling Water System Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Preventive Maintenance Program

- Systems Walkdown Program
- Bolting Integrity Program

Staff Evaluation. In ALRA Tables 3.4.2.A-1 through 3.4.2.A-7, the applicant provided a summary of AMRs for the steam and power conversion systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different AMP is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.4A.2.1.1 Loss of Material Due to Pitting and Crevice Corrosion

In the discussion section of ALRA Table 3.4.1.A Item 3.4.1.A-07 the applicant stated that for main steam carbon steel piping and valve bodies in a treated water environment the aging effect and aging effect mechanism of loss of material due to pitting and crevice corrosion will be managed by the Water Chemistry Control Program. For small-bore piping and valves in a treated water environment an additional program, the One-Time Inspection Program, will be used.

As documented in the Audit and Review Report, the staff questioned the applicant why the small-bore piping and its One-Time Inspection Program were not included in the AMP discussion for ALRA Table 3.4.2.A-4. The applicant stated that the NMP1 main steam system has small-bore carbon steel drain line piping, fitting, and valves. These components were not reflected accurately in ALRA Table 3.4.2.A-4. In its letter dated December 1, 2005, the applicant stated that this deficiency was corrected by revising ALRA Table 3.4.2.A-4 to include the small-bore carbon steel piping, fittings, and valves.

The staff reviewed the applicant's response and found it consistent with the GALL Report and, therefore, acceptable.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.4A.2.1.2 Loss of Material due to General Corrosion; Crack Initiation and Growth due to Cyclic Loading and/or SCC

In reviewing ALRA Tables 3.4.2.A-1 through 3.4.2.A-7 the staff noted that the applicant did not appear to list the AMR results for the extraction steam system. The GALL Report lists the extraction steam system components exposed to an environment of steam with aging effects and aging effects mechanisms of wall thinning (due to FAC) and loss of material (due to general, pitting, and crevice corrosion). For managing this component, material, environment, and aging effect and aging effect mechanism combination the GALL Report AMPs listed are GALL AMP XI.M17, "Flow-Accelerated Corrosion," and GALL AMP XI.M2, "Water Chemistry," in some cases augmented by GALL AMP XI.M32, "One-Time Inspection." As documented in the Audit and Review Report, the staff asked the applicant to explain this difference. The applicant responded that the AMR results for the NMP1 extraction steam system are included as part of the feedwater system; however, the applicant acknowledged that in ALRA

Table 3.4.2.A-2 for the feedwater system it did not identify specifically which piping, fittings, and valves were applicable to the extraction steam system by references to items in GALL Report Chapter VIII, Table C.

In its supplemental letter dated December 1, 2005, the applicant stated that to correct this difference ALRA Table 3.4.2.A-2 had been revised to identify specifically the components for the extraction steam system.

The staff reviewed the applicant's response and found it consistent with the GALL Report and, therefore, acceptable.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.4A.2.1.3 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion, MIC, and Biofouling, Buildup of Deposit Due to Biofouling for Open-Cycle Cooling System and Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion for Closed-Cycle Cooling System.

In RAI 3.4.1.A-1 dated December 23, 2005, the staff stated that in NMP ALRA Table 3.4.1.A Items 3.4.1.A-09 and 3.4.1.A-10 the applicant stated that these items are not applicable because, "All other heat exchangers are of a different material (copper alloys or stainless steel) and do not have this aging effect and aging effect mechanism." However, both copper alloy and stainless steel are subject to the aging effect of pitting and crevice corrosion. Therefore, the staff requested that the applicant clarify why both items were not applicable for NMP1.

In its response by letter dated January 11, 2006, the applicant stated that none of the in-scope heat exchangers in the NMP1 steam and power conversion systems are cooled by open or closed-cycle cooling water systems. The applicant stated that the "Discussion" column entries for these two Table 3.4.1.A items would be revised to indicate that "these components are not subject to an AMR in the NMP1 Steam and Power Conversion Systems."

The staff's review found the applicant's response to RAI 3.4.2.A-1 acceptable because for these two items there are no Table 2 entries. Therefore, the staff's concern described in RAI 3.4.1.A-1 is resolved.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.4.2.C of its supplemental letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the steam and power conversion systems components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general, pitting, and crevice corrosion
- loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling
- general corrosion
- loss of material due to general, pitting, crevice, and MIC

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it had adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.4.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.4A.2.2.1 Cumulative Fatigue Damage

In Section 3.4.2.C.1 of its supplemental letter dated August 19, 2005, the applicant stated that fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

3.4A.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

The staff reviewed Section 3.4.2.C.2 of the applicant's supplemental letter dated August 19, 2005 against the criteria in SRP-LR Section 3.4.2.2.2.

In Section 3.4.2.C.2 of its supplemental letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, and crevice corrosion for various carbon steel components.

SRP-LR Section 3.4.2.2.2 states that the management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The Water Chemistry Control Program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur in stagnant flow conditions. Therefore, the effectiveness of the applicant's Water Chemistry Control Program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion does not occur and that the component's intended function is maintained during the period of extended operation.

In Section 3.4.2.C.2 of its supplemental letter dated August 19, 2005, the applicant also stated that for NMP1 this aging effect and aging effect mechanism are managed by the combination of the Water Chemistry Control Program and One-Time Inspection Program for applicable systems and components.

The staff reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, "Water Chemistry" and GALL AMP XI.M32, "One-Time Inspection," for management of this aging effect and aging effect mechanism. The applicant's Water Chemistry Control Program mitigates the aging effects and aging effects mechanisms on component surfaces exposed to water as the process fluid; chemistry programs are used to control water chemistry for impurities (e.g., chloride and sulfate) that accelerate corrosion and that cause loss of material due to general, pitting, and crevice corrosion. This program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below system-specific limits. The applicant's One-Time Inspection Program is a new AMP; its scope includes verification of the effectiveness of the applicant's Water Chemistry Control Program. Implementation of the applicant's One-Time Inspection Program in conjunction with its Water Chemistry Control Program to manage the aging effect and aging effect mechanism provides added assurance that the aging effect and aging effect mechanism does not occur at locations of stagnant or low flow or that the aging effect and aging effect mechanism progresses very slowly and the component's intended function is maintained during the period of extended operation. The staff concludes that with these two programs the applicant appropriately evaluated AMR results of management of the loss of material due to general, pitting, and crevice corrosion for steam and power conversion systems components as recommended in the GALL Report.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.4.2.2.2. For those line items that apply to Section 3.4.2.C.2 of the applicant's supplemental letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

The staff reviewed Section 3.4.2.C.3 of the applicant's supplemental letter dated August 19, 2005, against the criteria in SRP-LR Section 3.4.2.2.3.

In Section 3.4.2.C.3 of its supplemental letter August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

Because NMP is a BWR the staff found this aging effect and aging effect mechanism not applicable to NMP.

3.4A.2.2.4 General Corrosion

The staff reviewed Section 3.4.2.C.4 of the applicant's supplemental letter dated August 19, 2005 against the criteria in SRP-LR Section 3.4.2.2.4.

In Section 3.4.2.C.4 of its supplemental letter August 19, 2005, the applicant addressed loss of material due to general corrosion on the external surfaces of all carbon steel structures and components including closure bolting exposed to operating temperatures < 212°F.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel structures and components including closure boltings exposed to operating temperature less that 212°F. The GALL Report recommends further evaluation to ensure that this aging effect and aging effect mechanism is adequately managed.

In Section 3.4.2.C.2 of its supplemental letter August 19, 2005, the applicant also stated that for NMP1 this aging effect and aging effect mechanism is managed by the Systems Walkdown Program. The staff reviewed the applicant's Systems Walkdown Program and its evaluation is documented in SER Section 3.0.3.3.2.

The staff found this program acceptable for managing loss of material due to general corrosion as visual inspection of external surfaces is performed during various systems walkdown. In addition the NMP plant-specific operating experience also indicated that this program is effective in identifying aging effects and aging effects mechanisms that have been observed in the applicant's plant. Therefore, the staff concludes that there is reasonable assurance that the applicant appropriately evaluated AMR results of management of the loss of material due to general corrosion for steam and power conversion systems components as recommended in the GALL Report.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.4.2.2.4. For those line items that apply to Section 3.4.2.C.4 of the applicant's supplemental letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The staff reviewed Section 3.4.2.C.5 of the applicant's supplemental letter dated August 19, 2005, against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant stated in Section 3.4.2.C.5 of its supplemental letter August 19, 2005, that the aging effect and aging effect mechanism of loss of material due to general, pitting, crevice, and MIC is not applicable to NMP1. This discussion applies to PWR systems only and is therefore not applicable to NMP1. The staff determined that for loss of material due to general, pitting, crevice, and MIC this aging effect and aging effect mechanism is not applicable to NMP1 because it applies to PWR systems only.

Because NMP has no components from this group the staff determined that this aging effect and aging effect mechanism is not applicable.

3.4A.2.2.6 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's Quality Assurance Program.

Conclusion. On the basis of its review for component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report and for which the GALL Report recommends further evaluation the staff determined that the applicant adequately addressed the issues further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.4A.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.4.2.A-1 through 3.4.2.A-7, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.4.2.A-1 through 3.4.2.A-7, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.4A.2.3.1 Steam and Power Conversion System NMP1 Condensate and Condensate Transfer System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-1

The staff initially reviewed the following ALRA Table 3.4.2.A-1 items in the original LRA for the NMP1 condensate and condensate transfer system.

- Loss of material for gray cast iron external surfaces in an air environment managed by the Systems Walkdown Program.
- Cracking and loss of strength of polymeric external surfaces managed by the Systems Walkdown Program.
- Cracking and loss of strength of polymeric piping and fittings in a treated water, temperature < 140 °F, environment managed by the Preventive Maintenance Program. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).
- Cracking of aluminum alloys (containing copper or zinc as the primary alloying elements) piping and fittings in a treated water, < 140 °F environment, managed by One-Time Inspection and Water Chemistry Control Programs. The applicant stated that this material is not in the GALL Report for this component (Note F).
- Loss of material of gray cast iron pumps in a treated water, temperature < 140 °F, environment managed by One-Time Inspection, Selective Leaching of Materials, and Water Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component-material-environment combination (Note H).
- Cracking of aluminum alloy (containing copper or zinc as the primary alloying elements) valves in a treated water, temperature < 140 °F, environment managed by One-Time Inspection and Water Chemistry Control Programs. The applicant stated that this material is not in the GALL Report for this component. (Note F)
- Loss of material of gray cast iron valves in a treated water, temperature < 140 °F, environment managed by One-Time Inspection, Selective Leaching of Materials, and Water Chemistry Control Programs. The applicant stated that this material is not in the GALL Report for this component (Note F).
- Cracking of aluminum alloys (containing copper or zinc as the primary alloying elements) valves in a treated water < 140 °F, low flow environment managed by One-Time Inspection and Water Chemistry Control Programs. The applicant stated that this material is not in the GALL Report for this component (Note F).

The staff evaluation of the cracking and loss of strength of polymeric piping and fittings in a treated water, temperature < 140 °F, environment managed by the Preventive Maintenance Program is provided in RAI 3.4-1.

In RAI 3.4-1 dated November 17, 2004, the staff requested the applicant to identify (a) the specific polymeric materials for these components, (b) the basis for concluding that no other aging effects occur in this environment, (c) specific tests and inspection methods for these components including the frequency of inspections, and (d) acceptance criteria and their bases for determining loss of strength of the polymers.

In its response by letter dated December 21, 2004, the applicant stated that:

> There are three components in the NMP1 Condensate System that are made of an elastomer material and subject to a treated water (temperature <140'F) environment. These components are expansion joints (EXJBJ-49-08, EXJBJ-49-09 and EXJBJ-49-10) located at the suction of the Condensate Pumps.
>
> a. The expansion joints are made of rubber (Chlorobutyl elastomer with polyester fabric and metal reinforcement.)
>
> b. Rubber in a treated water (temperature <140°F) environment is very resistant to wear and hardening, but is susceptible to cracking and loss of strength. Treated water can cause elastomer degradation, and hardening can occur when the water temperature increases above 130°F. This conclusion is based upon industry reports EPRI TR-1 14882, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 3, and EPRI TR-1 14881, "Aging Effects for Structures and Structural Components (Structural Tools)," Revision 1.
>
> c. The expansion joints are currently visually inspected periodically and replaced on a five-year frequency.
>
> d. The Preventive Maintenance Program does not include specific acceptance criteria for the loss of strength parameter since the expansion joints are replaced on a five-year frequency. The replacement frequency, however, was determined by considering the operating conditions and environment. These same factors also contribute to loss of strength. Therefore, the current replacement frequency ensures that the expansion joints are replaced prior to their loss of intended function.

The staff's review found the applicant's response to RAI 3.4-1 acceptable because the applicant provided appropriate tests and inspection methods for these components including the frequency of inspections and acceptance criteria and their bases for determining loss of strength of the polymers. Therefore, the staff's concern described in RAI 3.4-1 is resolved. This information is reflected in the ALRA..

The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).The staff concurred with this statement.

The staff found the AMPs for the cracking of aluminum alloy (containing copper or zinc as the primary alloying elements) valves in a treated water, < 140 °F environment, managed by One-Time Inspection and Water Chemistry Control Programs in this environment acceptable. As discussed in RAI 3.4.2B-2, the Water Chemistry Control Program controls the chemistry to maintain low concentration of halides so cracking of aluminum alloys (containing copper or zinc as the primary alloying elements) piping and fittings in a treated water < 140 °F environment would be unlikely. Aluminum in mild environments forms a protective passive layer that protects the base metal from further corrosion.

In RAI 3.4-4 dated November 17, 2004, the staff requested that the applicant discuss both the basis for not including selective leaching as an aging effect and the operating history of these valves.

In its response by letter dated December 21, 2004, the applicant stated:

> The basis for not including the aging effect of "selective leaching" for the material "Aluminum alloys containing copper or zinc as primary alloying elements" in an environment of treated water (temperature < 140'F) is the zinc content of the valves involved. These particular valves have a zinc content of less than 15%. As such, any copper-zinc alloy material with < 15% zinc is not susceptible to selective leaching. Since these valves are an aluminum alloy, however, they still would not be susceptible to selective leaching even if the zinc content was > 15%.
>
> Industry operating experience and the plant operating experience database were reviewed for instances where components of this aluminum alloy might have experienced failures due to corrosion. No such applicable failures were found in the industry information reviewed or in the plant database. A keyword search of the CAP database was also performed. Again, no failures due to corrosion of components fabricated of this aluminum alloy were found.

The staff's review found the applicant's response to RAI 3.4-4 acceptable because the applicant provided a justification for not considering selective leaching as an aging mechanism for aluminum alloys containing copper or zinc as primary alloying elements in an environment of treated water (temperature < 140 °F). Therefore, the staff's concern described in RAI 3.4-4 is resolved. This information is reflected in the ALRA.

The One-Time Inspection Program activities will utilize visual, volumetric, and other inspection techniques consistent with industry practice to verify that aging effect does not occur or progresses at such a slow rate that the intended function of the component would not be affected adversely. The staff's evaluations of One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The applicant stated that this material is not in the GALL Report for this component (Note F). The staff concurred with this statement.

The staff's evaluation of loss of material of gray cast iron pumps in a treated water, temperature ≥ 140 °F, environment managed by One-Time Inspection, Selective Leaching of Materials, and Water Chemistry Control Programs is in RAI 3.4-2

In RAI 3.4-2 dated November 17, 2004, the staff requested the applicant to discuss:

- visual, VT, or other inspection methods, frequency of inspections, acceptance criteria and their bases
- bases for sampling of the pumps to detect selective leaching

In its response by letter dated December 21, 2005, the applicant stated:

a. For the gray cast iron pumps with an internal environment of treated water (temperature <140 °F) (i.e., the two Condensate Transfer pumps), the aging effect requiring management is loss of material. The aging mechanisms to be managed by the One-Time Inspection Program and the Water Chemistry Control Program include crevice corrosion, general corrosion, and pitting corrosion. The One-Time Inspection Program is a new license renewal (LR) AMP commitment for NMP that is to be implemented prior to the period of extended operation. This commitment was made in the original LRA submittal, as supplemented by NMPNS letter NMP1L 1880 dated October 29, 2004. As such, program documents or procedures specific to managing the aging mechanisms (i.e. crevice corrosion, general corrosion, and pitting corrosion) that specify inspection methods and acceptance criteria for the two Condensate Transfer pumps do not currently exist. The frequency of any future inspections for the aging mechanisms of crevice corrosion, general corrosion, and pitting corrosion will be based on the findings of the One-Time Inspection Program. However, as stated in [the original] LRA Appendix B2.1.20, the One-Time Inspection Program will be implemented consistent with NUREG-1801, Section XI.M32.

b. As presented in [the original] LRA Sections A1.1.33 and B2.1.21, the implementation of the Selective Leaching of Materials Program is discussed in the program description for the One-Time Inspection Program (see [the original] LRA Sections A1.1.28 and B2.1.20). As stated above, the One-Time Inspection Program is a new LR AMP commitment for NMP that is to be implemented prior to the period of extended operation. As such, program documents or procedures specific to managing the aging mechanism of selective leaching for the two Condensate Transfer pumps do not currently exist. However, as stated in [the original] LRA Section B2.1.21, the Selective Leaching Program will be implemented consistent with NUREG-1801, Section XI.M33.

c. A determination of whether hardness tests are necessary will be made at the time of the One-Time Inspection Program implementation. This is consistent with [the original] LRA Section B2.1.20, which states: "Inspection techniques may include a one-time visual inspection and hardness measurement."

Hardness testing will be considered as a possible inspection technique if visual examination techniques alone cannot determine if selective leaching severe enough to affect the component intended function is occurring. The use of field hardness testing will also be contingent on the accessibility of the affected component surfaces to perform the test. Hardness testing on components susceptible to selective leaching may be appropriate if the component configuration and geometry allows. Tubing and other components such as valves with complex internal geometry do not provide adequate physical access to internal surfaces requiring examination to allow accurate measurements to be made.

The staff's review found the applicant's response to RAI 3.4-2 acceptable because the applicant's tests and inspection methods are consistent with industry practice and the GALL Report guidelines. Therefore, the staff's concern described in RAI 3.4-2 is resolved. This information is reflected in the ALRA.

The applicant stated in its ALRA that this aging effect is not in the GALL Report for this component-material-environment combination (Note H). The staff concurred with this statement.

The staff found the aging management of cracking of aluminum alloy (containing copper or zinc as the primary alloying elements) valves in a treated water, temperature < 140 °F, environment managed by One-Time Inspection and Water Chemistry Control Programs in this environment acceptable. As discussed in RAI 3.4.2B-2, the Water Chemistry Control Program controls the chemistry to maintain low concentration of halides so cracking of aluminum alloys (containing copper or zinc as the primary alloying elements) piping and fittings in a treated water < 140 °F environment would be unlikely. Aluminum in mild environments forms a protective passive layer that protects the base metal from further corrosion. The One-Time Inspection Program utilizes visual, volumetric, and other inspection techniques consistent with industry practice to verify that aging effect does not occur or progresses at such a slow rate that the intended function of the component would not be affected adversely. The staff's evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively. (This evaluation is also applicable for valves of the same material with a pressure boundary function in a similar environment).

The applicant stated that this material is not in the GALL Report for this component (Note F). The staff concurred with this statement.

The staff found the aging management of loss of material of gray cast iron valves in a treated water, temperature< 140 °F, environment managed by One-Time Inspection, Selective Leaching of Materials, and Water Chemistry Control Programs acceptable as discussed in RAI 3.4-2.

The applicant stated that this material is not in the GALL Report for this component (Note F). The staff concurred with this statement.

The staff's evaluations found that the applicant identified the appropriate AMPs for the materials and environment of the NMP1 condensate and condensate transfer system components.

3.4A.2.3.2 Steam and Power Conversion System NMP1 Feedwater/High Pressure Coolant Injection System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-2

The staff reviewed the following ALRA Table 3.4.2.A-2 items for the NMP1 feedwater/high pressure coolant injection system:

- Cracking in wrought austenitic stainless steel feedwater heaters in a treated water, temperature ≥ 140 °F, but < 212 °F, environment managed by the One-Time inspection and Chemistry Control Programs. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).

- Cracking of wrought austenitic stainless steel feedwater heaters in a treated water or steam, temperature ≥ 212°F, but < 482°F, environment managed by the One-Time Inspection and Chemistry Control Programs. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).
- Cumulative fatigue damage of wrought austenitic stainless steel feedwater heaters in a treated water or steam, temperature ≥ 212°F, but < 482°F, environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c).The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).
- Loss of material for copper alloy (zinc ≤ 15 percent) oil coolers in a demineralized untreated water low flow environment managed by Closed -Cycle Cooling Water Systems Program. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).
- Loss of material in carbon steel or low alloy steel (yield strength < 100 ksi) piping and fittings in a treated water or steam, temperature ≥ 212°F, but < 482°F, environment managed by the One-Time inspection and Water Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component-material-environment combination. This line item is for components in the reactor coolant pressure boundary portion of the main steam or feedwater system (Note H,16).
- Loss of material in carbon steel, low alloy steel (yield strength < 100 ksi) valves in a treated water or steam, temperature ≥ 212°F, but < 482°F, environment managed by the One-Time inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component-material-environment combination. This row is for components in the reactor coolant pressure boundary portion of the main steam or feedwater system (Note H,16).
- Loss of material in carbon steel or low alloy steel (yield strength < 100 ksi) valves in a treated water or steam, temperature ≥ 212°F, but < 482°F, low flow environment managed by the One-Time Inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this component-material-environment combination. This line item is for components in the reactor coolant pressure boundary portion of the main steam or feedwater system (Note H,16).

The staff requested during its audit that the applicant discuss the specific tests and inspections, frequency of inspections, and acceptance criteria for cracking in wrought austenitic stainless steel feedwater heaters in a treated water, temperature ≥ 140°F, but < 212°F, environment managed by the One-Time Inspection and Water Chemistry Control Programs to assure that the components will perform their intended functions. In its response the applicant stated:

> The One-Time Inspection Program is described in [the original] LRA Section B2.1.20, as supplemented by NMPNS letter NMP1L 1880 dated October 29, 2004. The One-Time Inspection Program is a new program that will be implemented prior to the period of extended operation. As such, the procedures needed to answer this question have not yet been developed. However, the One-Time Inspection Program will be consistent with the GALL Report,

> Section XI.M32 (One-Time Inspection) when implemented. The One-Time Inspection Program Attribute Assessment (PAA) addresses program implementation at NMPNS relative to the requirements of Appendix A of NUREG-1800. The One-Time Inspection PAA is available on-site at NMPNS for review.

The staff's review found the response acceptable because the applicant's AMPs will be consistent with industry practice and requirements of the GALL Report.

The staff's evaluations of the One-Time Inspection and Water Chemistry Control Programs are in Sections SER 3.0.3.1.4 and 3.0.3.2.2, respectively.

The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J). The staff concurred with this statement.

The staff requested that the applicant discuss the specific tests and inspections, frequency of inspections, and acceptance criteria for cracking of wrought austenitic stainless steel feedwater heaters in a treated water or steam, temperature $\geq$ 212 °F, but < 482 °F, environment managed by the One-Time Inspection and Chemistry Control Programs to assure that the components perform their intended function. In its response the applicant stated:

> The One-Time Inspection Program is described in ALRA Section B2.1.20, as supplemented by NMPNS letter NMP1L 1880 dated October 29, 2004. The One-Time Inspection Program is a new program that will be implemented prior to the period of extended operation. As such, the procedures needed to answer this question have not yet been developed. However, the One-Time Inspection Program will be consistent with the GALL Report, Section XI.M32 (One-Time Inspection) when implemented. The One-Time Inspection Program Attribute Assessment (PAA) addresses program implementation at NMPNS relative to the requirements of Appendix A of NUREG-1800. The One-Time Inspection PAA is available on-site at NMPNS for review.

The staff found the response reasonable and acceptable because the applicant's AMPs will be consistent with industry practice and requirements of the GALL Report.

The staff's evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J). The staff concurred with this statement.

The staff found the aging management of cumulative fatigue damage of wrought austenitic stainless steel feedwater heaters in a treated water or steam, temperature $\geq$ 212 °F, but < 482 °F, environment managed by TLAA evaluated in accordance with 10 CFR 54.21(c) reasonable and acceptable. This item is not evaluated in the original LRA Section 4.3.

The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J). The staff concurred with this statement.

The applicant stated as to the loss of material for copper alloy (zinc ≤ 15 percent) oil coolers in a demineralized untreated water low flow environment managed by Closed -Cycle Cooling Water Systems Program that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J). The staff concurred with this statement.

The staff found the aging management of the aging effects for this component by the Closed-Cycle Cooling Water Systems Program reasonable and acceptable. The staff reviewed this AMP. The staff evaluation is in SER Section 3.0.3.2.8.

The applicant stated that loss of material in carbon steel or low alloy steel (yield strength < 100 ksi) piping and fittings in a treated water or steam, temperature ≥ 212°F, but < 482°F, environment managed by the One-Time inspection and Water Chemistry Control Programs is not in the GALL Report for this component-material-environment combination (Note H). The staff concurred with this statement. The applicant also stated that this line item applies to components in the reactor coolant pressure boundary portion of the main steam or feedwater system (Note 16).

The staff found the One-Time inspection and Water Chemistry Control Programs appropriate AMPs to manage the aging effects for this component in this environment. The staff's evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The applicant stated that loss of material in carbon steel or low alloy steel (yield strength < 100 ksi) valves in a treated water or steam, temperature ≥ 212°F, but < 482°F, low flow environment is managed by the One-Time inspection and Chemistry Control Programs. The applicant stated that this aging effect is not in the GALL Report for this "component-material-environment" combination. This row in Table 3.4.2.A-2 is for components in the reactor coolant pressure boundary portion of the main steam or feedwater system (Note H,16). The staff concurred with this statement. The information provided by the applicant is reflected in the ALRA.

The staff found the One-Time inspection and Water Chemistry Control Programs appropriate AMPs to manage the aging effects for this component in this environment. The staff's evaluations of the One-Time Inspection and Water Chemistry Control Programs are in SER Sections 3.0.3.1.4 and 3.0.3.2.2, respectively.

The staff's evaluations found that the applicant has identified the appropriate AMPs for the materials and environment associated with the NMP1 feedwater/high pressure coolant injection system components. This information is reflected in the ALRA.

3.4A.2.3.3 Steam and Power Conversion System NMP1 Main Generator and Auxiliary System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-3

This system is listed here for information and completeness. The AMR results for the NMP1 main generator and auxiliary system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.4A.2.1.1 and 3.4A2.2.4.

3.4A.2.3.4 Steam and Power Conversion System NMP1 Main Steam System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-4

This system is listed here for information and completeness. The AMR results for the NMP1 main steam system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.4A.2.1.1, 3.4A.2.2.2, and 3.4A2.2.4

3.4A.2.3.5 Steam and Power Conversion System NMP1 Condenser Air Removal and Off-Gas System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-5

This system is listed here for information and completeness. The AMR results for the NMP1 condenser air removal and off-gas system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.4A.2.1, 3.4A.2.1.1, 3.4A.2.2.2, and 3.4A2.2.4

3.4A.2.3.6 Steam and Power Conversion System NMP1 Main Turbine and Auxiliary Systems – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-6

This system is listed here for information and completeness. The AMR results for the NMP1 main turbine and auxiliary systems are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.4A.2.1, 3.4A.2.2.2, and 3.4A2.2.4.

3.4A.2.3.7 Steam and Power Conversion System NMP1 Moisture Separator Reheater Steam System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.A-7

This system is listed here for information and completeness. The AMR results for the NMP1 moisture separator reheater steam system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.4A.2.1, 3.4A.2.2.2, and 3.4A2.2.4.

3.4A.3 Conclusion

The staff concludes that there is reasonable assurance that the applicant provided sufficient information to demonstrate that the effects of aging for the NMP1 steam and power conversion systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the steam and power conversion systems, as required by 10 CFR 54.21(d).

3.4B <u>NMP2 Aging Management of Steam and Power Conversion Systems</u>

This section of the SER documents the staff's review of the applicant's AMR results for the steam and power conversion systems components and component groups associated with the following NMP2 systems:

- main condenser air removal system
- condensate system

- feedwater system
- main steam system
- moisture separator and reheater system
- extraction steam and feedwater heater drain system
- turbine main system

3.4B.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.4, the applicant provided AMR results for the steam and power conversion systems components and component groups. In ALRA Table 3.4.1.B, "NMP2 Summary of Aging Management Programs for the Steam and Power Conversion Systems Evaluated in Chapter VIII of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the steam and power conversion systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.4B.2 Staff Evaluation

The staff reviewed ALRA Section 3.4 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the steam and power conversion systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.4B.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.4.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.4B.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.4B.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.4B.2.3.

Finally, the staff reviewed the AMP summary descriptions in the USAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the steam and power conversion systems components.

Table 3.4B-1 below provides a summary of the staff's evaluation of NMP2 components, aging effects and aging effects mechanisms, and AMPs listed in ALRA Section 3.4 that are addressed in the GALL Report.

Table 3.4B-1 Staff Evaluation for NMP2 Steam and Power Conversion Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Piping and fittings in main feedwater line, steam line and AFW piping (PWR only) (Item Number 3.4.1.B-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue Analysis
Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head and shell (except main steam system) (Item Number 3.4.1.B-02)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water chemistry and one-time inspection	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.4B.2.2.2)
Auxiliary feedwater (AFW) piping (Item Number 3.4.1.B-03)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Plant specific		Not applicable, PWR only
Oil coolers in AFW system (lubricating oil side possibly contaminated with water (Item Number 3.4.1.B-04)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion and MIC	Plant specific		Not applicable, PWR only
External surface of carbon steel components (Item Number 3.4.1.B-05)	Loss of material due to general corrosion	Plant specific	Systems Walkdown Program (B2.1.33)	Consistent with GALL, further evaluation recommended (See Section 3.4B.2.2.4)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Carbon steel piping and valve bodies (Item Number 3.4.1.B-06)	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow-Accelerated Corrosion Program (B2.1.9)	Consistent with GALL, which recommends further evaluation (See Section 3.4B.2.2.4)
Carbon steel piping and valve bodies in main steam system (Item Number 3.4.1.B-07)	Loss of material due to pitting and crevice corrosion	Water chemistry	Water Chemistry Control Program (B2.1.2), One-Time Inspection Program (B2.1.20)	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1)
Closure bolting in high-pressure or high-temperature systems (Item Number 3.4.1.B-08)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1)
Heat exchangers and coolers/condensers serviced by open-cycle cooling water (Item Number 3.4.1.B-09)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	None	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1)
Heat exchangers and coolers/condensers serviced by closed-cycle cooling water (Item Number 3.4.1.B-10)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed-cycle cooling water system	None	Not applicable (components not subject to an aging management review)
External surface of aboveground condensate storage tank (Item Number 3.4.1.B-11)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Aboveground carbon steel tanks	None	Not applicable (external surfaces of carbon steel components evaluated in 3.4.1.B-05
External surface of buried condensate storage tank and AFW piping (Item Number 3.4.1.B-12)	Loss of material due to general, pitting, and crevice corrosion and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	None	Not applicable (See Section 3.4B.2.2.5) Not applicable (See Section 3.4B.2.2.5)
External surface of carbon steel components (Item Number 3.4.1.B-13)	Loss of material due to boric acid corrosion	Boric acid corrosion		Not applicable, PWR only

The staff's review of the NMP2 component groups followed one of several approaches. One approach, documented in SER Section 3.4B.2.1, discusses the staff's review of the AMR results for components in the steam and power conversion systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.4B.2.2, discusses the staff's review of the AMR results for components in the steam and power conversion systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.4B.2.3, discusses the staff's review of the AMR results for components in the steam and power conversion systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the steam and power conversion systems components is documented in SER Section 3.0.3.

3.4B.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Section 3.4.2.B, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the steam and power conversion systems components:

- Water Chemistry Control Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Preventive Maintenance Program
- Systems Walkdown Program
- Bolting Integrity Program

Staff Evaluation. In ALRA Tables 3.4.2.B-1 through 3.4.2.B-7, the applicant provided a summary of AMRs for the steam and power conversion systems components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the

AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.4B.2.1.1 Loss of Material Due to Pitting and Crevice Corrosion

In the discussion section for Item 3.4.1.B-07 of ALRA Table 3.4.1.B the applicant stated that for main steam carbon steel piping and valve bodies in a treated water environment loss of material due to pitting and crevice corrosion is managed by the Water Chemistry Control Program. For small-bore piping and valves in a treated water environment an additional AMP, the One-Time Inspection Program, is used.

As documented in the Audit and Review Report, the staff asked the applicant why small-bore piping and the One-Time Inspection Program were not included in the AMP discussion for ALRA Table 3.4.2.B-4. The applicant stated that the main steam system has small-bore carbon steel drain line piping, fitting, and valves. These components were not reflected accurately in ALRA Table 3.4.2.B-4. By letter dated December 1, 2005, the applicant stated to correct this deficiency ALRA Table 3.4.2.B-4 had been revised to include the small-bore carbon steel piping, fittings, and valves.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.2 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.4.2.C of its supplemental letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the steam and power conversion systems components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general, pitting, and crevice corrosion
- loss of material due to general, pitting, and crevice corrosion, microbiologically influenced corrosion, and biofouling
- general corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.4.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.4B.2.2.1 Cumulative Fatigue Damage

In Section 3.4.2.C.1 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs according to

10 CFR 54.21(c)(1). SER Section 4.3 documents the staff's review of the applicant's evaluation of this TLAA.

3.4B.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

The staff reviewed Section 3.4.2.C.2 of the applicant's supplemental letter dated August 19, 2005, against the criteria of SRP-LR Section 3.4.2.2.2.

In Section 3.4.2.C.2 of its letter dated August 19, 2005, the applicant addressed loss of material due to general, pitting, and crevice corrosion for various carbon steel components.

SRP-LR Section 3.4.2.2.2 states that the management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes.

The Water Chemistry Control Program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at in stagnant flow conditions. Therefore, the effectiveness of the applicant's Chemistry Control Program should be verified to ensure no corrosion. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Control Program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure no corrosion and maintenance of the component's intended function during the period of extended operation.

In Section 3.4.2.C.2 of its letter dated August 19, 2005, the applicant also stated that for NMP2 this aging effect and aging effect mechanism is managed by the combination of the Water Chemistry Control Program and the One-Time Inspection Program for the applicable systems and components.

The staff reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs; the staff's evaluations are documented in SER Sections 3.0.3.2.2 and 3.0.3.1.4, respectively.

The AMPs recommended by the GALL Report for management of this aging effect and aging effect mechanism are GALL AMPs XI.M2 and XI.M32. The applicant's Water Chemistry Control Program mitigates the aging effects and aging effects mechanisms on component surfaces exposed to water as the process fluid. Chemistry Programs control water chemistry for impurities (e.g., chloride and sulfate) that accelerate and cause loss of material due to general, pitting, and crevice corrosion. This program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below system-specific limits. The One-Time Inspection Program's scope includes verification of the effectiveness of the Water Chemistry Control Program. Implementation of the One-Time Inspection Program in conjunction with the Water Chemistry Control Program to manage this aging effect and aging effect mechanism provides added assurance that (a) the aging effect and aging effects mechanism does not occur at stagnant or low-flow locations or (b) that the aging effect and aging effect mechanism progresses so slowly that the component's intended function will be maintained during the period of extended operation. The staff found that the applicant appropriately evaluated AMR results involving management of the loss of material due to general, pitting, and crevice corrosion for steam and power conversion systems components as recommended in the GALL Report.

The staff concludes that there is reasonable assurance that the applicant met the criteria of SRP-LR Section 3.4.2.2.2. For those line items addressed by Section 3.4.2.C.2 of its letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

The staff reviewed Section 3.4.2.C.3 of the applicant's supplemental letter dated August 19, 2005, against the criteria of SRP-LR Section 3.4.2.2.3.

In Section 3.4.2.C.3 of its letter dated August 19, 2005, the applicant stated that this aging effect applies to PWRs only.

Because NMPNS is a BWR design the staff found this aging effect not applicable to NMP2.

3.4B.2.2.4 General Corrosion

The staff reviewed Section 3.4.2.C.4 of the applicant's supplemental letter dated August 19, 2005, against the criteria of SRP-LR Section 3.4.2.2.4.

In Section 3.4.2.C.4 of its letter dated August 19, 2005, the applicant addressed loss of material due to general corrosion on the external surfaces of all carbon steel structures and components including closure bolting exposed to operating temperatures < 212°F.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel structures and components including closure boltings exposed to operating temperature less that 212°F. The GALL Report recommends further evaluation to ensure that this aging effect and aging effect mechanism is adequately managed.

In the ALRA, the applicant also stated that for NMP2 this aging effect and aging effect mechanism is managed by the Systems Walkdown Program. The staff reviewed the applicant's Systems Walkdown Program. The staff's evaluation is documented in SER Section 3.0.3.3.2.

The staff found this program acceptable for managing loss of material due to general corrosion by visual inspection of external surfaces performed during various systems walkdowns. In addition the NMP2 plant-specific operating experience also indicated that this program is effective in identifying aging effects and aging effects mechanisms in the applicant's plant. Therefore, the staff finds that the applicant appropriately evaluated AMR results of management of the loss of material due to general corrosion for steam and power conversion systems components as recommended in the GALL Report.

The staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.4.2.2.4. For those line items addressed by Section 3.4.2.C.4 of its letter dated August 19, 2005, the staff determined the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation as required by 10 CFR 54.21(a)(3).

3.4B.2.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The staff reviewed Section 3.4.2.C.5 of the applicant's supplemental letter dated August 19, 2005, against the criteria of SRP-LR Section 3.4.2.2.5.

The applicant stated in Section 3.4.2.C.5 of its letter dated August 19, 2005, that loss of material due to general, pitting, crevice, and MIC is not applicable to NMP2 because this aging effect and aging effect mechanism applies to PWR systems only and is therefore not applicable to NMP2.

The staff determined that the loss of material due to general, pitting, crevice, and MIC aging effect and aging effect mechanism is not applicable to NMP2 as it applies to PWR systems only.

Because NMP2 does not have any components from this group the staff determined that this aging effect and aging effect mechanism is not applicable.

3.4B.2.2.6 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's Quality Assurance Program.

<u>Conclusion</u>. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant had claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

<u>Summary of Technical Information in the Amended Application</u>. In ALRA Tables 3.4.2.B-1 through 3.4.2.B-7, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.4.2.B-1 through 3.4.2.B-7, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.4B.2.3.1 Steam and Power Conversion System NMP2 Main Condenser Air Removal System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.B-1

This system is listed here for information and completeness. The AMR results for the steam and power conversion system NMP2 main condenser air removal system are consistent with the GALL Report. The staff's evaluation of these results is presented in SER Sections 3.4B.2.1 and 3.4B2.2.2

3.4B.2.3.2 Steam and Power Conversion System NMP2 Condensate System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.B-2

The staff reviewed ALRA Table 3.4.2.B-2 for the following items:

- Cracking and loss of strength of elastomer external surfaces in an air environment managed by the Preventive Maintenance Program. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).
- Cracking and loss of strength of elastomer piping and fittings in a treated water, temperature < 140 °F, environment managed by the Preventive Maintenance Program. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).
- Cracking and loss of strength of fiberglass tanks in a treated water, temperature < 140 °F, environment managed by the One-Time Inspection Program. The applicant states that neither the component nor the material-environment combination is evaluated in the GALL Report (Note J).

The staff found management of cracking and loss of strength of elastomer external surfaces in an air environment by the Preventive Maintenance Program reasonable and acceptable. The staff's evaluation of the Preventive Maintenance Program is in SER Section 3.0.3.3.1. The staff requested additional information about tests and inspections in the Preventive Maintenance Program to manage the aging effects for this material and environment. In its response by letter dated, November 15, 2005, the applicant provided the information, which is evaluated in SER Section 3.2B.2.3.4.

The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report. The staff concurred with this statement.

The staff's evaluation of the aging management of cracking and loss of strength of elastomer piping and fittings in treated water, temperature < 140 °F, environment managed by the Preventive Maintenance Program is in RAI 3.4-9. The staff found the aging management of this component in this environment acceptable. The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report. The staff concurred with the applicant's statement.

In RAI 3.4-9 dated November 17, 2004, the staff stated that the original LRA Table 3.4.2.B-2 states that cracking and loss of strength of polymeric piping and fittings in a treated water, temperature < 140 °F, low-flow environment will be managed by the Preventive Maintenance Program. The staff requested that the applicant provide the following information:

- composition and/or mechanical and chemical properties of the polymer
- methods of inspection
- frequency of inspections and acceptance criteria and bases thereof
- operating history of these components

In its response by letter dated December 21, 2004, the applicant stated:

> The subject elastomeric piping and fittings in a treated water (temperature < 140 °F), low flow environment contained in the [original] LRA Table 3.4.2.B-2, consist of expansion joints associated with piping connected to the two Condensate Storage Tanks.
>
> (a) The composition of the elastomeric expansion joints is rubber.
>
> (b) The methods of inspection associated with these expansion joints are visual, dimensional and durometer readings.
>
> (c) Inspection of the expansion joints is performed every two years. Replacement of the components is scheduled for every 20 years. The acceptance criteria for the various methods are as follows.
>
> <u>Visual Inspection</u>
> - No excessive and deep cracking or cuts of outer cover exposing reinforcing wire, body, rings or fabric.
> - No blistering or local areas of deformation or ply separation.
> - No leakage or weeping through bellows or at flange connections.
> - No soft or gummy areas.
> - No mechanical damage due to maintenance or operating activity.
> - If expansion joint has a liner, liner is not damaged.
> - Structural members and attachment hardware is not damaged and maintains structural integrity.
>
> <u>Dimensional Inspection</u>
> - Face to face dimensions are within design tolerances.

Durometer Reading

- Reading between 50 -80 (Shur scale).

The inspections and acceptance criteria for the expansion joints are based upon approved vendor manuals.

(d) The license renewal operating experience database was reviewed for failures of any of the expansion joints associated with the two Condensate Storage Tanks. No such failures were found in this database.

In addition, the site CAP database was reviewed for any occurrences of non-conforming conditions associated with the expansion joints of the two Condensate Storage Tanks. One corrective action report was written as a result of the latest inspection (January 2004). This report identified signs of aging occurring but not to the extent that immediate action was necessary. The expansion joints were found to be leak-free and structurally intact.

The staff's review found the applicant's response to RAI 3.4-9 acceptable because it provided methods of inspection, frequency of inspections, and acceptance criteria including their bases. These are consistent with industry practice and vendor recommendations. In addition the operating history of these components supports the proposed AMPs. Therefore, the staff's concern described in RAI 3.4-9 is resolved. This information is reflected in the ALRA.

The staff's evaluation of the aging management of cracking and loss of strength of fiberglass tanks in a treated water, temperature < 140 °F, environment managed by the One-Time Inspection Program is in a-RAI 3.4.2.B-1.

In a-RAI 3.4.2.B-1 dated November 22, 2005, the staff requested that the applicant provide assurance that a one-time inspection alone is adequate to manage the aging effects identified. Because the tank nozzles were connected to rubber expansion joints or flanges the staff requested that the applicant discuss how the aging effects of these joints or flanges would be managed. In addition the staff requested that the applicant provide the NMPNS operational experience with these tanks and the bases for identifying the aging effects for the specific fiberglass (Atlac 382 resin) in this environment.

In its response by letter dated December 5, 2005, the applicant stated:

The tanks included in ALRA Table 3.4.2.B-2 are the NMP2 Condensate Storage Tanks 2CNS-TK1A and 2CNS-TK-1B.

The external surfaces of these tanks are inspected periodically under the Systems Walkdown Program and NMPNS has not observed any age-related degradation. The operational experience relative to these tanks relative to aging is that no issues have been raised. The Atlac 382 resin is a propoxylated bisphenol A fumarate unsaturated polyester resin which has been used for many years in industrial applications. In particular, the cured resin has excellent high-temperature properties with outstanding resistance against a broad range of aqueous acids, salts, and alkaline solutions. Its resistance to strong inorganic acids and oxidizing media is superior. Manufacturer chemical resistance data for

Atlac 382 indicates the resin resists degradation by de-ionized water, distilled water, and sea water at service temperatures up to 210 °F. A specific example for a severe industrial application in which a fiberglass tank constructed with Atlac 382 resin has been used is a chlorine chill and filtration tower that has been in service for at least 25 years. Therefore, low-temperature treated water is a very benign environment for these tanks. Based on this information, the One-Time Inspection Program alone has been determined to be adequate to manage aging of the internal surfaces of these tanks. Since the GALL Report and the EPRI Tools documents do not address fiberglass material, the aging effects of cracking and loss of strength were obtained from industry information sources on the internet that are dedicated to fiberglass material.

Rubber expansion joints and flanges are included under the ALRA line item for piping and fittings with the Material of Elastomer and the Environment of Treated Water, Temperature 140 °F. Cracking and loss of strength of these components is managed by the Preventive Maintenance Program. External surfaces of these components are included under the ALRA line item of External Surfaces, with the Material of Elastomer and the Environment of Air. Cracking and loss of strength of the elastomer external surfaces are also managed by the Preventive Maintenance Program. Visual inspection is performed for cracking and other evidence of degradation, and Durometer Hardness Testing is performed that will detect any hardening or loss of strength.

The staff's review of the tests and inspections and operational experience with these tanks and the bases for identifying the aging effects for the specific fiberglass Atlac 382 resin) in this environment found that the applicant had provided an adequate justification for the management of the aging effects for this component. Therefore, the staff's concern described in a-RAI 3.4.2.B-1 is resolved.

The applicant stated that neither the component nor the material-environment combination is evaluated in the GALL Report. The staff concurred with the applicant's statement.

The staff's above evaluations staff found that the applicant identified the appropriate AMPs for the materials and environment of the condensate system components.

3.4B.2.3.3 Steam and Power Conversion System NMP2 Feedwater System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.B-3

This system is listed here for information and completeness. The AMR results for the steam and power conversion system NMP2 feedwater system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.3B.2.1, 3B.2.2.2, 3.3B.2.2.4.

3.4B.2.3.4 Steam and Power Conversion System NMP2 Main Steam System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.B-4

The staff reviewed ALRA Table 3.4.2.B-4 for the following items:

- Loss of material for wrought austenitic stainless steel piping and fittings in demineralized untreated water low-flow environment managed by the One-Time Inspection Program.

The applicant stated that this aging effect is not in the GALL Report for this component-material-environment combination. The applicant also stated that this item is applicable to components that have an aging effect and aging effect mechanism of loss of material due to MIC (Note H,14).

- Loss of material for wrought austenitic stainless steel "T" quenchers in demineralized untreated water low-flow environment managed by the One-Time Inspection Program. The applicant stated that this aging effect is not in the GALL Report for this component-material-environment combination. The applicant also stated that this item is applicable to components that have an aging effect and aging effect mechanism of loss of material due to MIC (Note H,14).

The staff's discussion of loss of material for wrought austenitic stainless steel piping and fittings in demineralized untreated water low-flow environment managed by the One-Time Inspection Program is in a-RAI 3.4.2.B-2. The staff's evaluation of loss of material for wrought austenitic stainless steel "T" quenchers in demineralized untreated water low-flow environment managed by the One-Time Inspection Program is also in a-RAI 3.4.2.B-2.

In a-RAI 3.4.2.B-2 dated November 22, 2005, the staff stated that ALRA Table 3.4.2.B-4 indicates that loss of material in wrought austenitic stainless steel "T" quenchers, piping, and fittings exposed to demineralized untreated water low-flow environment would be managed by the One-Time Inspection Program. The staff requested that the applicant provide assurance that a one-time inspection alone is adequate to manage the aging effect.

In its response by letter dated December 5, 2005, the applicant changed the environment for these components to treated water and added the Water Chemistry Control Program to the management for the aging effect.

The staff's review staff concurred that with this change the aging management is now consistent with the GALL Report and, therefore, the staff found the applicant's response to a-RAI 3.4.2.B-4 acceptable and the staff's concern described in a-RAI 3.4.2.B-4 is resolved.

The staff's evaluations staff found that the applicant had identified the appropriate aging management for the materials and environment of the main steam system components.

3.4B.2.3.5 Steam and Power Conversion System NMP2 Moisture Separator and Reheater System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.B-5

This system is listed here for information and completeness. The AMR results for the steam and power conversion system NMP2 moisture separator and reheater system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.3B.2.1, 3.3B.2.2.2.

3.4B.2.3.6 Steam and Power Conversion System NMP2 Extraction Steam and Feedwater Heater Drain System – Summary of Aging Management Evaluation – ALRA Table 3.4.2.B-6

This system is listed here for information and completeness. The AMR results for the Steam and power conversion system NMP2 extraction steam and feedwater heater drain system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.3B.2.1, 3.3B.2.2.2, 3.3B.2.2.4.

3.4B.2.3.7 Steam and Power Conversion System NMP2 Turbine Main System – Summary of Aging Management Evaluation – ALRA Table3.4.2.B-7

This system is listed here for information and completeness. The AMR results for the steam and power conversion system NMP2 turbine main system are consistent with the GALL Report. The staff's evaluation of these results is in SER Sections 3.3B.2.1, 3.3B.2.2.2, 3.3B.2.2.4.

3.4B.3 Conclusion

The staff concludes that there is reasonable assurance that the applicant provided sufficient information to demonstrate that the effects of aging for the NMP2 steam and power conversion systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable USAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the steam and power conversion systems, as required by 10 CFR 54.21(d).

3.5 Aging Management of Structures and Component Supports

3.5A NMP1 Aging Management of Structures and Component Supports

This section of the SER documents the staff's review of the applicant's AMR results for the structures and component supports components and component groups associated with the following NMP1 systems, structures, and commodities:

- primary containment structure
- reactor building
- essential yard structures
- fuel handling system
- material handling system
- offgas building
- radwaste solidification and storage building
- screen and pump house building
- turbine building
- vent stack
- waste disposal building
- component supports commodity
- fire stops and seals commodity

3.5A.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.5, the applicant provided AMR results for the structures and component supports components and component groups. In ALRA Table 3.5.1.A, "NMP1 Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapter II and III of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the structures and component supports components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.5A.2 Staff Evaluation

The staff reviewed ALRA Section 3.5 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the structures and component supports components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report and are summarized in SER Section 3.5A.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.5.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.5A.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.5A.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.5A.2.3.

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the structures and component supports components.

Table 3.5A-1 below provides a summary of the staff's evaluation of NMP1 components, aging effects and aging effects mechanisms, and AMPs listed in ALRA Section 3.5, that are addressed in the GALL Report.

Table 3.5A-1 Staff Evaluation for NMP1 Structures and Component Supports in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Common Components of All Types of PWR and BWR Containment				
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1.A-01)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, "Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis"
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1.A-02)	Cracking for cyclic loading & crack initiation and growth from SCC	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends further evaluation (See Section 3.5A.2.2.1)
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1.A-03)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	Water Chemistry Control Program (B2.1.2), ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1.A-04)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1.A-05)	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanism	Containment leak rate test and Plant Technical Specifications	10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1.1)
Seals, gaskets, and moisture barriers (Item Number 3.5.1.A-06)	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
BWR Concrete (Mark II and III) Containment and Steel (Mark I, II and III) Containment (Note: NMP1 has a Mark I Containment)				

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Concrete elements: foundation, walls, dome (Item Number 3.5.1.A-07)	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI	None	Not applicable (See Section 3.5A.2.2.1)
Concrete elements: foundation (Item Number 3.5.1.A-08)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	None	Not applicable (See Section 3.5A.2.2.1)
Concrete elements: foundation (Item Number 3.5.1.A-09)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	None	Not applicable (See Section 3.5A.2.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.A-10)	Reduction of strength and modulus due to elevated temperature	Plant specific	None	Not applicable (See Section 3.5A.2.2.1)
Prestressed containment: tendons and anchorage components (Item Number 3.5.1.A-11)	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA, evaluated in accordance with 10 CFR 54.21(c)	None	Not applicable (See Section 3.5A.2.2.1)
Steel elements: liner plate, containment shell (Item Number 3.5.1.A-12)	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Water Chemistry Control Program (B2.1.2), ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26) Torus Corrosion Monitoring Program (B3.3)	Consistent with GALL, which recommends further evaluation (See Section 3.5A.2.2.1)
Steel elements: vent header, drywell head, torus, downcomers, pool shell (Item Number 3.5.1.A-13)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, "Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis"

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Steel elements: protected by coating (Item Number 3.5.1.A-14)	Loss of material due to corrosion in accessible areas only	Protective coating monitoring and maintenance	None	Not applicable (no credit for coatings taken)
Prestressed containment: tendons and anchorage components (Item Number 3.5.1.A-15)	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	None	Not applicable (PWR only)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.A-16)	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	None	Not applicable (Mark I Containment)
Steel elements: vent line bellows, vent headers, downcomers (Item Number 3.5.1.A-17)	Cracking due to cyclic loads or Crack initiation and growth due to SCC	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends further evaluation (See Section 3.5A.2.2.1)
Steel elements: Suppression chamber liner (Item Number 3.5.1.A-18)	Crack initiation and growth due to SCC	Containment ISI and Containment leak rate test	None	Not applicable (Mark I Containment)
Steel elements: drywell head and downcomer pipes (Item Number 3.5.1.A-19)	Fretting and lock up due to wear	Containment ISI	None	Not applicable (No fretting or wear for these components)
Class I Structures				
All Groups except Group 6: accessible interior/exterior concrete & steel components (Item Number 3.5.1.A-20)	All types of aging effects	Structures Monitoring	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), Structures Monitoring Program (B2.1.28)	Consistent with GALL, which recommends no further evaluation (See Sections 3.5A.2.1 and 3.5A.2.2.2)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation (Item Number 3.5.1.A-21)	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant specific	None	Not applicable (See Section 3.5A.2.2.2)
Group 6: all accessible/ inaccessible concrete, steel, and earthen components (Item Number 3.5.1.A-22)	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of Water-Control Structures or FERC/US Army Corps of Engineers dam inspection and maintenance	None	Not applicable (No water-control structures)
Group 5: liners (Item Number 3.5.1.A-23)	Crack initiation and growth from SCC and loss of material due to crevice corrosion	Water Chemistry Program and Monitoring of spent fuel pool water level	Water Chemistry Control Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1.2)
Groups 1-3, 5, 6: all masonry block walls (Item Number 3.5.1.A-24)	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry Wall	Masonry Wall Program (B2.1.27)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Groups 1-3, 5, 7-9: foundation (Item Number 3.5.1.A-25)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	None	Not applicable (See Section 3.5A.2.2.2)
Groups 1-3, 5-9: foundation (Item Number 3.5.1.A-26)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	None	Not applicable (See Section 3.5A.2.2.2)
Groups 1-5: concrete (Item Number 3.5.1.A-27)	Reduction of strength and modulus due to elevated temperature	Plant-specific	None	Not applicable (See Section 3.5A.2.2.2)
Groups 7, 8: liners (Item Number 3.5.1.A-28)	Crack Initiation and growth due to SCC; Loss of material due to crevice corrosion	Plant-specific	None	Not applicable (No tank liners within scope)
Component Supports				

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
All Groups: support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc. (Item Number 3.5.1.A-29)	Aging of component supports	Structures Monitoring	Structures Monitoring Program (B2.1.28) Fire Protection Program (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Sections 3.5A.2.1.3 and 3.5A.2.2.3)
Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds (Item Number 3.5.1.A-30)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4
All Groups: support members: anchor bolts, welds (Item Number 3.5.1.A-31)	Loss of material due to boric acid corrosion	Boric acid corrosion	None	Not applicable, PWR only
Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolators (Item Number 3.5.1.A-32)	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI	ASME Section XI Inservice Inspection (Subsection IWF) Program (B2.1.25)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Group B1.1: high strength low-alloy bolts (Item Number 3.5.1.A-33)	Crack initiation and growth due to SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)

The staff's review of the NMP1 component groups followed one of several approaches. One approach, documented in SER Section 3.5A.2.1, discusses the staff's review of the AMR results for components in the structures and component supports that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.5A.2.2, discusses the staff's review of the AMR results for components in the structures and component supports that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.5A.2.3, discusses the staff's review of the AMR results for components in the structures and component supports that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the structures and component supports components is documented in SER Section 3.0.3.

3.5A.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Sections 3.5.2.A and 3.5.2.C, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the structures and component supports components:

- Water Chemistry Control Program
- Boraflex Monitoring Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Fire Protection Program
- One-Time Inspection Program
- ASME Section XI Inservice Inspection (Subsection IWE) Program
- ASME Section XI Inservice Inspection (Subsection IWF) Program
- 10 CFR 50 Appendix J Program
- Masonry Wall Program
- Structures Monitoring Program
- Bolting Integrity Program
- Protective Coating Monitoring and Maintenance Program
- Torus Corrosion Monitoring Program

Staff Evaluation. In ALRA Tables 3.5.2.A-1 through 3.5.2.A-11 and Tables 3.5.2.C-1 and 3.5.2.C-2, the applicant provided a summary of AMRs for the structures and component supports components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant had claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different AMP is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.5A.2.1.1 Loss of Leak Tightness in Closed Position Due to Mechanical Wear of Locks, Hinges and Closure Mechanisms

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.A-1 for component type equipment hatches (including stabilizers) and aging effect and aging effect mechanisms loss of leak tightness Table 1 line item 3.5.1.B-05 is shown. During the audit the staff requested that the applicant explain why an NMP2 line item is shown with a NMP1 component type.

In its response by letter dated December 1, 2005, the applicant stated that the line item was an error. For NMP ALRA Table 3.5.2.A-1 (page 3.5-64) for component type equipment hatches (including stabilizers) for aging effect and aging effect mechanism loss of leak tightness the Table 1 reference was changed from Item 3.5.1.B-05 to Item 3.5.1.A-05.

The staff reviewed the applicant's response and found the correction of the reference to ALRA Table 3.5.1.A, Item 3.5.1.A-05 as is the proper NMP1 line item.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism as recommended by the GALL Report.

3.5A.2.1.2 Crack Initiation and Growth Due to SCC; Loss of Material Due to Crevice Corrosion

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.A-2 for component type liners and aging effect and aging effect mechanism cracking the GALL Report Volume 2 line item shown is Item III.A5.2-b with ALRA Table 3.5.1.A, Item 3.5.1.A-23. The Note D shown states that the component is different from the GALL Report line item. During the audit the staff requested that the applicant explain how this AMR line item component differs from the GALL Report when GALL Report Item III.A5.2-b is also for the component type liners.

In its response by letter dated December 1, 2005, the applicant stated that the note referenced should be Note B instead of Note D. The reference would be to Note A except the AMP shown takes exceptions to the GALL Report AMP. The applicant revised ALRA Table 3.5.2.A-2 to change Note D to Note B for all AMR line item component liners with the aging effect/ mechanism of cracking.

The staff reviewed the applicant's response and found the correction of Note D to Note B acceptable because it assigned the proper note to this AMR line item.

The staff's review found that the applicant appropriately addressed the aging effect and aging effects mechanism, as recommended by the GALL Report.

3.5A.2.1.3 Aging of Component Supports

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.A-1 for component type expansion/grouted anchors and aging effect and aging effect mechanism loss of anchor capacity the GALL Report Volume 2 line items shown are Items III.B1.1.4-a and III.B1.2.3-a with ALRA Table 3.5.1.A, Item 3.5.1.A-29. The environment shown is concrete and the note states that it is consistent with the GALL Report. During the audit the staff requested that the applicant explain how this AMR line item is consistent with the GALL Report when the two GALL Report line items have a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside containment, and an aging effect and aging effect mechanism of reduction in anchor capacity. The logic of this AMR line item was not consistent with the GALL Report. Such inconsistency also applied to ALRA Tables 3.5.2.A-2, 3.5.2.A-6, 3.5.2.A-8, and 3.5.2.A-9 for component type expansion/grouted anchors. These four additional AMR line items are shown in the ALRA as associated with the GALL Report Volume 2 Item III.B1.2.3-a only.

In its response by letter dated December 1, 2005, the applicant stated that it had made the ALRA consistent with the GALL Report for all of its expansion/grouted anchor AMR line items listed above. The ALRA line item for carbon steel in concrete was revised. In its place the component type was changed to concrete surrounding anchor bolts, the carbon steel was replaced with concrete (new line with the current line that starts with concrete), the environment of concrete was replaced with air, and the rest of the lines remained as displayed. The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity as per the GALL Report but intended these terms to have exactly the same meaning.

The staff reviewed the applicant's response and found after revision of the applicant's AMR line items for the component expansion/grouted anchor (component type concrete surrounding anchor bolts after revision) are consistent with the GALL Report and therefore acceptable.

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.A-11 for component type expansion/grouted anchors and aging effect and aging effect mechanism loss of anchor capacity the GALL Report Volume 2 line item shown is Item III.B1.2.3-a with ALRA Table 3.5.1.A, Item 3.5.1.A-19. The environment shown is concrete and the note states that it is consistent with the GALL Report. During the audit the staff requested that the applicant explain how this AMR line item is consistent with the GALL Report when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment, and an aging effect and aging effect mechanism of reduction in anchor capacity. The logic of this AMR line item was not consistent with the GALL Report. The staff asked the applicant to explain why the ALRA Table 3.5.1.A line item shown was Item 3.5.1.A-19 instead of Item 3.5.1.A-29.

In its response by letter dated December 1, 2005, the applicant stated that it had made the ALRA consistent with the GALL Report for the expansion/grouted anchor AMR line item. The ALRA line for carbon steel in concrete was revised. In its place the component type was changed to concrete surrounding anchor bolts, the material of carbon steel was replaced with concrete (new line with the current line that starts with concrete), the environment of concrete was replaced with air, and the rest of the line remained as displayed. The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report;' however it is intended that these items have exactly the same meaning. The ALRA Table 3.5.1.A, Item 3.5.1.A-19 listed in error was revised to ALRA Table 3.5.1.A, Item 3.5.1.A-29.

The staff reviewed the applicant's response and found that after revision the applicant's AMR line item for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) is consistent with the GALL Report and therefore acceptable. The staff also found the correction of the reference to ALRA Table 3.5.1.A, Item 3.5.1.A-29 appropriate.

The staff's review found that the applicant appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

<u>Conclusion</u>. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.5.2.C of its letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the structures and component supports components. The applicant provided information concerning how it will manage the following aging effects:

BWR Containment:

- aging of inaccessible concrete areas
- cracking, distortion, and increase in component stress level due to settlement; reduction of foundation strength due to erosion of porous concrete subfoundations, if not covered by structures monitoring program
- reduction of strength and modulus of concrete structures due to elevated temperature
- loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate
- loss of prestress due to relaxation, shrinkage, creep, and elevated temperature
- cumulative fatigue damage
- cracking due to cyclic loading and SCC

Class I Structures:

- aging of structures not covered by structures monitoring program
- aging management of inaccessible areas

Component Supports:

- aging of supports not covered by structures monitoring program
- cumulative fatigue damage due to cyclic loading

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant had claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.5.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.5A.2.2.1 PWR and BWR Containments

The staff reviewed Section 3.5.2.C.1 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1, which addresses several areas discussed below.

Aging of Inaccessible Concrete Areas. The staff reviewed Section 3.5.2.C.1.1 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.1.

In Section 3.5.2.C.1.1 of its letter dated August 19, 2005, the applicant stated that the aging of inaccessible concrete areas in BWR containments effect and aging effect mechanism is not applicable to NMP1, a BWR with a Mark I containment. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that the aging of inaccessible concrete areas in BWR containments is not applicable because NMP1 is a BWR with a Mark I containment.

Because NMP1 has no components from this group the staff found this aging effect and aging effect mechanism not applicable.

Cracking, Distortion, and Increase in Component Stress Level due to Settlement; Reduction of Foundation Strength due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program. The staff reviewed Section 3.5.2.C.1.2 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.2.

In Section 3.5.2.C.1.2 of its letter dated August 19, 2005, the applicant stated that the aging effect and aging effect mechanism cracking, distortion, and increase in component stress level due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations in BWR containments is not applicable because NMP1 is a BWR with a Mark I containment. The staff determined through discussions with the applicant's technical personnel that this aging effect and aging effect mechanism does not apply because NMP1 is a BWR with a Mark I containment.

Because NMP1 has no components from this group the staff found this aging effect and aging effects mechanism not applicable.

Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature. The staff reviewed Section 3.5.2.C.1.3 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.1.3.

In Section 3.5.2.C.1.3 of its letter dated August 19, 2005, the applicant stated that the aging effect and aging effect mechanism reduction of strength and modulus of concrete structures due to elevated temperature in BWR containments is not applicable to NMP1. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that this aging effect and aging effect mechanism is not applicable because NMP1 is a BWR with a Mark I containment.

Because NMP1 has no components from this group the staff found this aging effect and aging effects mechanism not applicable.

Loss of Material due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate. The staff reviewed Section 3.5.2.C.1.4 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.1.4.

In Section 3.5.2.C.1.4 of its letter dated August 19, 2005, the applicant addressed loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate in BWR containments.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of BWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect and aging effect mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

For NMP1 the ASME Section XI Inservice Inspection (Subsection IWE) Program is credited with managing aging effects and aging effects mechanisms due to corrosion of accessible primary containment structure carbon steel components comprising the containment pressure boundary. Inaccessible areas are compared to accessible areas with similar environments. If warranted additional inspections are performed.

In Section 3.5.2.C.1.4 of its letter dated August 19, 2005, the applicant also stated that NMP1 credits the Water Chemistry Control Program and Torus Corrosion Monitoring Program with managing aging effects and aging effects mechanisms due to corrosion of primary containment structure carbon steel components in demineralized untreated water.

The staff reviewed the applicant's ASME Section XI Inservice Inspection (Subsection IWE), Water Chemistry Control, and Torus Corrosion Monitoring Programs and its evaluations are in SER Sections 3.0.3.2.17, 3.0.3.2.2, and 3.0.3.3.7, respectively.

The staff noted in SRP-LR Section 3.5.2.2.1.4 that the GALL Report recommends further evaluation of plant-specific programs to manage this aging effect and aging effect mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

GALL Report Item B1.1.1-a states that for inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following four specific 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 concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner.

(3) The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements.

(4) Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

The GALL Report recommends a plant-specific AMP for corrosion if any of the four conditions cannot be satisfied. As documented in the Audit and Review Report, the staff asked the applicant to explain how each of the four conditions is satisfied at NMP1. The applicant addressed the four conditions:

(1) NMP1 was designed and constructed with equivalent codes as specified in the GALL Report.

(2) The concrete is monitored in accordance with the applicant's ASME Section XI Inservice Inspection (Subsection IWE) and Structures Monitoring Programs.

(3) This condition is not applicable to the NMP design.

(4) This condition is not applicable to a BWR design.

The staff's audit and review determined that all of the conditions identified in the GALL Report are satisfied. The applicant stated that the NMP1 containment was designed and constructed with codes equivalent to those specified in the GALL Report. Accessible concrete of the containment structure is monitored for penetrating cracks by the applicant's ASME Section XI Inservice Inspection (Subsection IWE) and Structures Monitoring Programs. Operating experience demonstrates that the aging effect and aging effect mechanism of loss of material due to corrosion has not been significant for the NMP1 steel containment shell. The staff found that no additional plant-specific AMP is required to manage inaccessible areas of the steel containment shell.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.1.4. For those line items that apply to Section 3.5.2.C.1.4 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature. The staff reviewed Section 3.5.2.C.1.5 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.1.5.

The applicant stated in Section 3.5.2.C.1.5 of the letter dated August 19, 2005, that the aging effect and aging effect mechanism loss of prestress due to relaxation, shrinkage, creep, and elevated temperature in BWR containments is not applicable to NMP1. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel that because NMP1 is a BWR with a Mark I containment this aging effect and aging effect mechanism does not apply.

Because NMP has no components from this group the staff found this aging effect and aging effect mechanism not applicable.

Cumulative Fatigue Damage. In Section 3.5.2.C.1.6 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.6 documents the staff's review of the applicant's evaluation of this TLAA.

Cracking due to Cyclic Loading and SCC. The staff reviewed Section 3.5.2.C.1.7 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.1.7.

In Section 3.5.2.C.1.7 of its letter dated August 19, 2005, the applicant addressed cracking due to cyclic loading and SCC in BWR containments.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in all types of PWR and BWR containments. Cracking could occur also in vent line bellows, vent headers, and downcomers due to SCC for BWR containments. A visual VT-3 examination would not detect such cracks. The GALL Report recommends further evaluation of the inspection methods implemented to detect these aging effects and aging effects mechanisms.

In Section 3.5.2.C.1.7 of its letter dated August 19, 2005, the applicant stated that the ASME Section XI Inservice Inspection (Subsection IWE) Program and 10 CFR 50 Appendix J Program are credited with managing cracking due to cyclic loading and SCC of primary containment structure steel components. In addition an augmented VT-1 visual examination will be performed on containment bellows using enhanced techniques qualified for detecting SCC.

The staff reviewed the applicant's ASME Section XI Inservice Inspection (Subsection IWE) and 10 CFR 50 Appendix J Programs and its evaluations are in SER Sections 3.0.3.2.17and 3.0.3.1.7, respectively.

The staff found that after further evaluation as recommended by the GALL Report for detecting cracking due to SCC the applicant had elected to perform augmented VT-1 visual examinations on containment bellows using enhanced techniques qualified for detecting SCC. The staff found this election consistent with the GALL Report and, therefore, acceptable.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.7. For those line items that apply to Section 3.5.2.C.1.7 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2.2 Class I Structures

The staff reviewed Section 3.5.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.2, which addresses several areas discussed below.

Aging of Structures Not Covered by Structures Monitoring Program. The staff reviewed Section 3.5.2.C.2.1 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.2.1.

In Section 3.5.2.C.2.1 of its letter dated August 19, 2005, the applicant addressed the aging of all Class I structures not covered by the Structures Monitoring Program.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure-aging effect combinations if not covered by the applicant's Structures Monitoring Program, including (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increased porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundation for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure-aging effect combinations not covered by the applicant's Structures Monitoring Program.

SRP-LR Section 3.5.2.2.2.1 further states that technical details of the aging management issue are presented in Subsection 3.5.2.2.1.2 for Items (5) and (6) and Subsection 3.5.2.2.1.3 for Item (8).

In Section 3.5.2.C.2.1 of its letter dated August 19, 2005, the applicant stated that there are no Group 6 structures (water control structures) at NMP1.

In addition the applicant stated in Section 3.5.2.C.2.1 of its letter dated August 19, 2005, that aging management of components in accessible areas of Class I structures will be by general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect and aging effect mechanisms: freeze-thaw, leaching of calcium hydroxide, aggressive chemical attack, reaction with aggregates, corrosion of embedded steel, and corrosion of structural steel.

Further, the applicant stated in Section 3.5.2.C.2.1 of its letter dated August 19, 2005, that for NMP1 cracking, distortion, and an increase in component stress level due to settlement for Group 1-3, 5, 7-9 structures is not significant. Class I structures are founded on impervious rock. Although evaluated as not significant, the applicant credited its Structures Monitoring Program with monitoring for settlement. NMP1 does not utilize a dewatering system.

The applicant also stated in Section 3.5.2.C.2.1 of its letter dated August 19, 2005, that for NMP1 reduction of foundation strength due to erosion of porous concrete subfoundation for Group 1-3, 5, 7-9 structures is not applicable. Porous concrete is not utilized in the construction of Class I structures.

In Section 3.5.2.C.2.1 of its letter dated August 19, 2005, the applicant stated that for NMP1 loss of material due to corrosion of structural steel components for Group 1-5, 7-8 structures is managed by its Structures Monitoring Program. Although NMP1 vent stack steel components are not identified in the GALL Report these components are also managed using the applicant's Structures Monitoring Program. Additionally, the applicant credited the ASME Section XI Inservice Inspection (Subsection IWE) Program in lieu of its Structures Monitoring Program with managing loss of material due to corrosion of high-strength structural fasteners in demineralized untreated water.

The staff review and evaluations of the applicant's Structures Monitoring and ASME Section XI Inservice Inspection (Subsection IWE) Programs are in SER Sections 3.0.3.2.21 and 3.0.3.2.17, respectively.

In addition the applicant stated in its letter dated August 19, 2005, that for NMP1 loss of strength and modulus of concrete structures due to elevated temperatures for Group 1-5 structures is not significant. In Class I structures where general area temperatures do not exceed 150°F and local area temperatures do not exceed 200°F. These temperatures are not sufficient to cause this aging effect and aging effect mechanism of the applicable components.

Furthermore, the applicant stated in its letter dated August 19, 2005, that for NMP1 crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures is not applicable. No tank liners were identified as subject to an AMR.

The staff's audit and review found that scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; and loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures are within the scope of license renewal and will be adequately managed by the applicant's Structures Monitoring Program.

As documented in the Audit and Review Report, the staff interviewed members of the applicant's technical personnel and reviewed relevant operating experience to confirm that these aging effects and aging effects mechanisms have not been observed or when observed, corrective action was taken under the applicant's Structures Monitoring Program. The staff found that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for these aging effects and aging effects mechanisms of Class I structures is not required.

The staff's audit and review found that reduction of foundation strength due to erosion of porous concrete subfoundations of Groups 1-3, 5,and 7-9 structures is an absent and implausible aging effect and aging effect mechanism. The applicant stated that porous concrete subfoundations were not utilized below the building foundations for Groups 1-3, 5, and 7-9 structures. The staff determined that no AMP is required because this aging effect and aging effect mechanism does not occur at NMP1.

The staff found the applicant's further evaluation for elevated temperatures acceptable because change in material properties due to elevated temperatures is an aging effect and aging effect mechanism requiring no management for the NMP1 Groups 1-5 Class I structures.

The applicant stated in Section 3.5.2.C.2.1 of its letter dated August 19, 2005, that the aging effects and aging effects mechanisms of crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for NMP1 Group 7 and 8 structures are not applicable because no tank liners were identified as subject to AMR. The staff's audit and review determined that no AMP is required for aging effects and aging effects mechanisms for stainless steel liners for Group 7 and 8 structures.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.5.2.2.2.1. For those line items that apply to Section 3.5.2.C.2.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Aging Management of Inaccessible Areas. The staff reviewed Section 3.5.2.C.2.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.2.2.

In Section 3.5.2.C.2.2 of its letter dated August 19, 2005, the applicant addressed aging management of inaccessible areas of Class I structures.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects and aging effects mechanisms in inaccessible areas of Groups 1-3, 5, 7-9 structures if specific conditions defined in the GALL Report cannot be satisfied.

In Section 3.5.2.C.2.2 of its letter dated August 19, 2005, the applicant stated that for NMP1 cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are not significant. Ground water tests confirm that no below-grade aggressive environment exists. The applicant evaluated aggressive chemical attack and corrosion of embedded steel as not significant but credits the Structures Monitoring Program with monitoring for them. A regularly scheduled ground water monitoring program will ensure maintenance of a benign environment. The staff's review and evaluation of the applicant's Structures Monitoring Program are in SER Section 3.0.3.2.21.

As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical personnel and review of the ALRA that the recommendations of the GALL Report had been satisfied and that a plant-specific AMP for inaccessible concrete of Class I (Groups 1-3, 5, 7-9) structures was not required for these locally insignificant aging effect and aging effect mechanisms.

Because NMP has a regularly scheduled for ground water monitoring to ensure that the below-grade environment remains non-aggressive and has no cracking, spalling, increases in porosity and permeability, loss of bond, or loss of material for inaccessible concrete, the staff determined that these aging effects and aging effects mechanisms are not applicable to NMP Groups 1-3, 5, 7-9 Class I structures.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.5.2.2.2.2. For those line items that apply to Section 3.5.2.C.2.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2.3 Component Supports

The staff reviewed Section 3.5.2.C.3 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.3, which addresses several areas discussed below.

Aging of Supports Not Covered by Structures Monitoring Program. The staff reviewed Section 3.5.2.C.3.1 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.3.1.

In Section 3.5.2.C.3.1 of its letter dated August 19, 2005, the applicant addressed aging of component supports not covered by the Structures Monitoring Program.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support-aging effect and aging effect mechanism combinations not covered by the applicant's Structures Monitoring Program including (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete for Groups B1-B5 supports, (2) loss of material due to environmental corrosion for Groups B2-B5 supports, and (3) reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports. Further evaluation is necessary only for structure-aging effect combinations not covered by the applicant's Structures Monitoring Program.

In Section 3.5.2.C.3.1 of its letter dated August 19, 2005, the applicant stated that aging management of component supports will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for reduction in concrete anchor capacity due to degradation of the surrounding concrete, loss of material due to environmental corrosion, and reduction/loss of isolation function due to degradation of vibration isolation elements.

The staff found that the applicant's Structures Monitoring Program covers reduction in concrete anchor capacity due to degradation of the surrounding concrete for Groups B1 through B5 supports, loss of material due to environmental corrosion for Groups B2 through B5 supports, and reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports. As per the GALL Report no further evaluation is required and, therefore, has not been provided.

The staff found that the applicant included the aging effect and aging effect mechanism combinations within the scope of its Structures Monitoring Program and agreed that no further evaluation is required. The staff review and evaluation of the applicant's Structures Monitoring Program are in SER Section 3.0.3.2.21. The staff found the applicant's Structures Monitoring Program acceptable for managing the aging effect and aging effect mechanism combinations of component supports for the GALL Report component support Groups B1 through B5 as those combinations are applicable.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.5.2.2.3.1. For those line items that apply to Section 3.5.2.C.3.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cumulative Fatigue Damage due to Cyclic Loading. Fatigue is a TLAA as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4 documents the staff's review of the applicant's evaluation of this TLAA.

3.5A.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 includes the staff's evaluation of the applicant's Quality Assurance Program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant had claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In ALRA Tables 3.5.2.A-1 through 3.5.2.A-11 and Tables 3.5.2.C-1 and 3.5.2.C-2, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.5.2.A-1 through 3.5.2.A-11 and Tables 3.5.2.C-1 and 3.5.2.C-2, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and aging effect requiring management does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicated that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicated that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicated that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicated that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicated that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.5A.2.3.1 Structures and Component Supports NMP1 Primary Containment Structure – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-1

The staff initially reviewed the original LRA Table 3.5.2.A-1, which summarizes the results of AMR evaluations for the primary containment structure component groups.

Staff Evaluation. In RAI 3.5.A-1 dated December 9, 2004, the staff noted that in items 3.5.1.A-3 and 3.5.1.A-17 of original LRA Table 3.5.1.A, the applicant had asserted AMR results consistent with the GALL Report with the exceptions described in AMP B.2.1.23. The GALL Report under item B1.1.1-d recommends further evaluation of the stress corrosion cracking of containment bellows. In the discussion of these items with the staff the applicant asserted that crack initiation and growth due to SCC are not applicable to NMP1 vent line bellows. The staff further noted that in similar environmental conditions NRC IN 92-20 reports thermal growth SCC of pressure boundary bellows. Therefore, the staff requested that the applicant provide additional information to address the effectiveness of the applicable AMP(s) to detect degradation of vent line as well as other containment penetration bellows.

In its response by letter dated January 10, 2005, the applicant provided the following answer:

> Although the vent line bellows, vent line headers, and downcomers at NMP1 are not normally subjected to conditions that cause cracking due to cyclic loading and crack growth due to stress corrosion cracking (SCC), the [original] LRA will be revised to reflect the recommendations in NUREG- 1611, Table 2, Item 12. The recommendations in NUREG-1611 identify stress corrosion cracking as an aging effect requiring management by examination categories E-B and E-F of the ASME Section XI Inservice Inspection (Subsection IWE) Program ([original] LRA Section B2.1.23) and by the 10 CFR 50 Appendix J Program ([original] LRA Section B2.1.26). In addition, per NUREG-1611, an augmented VT-1 visual examination will be performed using enhanced techniques qualified for detecting SCC. This augmented inspection will be included as an enhancement to the IWE inspection program.

The applicant proposed the following revisions to its original LRA:

In Section A1.1.2 the applicant added the following paragraph:

> The NMP1 ASME Section XI Inservice Inspection (Subsection IWE) Program is being enhanced to add an augmented VT-1 visual examination of the NMP1 containment penetration bellows. This inspection will be performed using enhanced techniques qualified for detecting SCC per NUREG-1611, Table 2, Item 12.

In Section A2.1.2 the applicant added the following paragraph:

> The NMP2 ASME Section XI Inservice Inspection (Subsection IWE) Program is being enhanced to add an augmented VT-1 visual examination of the NMP2 containment penetration bellows. This inspection will be performed using enhanced techniques qualified for detecting SCC per NUREG-1611, Table 2, Item 12.

In Section B2.1.23 under the "Enhancements" heading the applicant replaced "None" with the following:

> An augmented VT-1 visual examination of the NMP1 and NMP2 containment penetration bellows will be performed using enhanced techniques qualified for detecting SCC, per NUREG-1611, Table 2, Item 12.

The staff's review found the applicant's response to RAI 3.5.A-1 acceptable. A review of the ALRA indicated that the applicant had incorporated the enhancements stated in the applicant's response to RAI 3.5.A-1. The staff found the applicant's proposed revision of the original LRA to incorporate the augmented inspection of the containment pressure retaining bellows acceptable. Therefore, the staff's concern described in RAI 3.5.A-1 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-2 dated December 9, 2004, the staff asked the applicant to justify the Type B leak rate testing frequency for monitoring aging degradation of containment pressure boundary mechanical and electrical penetrations with seals and gaskets, noting that item number 3.5.1.A-06 of the original LRA Table 3.5.1.A states that containment ISI (AMP B.2.1.23) and containment leak rate test (AMP B.2.1.26) are programs for managing aging of seals, gaskets, and moisture barriers. Original LRA Table 3.5.2.A addresses these components under a generic category of "polymer in air." However, based on an exception taken in AMP B.2.1.23 this AMP will not be applicable to containment seals and gaskets. The staff requested the applicant to explain this discrepancy.

In the RAI the staff further noted that the leak rate testing program would monitor aging degradation of seals and gaskets of equipment hatches and air-locks at NMP1 as they are leak rate tested after each opening. Therefore, the staff requested that the applicant justify Type B leak rate testing frequency for adequately monitoring aging degradation of containment pressure boundary penetrations (mechanical and electrical) with seals and gaskets.

In its response by letter dated January 10, 2005, the applicant provided the following explanation:

> The inspection of the component type "Polymer in Air" is included in the ASME Section XI Inservice Inspection (Subsection IWE) Program ([original] LRA Section B2.1.23). The exception described in [original] LRA Section B2.1.23 identifies that the Subsection IWE inservice inspection (ISI) program for NMP1 is based on the 1998 Edition of ASME Section XI, rather than the 1992/1995 editions and addenda. This was found acceptable by the NRC in a safety evaluation report dated August 17, 2000. There is no exception taken to the performance of examinations for the subject polymeric components.
>
> The aging management of the electrical penetrations and their associated polymeric components is addressed in the NMPNS LRA supplemental letter NMP1L 1912, dated January 10, 2005. These components are managed by the ASME Section XI Inservice Inspection Program ([original] LRA Section B2.1.23) and the 10 CFR 50 Appendix J Program ([original] LRA Section B2.1.26). The mechanical primary containment penetrations for NMP1 are seal-welded to the

containment shell and do not utilize polymeric seals or gaskets for pressure retention.

NMP1 uses Option B for testing of the containment under 10 CFR 50, Appendix J. Type B testing of containment penetrations follows the guidance provided in NRC Regulatory Guide 1.163 and Nuclear Energy Institute (NEI) 94-01. The testing frequency for these components is at least once per 30 months. However, under Option B, the test frequency may be extended to 60 months and then 120 months based upon component testing performance, service conditions and environment, penetration design, and safety impact of penetration failure. For those components with extended testing frequencies, an approximately even distribution is tested during each interval (i.e., 30 months) to minimize the impact of unanticipated random failures and increase the likelihood of detecting common-mode failures. Based on the above attributes, there is reasonable assurance that the Type B testing frequency is adequate for monitoring aging degradation of containment penetrations with seals and gaskets.

The staff's review found the applicant's response to RAI 3.5.A-2 acceptable. The applicant asserted that there are no containment pressure boundary mechanical penetrations with resilient seals and that approximately 25 percent of the pressure boundary electrical penetrations are Type B tested every 30 months to assure that each electrical penetration is Type B tested every 120 months. Therefore, the staff's concern described in RAI 3.5.A-2 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-3 dated December 9, 2004, the staff requested information about activities and programs for ensuring the integrity of seals, gaskets, and bolting of the containment pressure boundary joints, noting that the applicant took exceptions in the containment ISI program (AMP B.2.1.23) to examinations of seals, gaskets, and bolting of pressure boundary joint points. The staff further noted that occasional SRV discharges, sustained elevated temperatures (may be < 150°F), and high humidity could contribute to degradation of containment pressure boundary. Only Type A leak rate testing and associated visual examination requirements of the Appendix J Program (AMP B.2.1.26) could detect defects and degradation of containment pressure boundary joint points reliably. The test interval for Type A leak rate testing could be 10 to 15 years. Therefore, the staff requested that the applicant provide information about activities and programs used for aging management for the functional integrity of these pressure boundary joints for NMP1 primary containment.

In its response by letter dated January 10, 2005, the applicant explained:

The exceptions noted by the NRC for the Containment ISI program ([original] LRA Section B.2.1.23) do not preclude examinations of seals, gaskets, and bolting of pressure boundary joint points. By letter dated October 28, 1999, NMP submitted a relief request (RR-IWE/IWL-1) to the NRC which proposed the use of the 1998 Edition of ASME Section XI, Subsection IWE, in lieu of the 1992 Edition with the 1992 Addenda of Subsection IWE. The use of the 1998 Edition provides more practical requirements for the performance, training, qualification, and scheduling of examinations and provides a uniform set of requirements that eliminates the need for multiple relief requests. The NRC approved the relief request in a safety evaluation report (SER) dated August 17, 2000. As noted in the NRC SER, Examination Category E-D (Seals, Gaskets, and Moisture Barriers) and Examination Category E-G (Pressure Retaining Bolting) were eliminated from the 1998 Code. However, the examination of the pressure retaining bolting and moisture barriers is now included in Examination Category E-A, footnote (1)(d) and Item E1.30, respectively. The NRC also determined that the verification of containment leak-tight integrity through 10 CFR 50, Appendix J testing provides an adequate method to verify the pressure integrity of bolted connections, seals, and gaskets.

Containment pressure boundary joint points are examined and leak tested every two years in accordance with NMP1 instrument surveillance procedure N1-ISP-LRT-TYB. This procedure measures leakage of Type B Appendix J Containment boundaries, which include Containment penetrations whose design incorporates resilient seals, gaskets or sealing compounds, piping penetrations fitted with expansion bellows, electrical penetrations fitted with flexible metal seal assemblies, air lock door seals, and doors with resilient seals or gaskets. This surveillance verifies that the leakage through resilient seals, gaskets, sealant compounds, piping penetrations, and electrical penetrations is maintained within specified values in accordance with the NMP1 Technical Specifications and the NMP1 Appendix J Testing Program Plan.

The staff's review found the applicant's response to RAI 3.5.A-3 acceptable because the examination process used by the applicant provides assurance that the containment pressure boundary joints will retain their integrity during the period of extended operation. Therefore, the staff's concern described in RAI 3.5.A-3 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-4 dated December 9, 2004, the staff noted that the original LRA Table 3.5.2.A did not address load resisting reinforced concrete structures within the drywell shell likely to be subject to temperatures higher than the established threshold of 150°F. Original LRA item 3.5.1.A-27 indicates that the operating temperatures are not sufficient to cause aging effects and aging effects mechanism for these components. Therefore, the staff requested that the applicant provide additional information to address the following questions related to these structures:

Are these structures kept within the threshold temperature 150°F by a cooling system? If yes, please provide a summary of the operating experience related to the reliability of the cooling ventilation system. If no, provide the method of monitoring the temperatures of these structures.

In addition, please provide a summary of the results of the last inspections performed on (1) RPV pedestal supports, (2) the foundation and floor slabs, and (3) the sacrificial shield wall under the existing Structural Monitoring Program.

In its response by letter dated January 10, 2005, the applicant provided the following information:

Load resisting reinforced concrete structures within the drywell shell are not subjected to temperatures higher than the established threshold of 150°F. NMP1

UFSAR Section VI.E.1.2 states that 150°F is the design basis maximum temperature limit for the drywell bulk ambient temperature under normal operation. The reinforced concrete primary containment structure is addressed in [original] LRA Table 3.5.2.A-1 in the component type "Concrete in Air."

Drywell temperatures are maintained by the safety-related Primary Containment Area Cooling System which is in-scope for LR and is described in [original] LRA Section 2.3.3.A.5. The system must be in service to support plant operation; there is no acceptable unavailability. There are six containment cooling units of which five must be in operation to maintain the containment below its temperature limits. All six units in operation maintain the containment at or below 135°F.

The results of the last inspections performed on (1) RPV pedestal supports, (2) the foundation and floor slabs, and (3) the sacrificial shield wall under the existing Structural Monitoring Program show the structures to be in good to excellent condition.

The staff's review found the applicant's response to RAI 3.5.A-4 acceptable. As the cooling system is managed programmatically the staff maintains that the affected concrete structures will not experience temperatures above the threshold limits. Also, the aging of these structures will be managed under the applicant's structural monitoring program during the period of extended operation. Therefore, the staff found the applicant's methods of controlling the temperatures of these structures and of managing their aging acceptable. Therefore, the staff's concern described in RAI 3.5.A-4 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-5 dated December 9, 2004, the staff noted that the original LRA Table 3.5.2.C-1 did not address aging effects and AMPs for fasteners and structural steel made of martensitic precipitation hardenable material. Therefore, the staff requested that the applicant address the stress corrosion potential of these fasteners and structural steel, considering the hardness of these materials and the fact that the fasteners are subject to constant moisture and occasional water due to pipe or valve leakage. The staff requested the applicant to provide the operating experience with these items at NMP1.

In its response by letter dated January 10, 2005, the applicant explained:

[Original] LRA Table 3.5.2.C-1 identifies fasteners (precipitation hardenable) in air (for NMP1 only) with no aging effect requiring management. The material for these fasteners is A-193, Grade B-6 (AISI Type 410). Martensitic stainless steels are hardened by quenching and tempering similar to high strength carbon and low alloy stainless steels, but have better corrosion resistance than carbon and low alloy steels. Precipitation hardenable stainless steels are typically used for parts requiring high strength applications. The minimum specified tempering temperature for A-193, Grade B-6 (AISI Type 410) is 1100°F, resulting in a yield strength of approximately 100 ksi. Throughout NMP1, these fasteners are in-scope due to two intended functions: (1) structural support for NSR and (2) structural/functional support. For stress corrosion cracking to occur, significant moisture must be present. Martensitic, precipitation hardenable stainless steels are susceptible to stress corrosion cracking in most waters.

However, stress corrosion cracking will not occur at temperatures <140°F even in a moist or occasionally wet environment. Many of the component supports are for heating, ventilation, and air conditioning (HVAC) equipment, with these fasteners exposed to indoor air in the Turbine Building, the Waste Disposal Building, and the Offgas Building, which do not see sustained temperatures > 140°F. In addition, susceptibility to stress corrosion cracking increases with increasing yield strength, with most failures occurring at yield strengths > 140 ksi. Since the yield strength of A-193, Grade B-6 (AISI Type 410) is approximately 100 ksi, it is very unlikely that stress corrosion cracking will occur. NUREG-1801, Section XI.M18, "Bolting Integrity," states that cracking must be monitored for bolts with yield strengths exceeding 150 ksi. Therefore, the fact that stress corrosion cracking is not identified as an aging effect requiring management for the fasteners is consistent with NUREG-1801. A review of the operating experience for NMP1 for the stress corrosion cracking of martensitic precipitation hardenable stainless steels found no instances of this occurring.

The staff's review found the applicant's response to RAI 3.5.A-5 acceptable as the staff agreed that (1) SCC of the components made from the martensitic precipitation hardenable stainless steels used at NMP1 is unlikely and (2) the applicant's position is consistent with the GALL Report. Therefore, the staff's concern described in RAI 3.5.A-5 is resolved.

In RAI 3.5.A-6 dated December 9, 2004, the staff requested that applicant justify not including aging management of Class MC supports in original LRA Table 3.5.2.C-1 and in AMP B2.1.25, noting that Table 3.5.2.C-1 and AMP B2.1.25 did not address any AMR of Class MC supports. The GALL Report, Section XI.S3, recommends Subsection IWF for examination of supports of MC components. The staff requested the applicant to provide information on the results of the aging management review for (1) MC component supports within the NMP1 containment (including the supports submerged in water), (2) MC component supports outside the containments (i.e., drywell and torus), and (3) supports for piping penetrating through the containments designated as MC piping (if any). Furthermore, the staff requested the applicant to summarize the programs to be used for managing the aging effect of these supports, including sample size, inspection frequency, personnel qualifications, etc.

In the response by letter dated January 10, 2005, the applicant explained:

> Class MC supports are addressed in [the original] LRA Table 3.5.2.C-1. Several line items in the table correspond to NUREG-1801, Volume 2, Item III.B1.3.1-a, which is for loss of material for carbon steel ASME Class MC supports. The description of the scope of the ASME Section XI Inservice Inspection (Subsection IWF) Program in [the original] LRA Section B2.1.25 inadvertently omitted Class MC supports. The [original] LRA will be corrected to include Class MC supports in the scope description.
>
> All NMP1 Class MC supports are included in the ASME Section XI Inservice Inspection (Subsection IWF) Program. Class MC supports fall into three component types: (1) "Structural Steel (Carbon and Low Alloy Steel) in Air;" (2) "Structural Steel (Wrought Austenitic Stainless Steel) in Air;" and (3) "Wrought Stainless Steel in Treated Water." Therefore, the only aging effect

is loss of material due to general corrosion, applicable only to the carbon/low alloy steel supports.

All component supports at NMP1 are examined in accordance with the requirements of Code Case N-491-1. The sample size and inspection frequency are as specified in Table 2500-1 of Code Case N-491-1, which requires 100 percent of Class MC supports to be examined each inspection interval, except that for multiple components other than piping, within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined. The examination method is a visual VT-3 examination.

Nondestructive examination personnel at NMP1 are qualified by examination, and so certified, in accordance with SNT-TC-1A, per ASME Section XI. Level I and Level II personnel are recertified by qualification examinations every 3 years. Level III personnel are recertified by qualification examinations once every 5 years.

The applicant proposed the following revisions to the original LRA:

The first sentence of [the original] LRA Sections A1.1.3 (page A1-2) and A2.1.3 (page A2-2) is revised as follows:

"The ASME Section XI Inservice Inspection (Subsection IWF) Program (referred to herein as the IWF ISI Program) manages aging of carbon steel component and piping supports, <u>including ASME Class MC supports</u>, due to general corrosion and wear."

In [the original] LRA Section B2.1.25 (page B-49), under the "Program Description" heading, the first sentence is revised as follows:

"The ASME Section XI Inservice Inspection (Subsection IWF) Program (referred to herein as the IWF ISI Program) is an existing program that manages aging of carbon steel component and piping supports, <u>including ASME Class MC supports</u>, due to general corrosion and wear."

The staff's review found the applicant's response to RAI 3.5.A-6 acceptable. A review of the ALRA indicates that the applicant had incorporated such provisions in the original LRA sections. The staff found that the applicant had corrected the errors. Therefore, the staff's concern described in RAI 3.5.A-6 is resolved.

In RAI 3.5.A-10 dated December 9, 2004, the staff noted that Item 3.5.1.A-21 in the original LRA Table 3.5.1.A states under its discussion column that "ground water test data confirm that a below grade aggressive environment does not exist." Therefore, the staff requested that the applicant provide a quantitative summary of NMP1's past ground water test data to support the noted statement. The staff also requested the applicant provide, if available, both the phosphate and phosphoric acid contents of the NMP1 ground water.

In its response by letter dated January 10, 2005, the applicant indicated that NMP1 and NMP2 are situated adjacent to a very large inland fresh water lake with ground water testing every six months for the site. The applicant stated that no evidence of aggressive ground water (pH<5.5, >550 ppm chlorides or sulfates > 1500 ppm) has been found at NMP and that ground water test data is consistently within the acceptable ranges for nonaggressive ground water as defined by the GALL Report. The applicant further noted that results from the ground water tests performed in April and October of 2003 from the two site test wells were pH 6.79-7.83, chloride 7.7-49 ppm, and sulfate 28-60 ppm. The applicant also noted that due to the nonaggressive nature of the subsurface conditions phosphate and phosphoric acid concentrations have not been parts of the chemical analysis.

The staff's review found the applicants response to RAI 3.5.A-10 acceptable. Therefore, the staff's concern described in RAI 3.5.A-10 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-12 dated December 9, 2004, the staff noted that Item 3.5.1.A-12 of the original LRA Table 3.5.1.A states in the discussion column that inaccessible areas are compared against accessible areas and where warranted additional inspections are performed. Therefore, the staff requested that the applicant provide related examples of past NMP1 operating/inspection experience and address the deficiencies found and how additional inspections were relied upon to resolve them.

In its response by letter dated January 10, 2005, the applicant stated that the AERMs for the original LRA Table Item 3.5.1.A-12, Primary Containment (BWR), are managed by the ASME Section XI Inservice Inspection (Subsection IWE) Program described in the original LRA Section B2.1.23, which states that both industry and plant-specific operating experience relating to the ASME Section XI Inservice Inspection (Subsection IWE) Program were reviewed. Review of plant-specific operating experience revealed no identified deficiencies warranting further evaluation for applicability to adjacent inaccessible areas.

The staff's review found the applicant's response to RAI 3.5.A-12 acceptable because no identified deficiencies warranted further evaluation for applicability to adjacent inaccessible areas. Therefore, the staff's concern described in RAI 3.5.A-12 is resolved. This information is reflected in the ALRA.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 primary containment structure components not addressed by the GALL Report and that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.5A.2.3.2 Structures and Component Supports NMP1 Reactor Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-2

The staff reviewed the original LRA Table 3.5.2.A-2, which summarizes the results of AMR evaluations for the reactor building component groups.

In RAI 3.5.A-8, dated December 9, 2004, the staff noted that In the original LRA Tables 3.5.2.A-2, 3.5.2.A-6, 3.5.2.A-8, 3.5.2.A-9, and 3.5.2.A-11, the Structures Monitoring Program is credited with monitoring loss of anchor capacity of expansion/grouted anchors (carbon and low alloy steel) in air. Therefore, the staff requested that the applicant address the methods used for checking anchor bolt torque or bolt tightness to assure that there is no loss of anchor capacity and to ensure that the Structures Monitoring Program will stipulate clearly methods for monitoring the anchor capacity of expansion/grouted anchors.

In its response by letter dated January 10, 2005, the applicant stated that in the original LRA Tables 3.5.2.A-2, 3.5.2.A-6, 3.5.2.A-8, 3.5.2.A-9, and 3.5.2.A-11 the Structures Monitoring Program is credited with monitoring the loss of anchor capacity of expansion/grouted anchors (carbon and low alloy steel) in air. Two AERMs are identified in the original LRA and the GALL Report for carbon steel expansion or grouted anchors: (1) loss of material due to general corrosion and (2) loss of anchor capacity due to local concrete aging mechanisms. The inspection method to determine potential for loss of anchor capacity of an expansion or grouted anchor is the identification of local concrete degradation. If local concrete degradation is identified additional inspections may be required as evaluated under the NMPNS CAP. Anchor bolt torque or bolt tightness checks are not routine unless the potential for loss of anchor capacity due to local concrete aging mechanisms is detected. The staff found the applicant's performance-based approach to ensure no loss of anchor capacity acceptable and RAI 3.5.A-8 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-9 dated December 9, 2004, the staff noted that the original LRA Tables 3.5.2.A-2 and 3.5.2.A-4 state that no AMP is needed for fasteners/structural steel (wrought austenitic stainless steel) exposed to low flow treated water with temperature < 140 °F. Item A.5.2.b of Section III of GALL Report recommends the use of an appropriate Water Chemistry Control Program to manage aging of stainless steel liners exposed to water. Therefore, the staff requested that the applicant explain the meaning of the "treated water" referred to above and explain the NMP1's criteria (e.g., a Water Chemistry Control Program or equivalent) used in quality control of the treated water. The staff also requested that the applicant provide information to justify the NMP1's finding that no AMP is needed for the listed items subject to the above stipulated environment.

In its response by letter dated January 10, 2005, the applicant stated that NMP will revise the original LRA Tables 3.5.2.A-2 and 3.5.2.A-4 to include crack initiation and growth due to SCC and loss of material due to crevice corrosion as an AERM for the following component types, (1) fasteners (wrought austenitic stainless steel) exposed to low flow treated water with temperature < 140 °F and (2) structural steel (wrought austenitic stainless steel) exposed to low flow treated water with temperature < 140 °F, and will credit the Water Chemistry Control Program described in the original LRA Section B2.1.2. The applicant stated that NMP1 also monitors the spent fuel pool water level; therefore, NMP1 will be consistent with GALL Report Item III.A5.2-b. The applicant further stated that the supplemental letter it had committed to submit by February 28, 2005 (reference NMPIL 1902 dated December 21, 2004) will include such table changes. The applicant also clarified that "treated water" is defined in the original LRA Table 3.0-1 (footnote on page 3.0-9) as demineralized water chemically treated to remove oxygen. Corrosion inhibitors can be added to the water. Administrative limits are placed on dissolved oxygen, contaminants, and in some cases suspended solids. The concentration of contaminants is controlled by a combination of filtration, ion exchangers, or feed-and-bleed (dilution) operations.

The staff's review found the applicant's response to RAI 3.5.A-9 acceptable with the proposed revision to the original LRA Tables 3.5.2.A-2 and 3.5.2.A-4 and clarification of the definition of "treated water." Therefore, the staff's concern described in RAI 3.5.A-9 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-11 dated December 9, 2004, the staff noted that the original LRA Tables 3.5.2.A-2, 3.5.2.A-3, 3.5.2.A-6, 3.5.2.A-7, 3.5.2.A-9, 3.5.2.A-10, and 3.5.2.A-11, state that the Structures Monitoring Program is credited with managing aging of concrete in soil both above and below the ground water table (GWT) and concrete lean fill in soil below the GWT. Because these concrete elements are inaccessible because of the presence of soil, the staff requested that the applicant discuss the specific Structures Monitoring Program provisions or methods to be used to inspect or manage aging effect of such inaccessible concrete.

In its response by letter dated January 10, 2005, the applicant indicated that in the original LRA Tables 3.5.2.A-2, 3.5.2.A-3, 3.5.2.A-6, 3.5.2.A-7, 3.5.2.A-9, 3.5.2.A-10, and 3.5.2.A-11, the Structures Monitoring Program is credited with managing aging of concrete in soil (both above and below the GWT) and of concrete lean fill in soil below the GWT. Although no AERMs are expected due to the design of the reinforced concrete and the nonaggressive condition of the ground water and soil the Structures Monitoring Program implementing procedure provides instructions for the performance of inspections of opportunity when the inaccessible surface(s) of a buried structure is excavated or exposed. In addition to these inspections of opportunity, the inspections of similar accessible surfaces or accessible surfaces in the vicinity of the inaccessible surfaces are used to gauge the condition of the inaccessible surfaces.

The staff's review found the applicant's response to RAI 3.5.A-11 acceptable because the applicant's position was consistent with the staff's position for managing aging of concrete in soil (both above and below the GWT) and of concrete lean fill in soil below the GWT. Therefore, the staff's concern described in RAI 3.5.A-11 is resolved. This information is reflected in the ALRA.

In RAI 3.5.A-14 dated December 9, 2004, the staff noted that original LRA Tables 3.5.2.A-2 and 3.5.2.C-2 list aluminum alloys exposed to either air or treated water as items having no aging effects and no AMP credited with managing their aging. Because cable trays, conduits, ducts, and tube tracks made of aluminum alloys might be exposed to a chemically aggressive or acidic environment causing aging of these components the staff requested that the applicant provide past operating/inspection experience with aging management of the components and justify the position that no AMP is needed during the period of extended operation.

In its response letter dated January 10, 2005, the applicant stated that cable trays, conduits, ducts, and tube tracks are not constructed of aluminum alloys at NMP1, where "Aluminum Alloy in Air" is the component type for fire stops and seals. Review of the NMP plant-specific operating experience identified no degradation of aluminum alloy components in air or treated water. Therefore, no specific AMP is required.

The staff's review found the applicant's response to RAI 3.5.A-14 acceptable because review of plant-specific operating experience by the applicant identified no occurrences of degradation of aluminum alloy components in air or treated water. Therefore, the staff's concern described in RAI 3.5.A-14 is resolved. This information is reflected in the ALRA.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 reactor building components not addressed by the GALL Report so that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.3 Structures and Component Supports NMP1 Essential Yard Structures – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-3

The staff reviewed ALRA Table 3.5.2.A-3, which summarizes the results of AMR evaluations for the essential yard structures component groups.

The staff reviewed the information in ALRA Table 3.5.2.A -3 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 essential yard structures components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 Essential Yard Structures components acceptable.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 essential yard structures components not addressed by the GALL Report so that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.4 Structures and Component Supports NMP1 Fuel Handling System – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-4

The staff reviewed ALRA Table 3.5.2.A-4, which summarizes the results of AMR evaluations for the fuel handling system component groups.

The staff reviewed the information in ALRA Table 3.5.2.A-4 and agreed with the applicant's assertion that there are no aging effects requiring AMPs for license renewal for the NMP1 Fuel Handling System components. The staff found the applicant's AMR results for NMP1 Fuel Handling System components acceptable.

On the basis of its review, the staff therefore, concludes that the applicant had adequately identified no aging effects and no AMPs required for NMP1 Fuel Handling System components. The staff concludes that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CRF 54.21(a)(3)

3.5A.2.3.5 Structures and Component Supports NMP1 Material Handling System – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-5

The staff reviewed ALRA Table 3.5.2.A-5, which summarizes the results of AMR evaluations for the material handling system component groups.

The staff reviewed the information in ALRA Table 3.5.2.A -5 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 material handling system components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 Material Handling System components acceptable.

The staff's review concludes that the applicant had identified adequately no aging effects requiring AMPs to manage them for the NMP1 material handling system components not addressed by the GALL Report and that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.6 Structures and Component Supports NMP1 Offgas Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-6

The staff initially reviewed the original LRA Table 3.5.2.A-6, which summarizes the results of AMR evaluations for the offgas building component groups.

In RAI 3.5.A-15 dated December 9, 2004, the staff noted that the original LRA Table 3.5.2.A-1 lists structural steel (wrought austenitic stainless steel) exposed to air as having no aging effect and thus requiring no AMP. Original LRA Tables 3.5.2.A-2, 3.5.2.A-6, and 3.5.2.A-11 also list fasteners (wrought austenitic stainless steel) exposed to air as having no aging effect, thus requiring no AMP. However, because sustained exposure to a chemically aggressive or acidic outside air environment might age these components the staff requested that the applicant provide the past operating/inspection experience with aging management of the components and justify the applicant's position that no AMP is needed during the period of extended operation.

In its response by letter dated January 10, 2005, the applicant stated that the review of NMP plant-specific operating experience for degradation of wrought austenitic stainless steel structural steel and fasteners in air identified no such degradation; thus, there have been no events identifying AERMs for wrought austenitic stainless steel in air requiring an AMP for their management. The applicant further stated that because there is no environment to which the stainless steel components in question could be exposed for extended periods of time that would result in an AERM and because such an environment, if one could be postulated, would be abnormal and very short-term compared to the current licensing period and the period of extended operation its consideration for license renewal would not be warranted. The applicant asserted that for these reasons the exclusion of any AERMs for these material/environment combinations is justified.

The staff's review found the applicant's response to RAI 3.5.A-15 acceptable based on operating experience justification. Therefore, the staff's concern described in RAI 3.5.A-15 is resolved. This information is reflected in the ALRA.

The staff's review concludes that the applicant had identified adequately no aging effects requiring no AMPs to manage them for the NMP1 offgas building components not addressed by the GALL Report and that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.7 Structures and Component Supports NMP1 Radwaste Solidification and Storage Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-7

The staff initially reviewed the original LRA Table 3.5.2.A-7, which summarizes the results of AMR evaluations for the radwaste solidification and storage building component groups.

In RAI 3.5.A-13 dated December 9, 2004, the staff noted that Tables 3.5.2.A-1, 3.5.2.A-2, and 3.5.2.A-7 list the AMR results for polymers in air and treated water. Both the 10 CFR 50 Appendix J Program and the ASME Section XI Inservice Inspection Program (Subsection IWE) are credited with managing the aging effects of polymers. For NMP1 Category I structures the original LRA does not indicate that polymers (e.g., compressive joints and seals, elastomer sealer or caulking material, fibre, forms, and resin sealing compound, etc.) exposed to soil, ground water or other aggressive environments are within the scope of license renewal requiring aging effect management during the period of extended operation. Therefore, the staff requested that the applicant provide a basis for their exclusion and also the AMR results for these polymer materials exposed to the soil, ground water, or other aggressive environments.

In its letter dated January 10, 2005, the applicant responded that there are no in-scope polymers (e.g., compressive joints and seals, elastomer sealer or caulking material, fiber, forms and resin sealing compound, etc.) in the NMP1 primary Containment, Reactor Building, or Radwaste Building exposed to soil, ground water, or aggressive environments requiring aging management during the period of extended operation. This is reflected in the original LRA Sections 2.4.A.1, 2.4.A.2, 2.4.A.8, 3.5.2.A.1, 3.5.2.A.2, and 3.5.2.A.7 and in Tables 2.4.A.1-1, 2.4.2.A.2-1, 2.4.A.8-1, 3.5.2.A-1, 3.5.2.A-2, and 3.5.2.A-7.

The staff's review found the applicant's response to RAI 3.5.A-13 acceptable because of the assertion that there are no in-scope polymers in the NMP1 primary containment, reactor building, or radwaste building exposed to soil, ground water, or aggressive environments. Therefore, the staff's concern described in RAI 3.5.A-13 is resolved. This information is reflected in the ALRA.

On the basis of its review, the staff therefore, concludes that the applicant had identified adequately no aging effects and no AMPs required to manage them for the NMP1 radwaste solidification and storage building components not addressed by the GALL Report and that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)

3.5A.2.3.8 Structures and Component Supports NMP1 Screen and Pump House Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-8

The staff reviewed ALRA Table 3.5.2.A-8, which summarizes the results of AMR evaluations for the screen and pump house building component groups.

The staff reviewed the information in ALRA Table 3.5.2.A -8 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 screen and pump house building components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 Screen and Pump House Building components acceptable.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 screen and pump house building components not addressed by the GALL Report so that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.9 Structures and Component Supports NMP1 Turbine Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-9

The staff reviewed ALRA Table 3.5.2.A-9, which summarizes the results of AMR evaluations for the turbine building component groups.

The staff reviewed the information in ALRA Table 3.5.2.A -9 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 turbine building components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 turbine building components acceptable.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 turbine building components that are not addressed by the GALL Report so that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.10 Structures and Component Supports NMP1 Vent Stack – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-10

The staff reviewed ALRA Table 3.5.2.A-10, which summarizes the results of AMR evaluations for the vent stack component groups, and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 vent stack components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 Vent Stack components acceptable.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 vent stack components not addressed by the GALL Report so that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.11 Structures and Component Supports NMP1 Waste Disposal Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.A-11

The staff reviewed the information in ALRA Table 3.5.2.A-11 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 waste disposal building components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 Waste Disposal Building components acceptable.

On the basis of its review, the staff concludes that there is reasonable assurance that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 waste disposal building components not addressed by the GALL Report so that intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.12 Structures and Component Supports: Component Supports – Summary of Aging Management Evaluation – ALRA Table 3.5.2.C-1

The staff initially reviewed the original LRA Table 3.5.2.C-1, which summarizes the results of AMR evaluations for the component supports component groups for both NMP1 and NMP2.

In RAI 3.5.A-6 dated December 9, 2004, the staff requested that the applicant justify not including aging management of Class MC supports in Table 3.5.2.C-1 and in AMP B2.1.25, noting that the original LRA Table 3.5.2.C-1 and AMP B2.1.25 did not address AMR of Class MC supports. The GALL Report, Section XI.S3, recommends the use of Subsection IWF for examination of MC component supports. The staff requested the applicant to provide information on the results of the AMR for (1) MC component supports within the NMP1 containment (including the supports submerged in water), (2) MC component supports outside the containments (i.e., drywell and torus), and (3) supports for piping penetrating through the containments designated as MC piping (if any). Furthermore, the staff asked the applicant to summarize the programs to be used for managing the aging effect of these supports, including sample size, inspection frequency, personnel qualifications, etc.

The applicant's response to RAI 3.5.A-6, dated January 10, 2005, and its resolution are provided in SER Section 3.5A.2.3.1.

The staff reviewed the information in ALRA Table 3.5.2.C-1 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 component supports component groups components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 Waste Disposal Building components acceptable.

On the basis of its review, the staff concludes that there is reasonable assurance that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 component supports component groups components not addressed by the GALL Report so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.2.3.13 Structures and Component Supports Fire Stops and Seals – Summary of Aging Management Evaluation – ALRA Table 3.5.2.C-2

The staff reviewed ALRA Table 3.5.2.C-2, which summarizes the results of AMR evaluations for the fire stops and seals component groups.

The staff reviewed the information in ALRA Table 3.5.2.C-2 and determined that the applicant had identified adequately applicable aging effects and the AMPs credited with managing them for the NMP1 fire stops and seals component groups components not addressed by the GALL Report. The staff found the applicant's AMR results for NMP1 fire stops and seals component groups components acceptable.

The staff's review concludes that the applicant had identified adequately the aging effects and the AMPs credited with managing them for the NMP1 fire stops and seals component groups components not addressed by the GALL Report so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a).

3.5A.3 Conclusion

The staff concludes that there is reasonable assurance that the applicant has provided sufficient information to demonstrate that the effects of aging for the NMP1 structures and component supports components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program summaries and concludes that they adequately describe the AMPs credited with managing aging of the structures and component supports as required by 10 CFR 54.21(d).

3.5B NMP2 Aging Management of Structures and Component Supports

This section of the SER documents the staff's review of the applicant's AMR results for the structures and component supports components and component groups associated with the following NMP2 systems, structures, and commodities:

- primary containment structure
- reactor building
- auxiliary service building
- control room building
- diesel generator building
- essential yard structures
- fuel handling system
- main stack
- material handling system
- radwaste building
- screenwell building
- standby gas treatment building
- turbine building
- component supports commodity
- fire stops and seals commodity

3.5B.1 Summary of Technical Information in the Amended Application

In ALRA Section 3.5, the applicant provided AMR results for the structures and component supports components and component groups. In ALRA Table 3.5.1.B, "NMP2 Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapter II and III of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the structures and component supports components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.5B.2 Staff Evaluation

The staff reviewed ALRA Section 3.5 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the structures and component supports components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit evaluation are documented in the Audit and Review Report, dated January 18, 2006, and are summarized in SER Section 3.5B.2.1.

In the onsite audit, the staff also selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.5.2.2. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.5B.2.2.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the Audit and Review Report and are summarized in SER Section 3.5B.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.5B.2.3.

Finally, the staff reviewed the AMP summary descriptions in the USAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the structures and component supports components.

Table 3.5B-1 below provides a summary of the staff's evaluation of NMP2 components, aging effects and aging effects mechanisms, and AMPs listed in ALRA Section 3.5, that are addressed in the GALL Report.

Table 3.5B-1 Staff Evaluation for NMP2 Structures and Component Supports in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Common Components of All Types of PWR and BWR Containment				
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1.B-01)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1.B-02)	Cracking for cyclic loading; crack initiation and growth from SCC	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends further evaluation (See Section 3.5B.2.2.1)
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1.B-03)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1.B-04)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1.B-05)	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanism	Containment leak rate test and Plant Technical Specifications	10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Seals, gaskets, and moisture barriers (Item Number 3.5.1.B-06)	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and Containment leak rate test	10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1) ISI not required, no moisture barriers
BWR Concrete (Mark II and III) Containment and Steel (Mark I, II, and III) Containment (Note: NMP2 has a Mark II Containment)				

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Concrete elements: foundation, walls, dome (Item Number 3.5.1.B-07)	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI	ASME Section XI Inservice Inspection (Subsection IWL) Program (B2.1.24)	Not applicable (See Section 3.5B.2.2.1) However, applicant chose to monitor with ISI Program
Concrete elements: foundation (Item Number 3.5.1.B-08)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	Structures Monitoring Program (B2.1.28)	Not applicable (See Section 3.5B.2.2.1) However, applicant chose to monitor with Structures Monitoring Program
Concrete elements: foundation (Item Number 3.5.1.B-09)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	None	Not applicable (See Section 3.5B.2.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.B-10)	Reduction of strength and modulus due to elevated temperature	Plant-specific	None	Not applicable (See Section 3.5B.2.2.1)
Prestressed containment: tendons and anchorage components (Item Number 3.5.1.B-11)	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA, evaluated in accordance with 10 CFR 54.21(c)	None	Not applicable (See Section 3.5B.2.2.1)
Steel elements: liner plate, containment shell (Item Number 3.5.1.B-12)	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends further evaluation (See Section 3.5B.2.2.1)
Steel elements: vent header, drywell head, torus, downcomers, pool shell (Item Number 3.5.1.B-13)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis
Steel elements: protected by coating (Item Number 3.5.1.B-14)	Loss of material due to corrosion in accessible areas only	Protective coating monitoring and maintenance	None	Not applicable No credit for coatings taken

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Prestressed containment: tendons and anchorage components (Item Number 3.5.1.B-15)	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	None	Not applicable. PWR only
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.B-16)	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	None	Not applicable NMP2 primary containment is enclosed (protected) by reactor building and does not have an independent foundation
Steel elements: vent line bellows, vent headers, downcomers (Item Number 3.5.1.B-17)	Cracking due to cyclic loads or Crack initiation and growth due to SCC	Containment ISI and Containment leak rate test	ASME Section XI Inservice Inspection (Subsection IWE) Program (B2.1.23), 10 CFR 50 Appendix J Program (B2.1.26)	Consistent with GALL, which recommends further evaluation (See Section 3.5B.2.2.1)
Steel elements: Suppression chamber liner (Item Number 3.5.1.B-18)	Crack initiation and growth due to SCC	Containment ISI and Containment leak rate test	None	Not applicable No SCC environment
Steel elements: drywell head and downcomer pipes (Item Number 3.5.1.B-19)	Fretting and lock up due to wear	Containment ISI	None	Not applicable No fretting or wear for these components
Class I Structures				
All Groups except Group 6: accessible interior/exterior concrete & steel components (Item Number 3.5.1.B- 20)	All types of aging effects	Structures Monitoring	Structures Monitoring Program (B2.1.28)	Consistent with GALL, which recommends no further evaluation (See Sections 3.5B.2.1 and 3.5B.2.2.2)
Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation (Item Number 3.5.1.B-21)	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant-specific	Structures Monitoring Program (B2.1.28)	Not applicable (See Section 3.5B.2.2.2)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Group 6: all accessible/ inaccessible concrete, steel, and earthen components (Item Number 3.5.1.B-22)	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of Water-Control Structures or FERC/US Army Corps of Engineers dam inspection and maintenance	Structures Monitoring Program (B2.1.28)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1) Inspections of water control structures is part of the Structures Monitoring Program
Group 5: liners (Item Number 3.5.1.B-23)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Water Chemistry Program and Monitoring of spent fuel pool water level	Water Chemistry Control Program (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1.1)
Groups 1-3, 5, 6: all masonry block walls (Item Number 3.5.1.B- 24)	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry Wall	Masonry Wall Program (B2.1.27)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Groups 1-3, 5, 7-9: foundation (Item Number 3.5.1.B-25)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	None	Not applicable (See Section 3.5B.2.2.2)
Groups 1-3, 5-9: foundation (Item Number 3.5.1.B-26)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	None	Not applicable (See Section 3.5B.2.2.2)
Groups 1-5: concrete (Item Number 3.5.1.B-27)	Reduction of strength and modulus due to elevated temperature	Plant-specific	None	Not applicable (See Section 3.5B.2.2.2)
Groups 7, 8: liners (Item Number 3.5.1.B-28)	Crack Initiation and growth due to SCC; Loss of material due to crevice corrosion	Plant-specific	None	Not applicable No tank liners within scope
Component Supports				

Component Group	Aging Effect/ Mechanism	AMP In GALL Report	AMP In ALRA	Staff Evaluation
All Groups: support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc. (Item Number 3.5.1.B-29)	Aging of component supports	Structures Monitoring	Structures Monitoring Program (B2.1.28)	Consistent with GALL, which recommends no further evaluation (See Sections 3.5B.2.1.2 and 3.5B2.2.3)
Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds (Item Number 3.5.1.B-30)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4
All Groups: support members: anchor bolts, welds (Item Number 3.5.1.B-31)	Loss of material due to boric acid corrosion	Boric acid corrosion	None	Not applicable, PWR only
Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolators (Item Number 3.5.1.B-32)	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI	ASME Section XI Inservice Inspection (Subsection IWF) Program (B2.1.25)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Group B1.1: high strength low-alloy bolts (Item Number 3.5.1.B-33)	Crack initiation and growth due to SCC	Bolting integrity	Bolting Integrity Program (B2.1.36)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)

The staff's review of the NMP2 component groups followed one of several approaches. One approach, documented in SER Section 3.5B.2.1, discusses the staff's review of the AMR results for components in the structures and component supports that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.5B.2.2, discusses the staff's review of the AMR results for components in the structures and component supports that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.5B.2.3, discusses the staff's review of the AMR results for components in the structures and component supports that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the structures and component supports components is documented in SER Section 3.0.3.

3.5B.2.1 AMR Results That Are Consistent with the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Sections 3.5.2.B and 3.5.2.C, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the structures and component supports components:

- Water Chemistry Control Program
- Boraflex Monitoring Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Fire Protection Program
- ASME Section XI Inservice Inspection (Subsection IWE) Program
- ASME Section XI Inservice Inspection (Subsection IWL) Program
- ASME Section XI Inservice Inspection (Subsection IWF) Program
- 10 CFR 50 Appendix J Program
- Masonry Wall Program
- Structures Monitoring Program
- Bolting Integrity Program
- Protective Coating Monitoring and Maintenance Program

Staff Evaluation. In ALRA Tables 3.5.2.B-1 through 3.5.2.B-13 and Tables 3.5.2.C-1 and 3.5.2.C-2, the applicant provided a summary of AMRs for the structures and component supports components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant had claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes indicate how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicate that the AMR is consistent with the GALL Report.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR line item, although different from, is consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the Audit and Review Report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.5B.2.1.1 Crack Initiation and Growth Due to SCC; Loss of Material Due to Crevice Corrosion

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.B-2, for the liners component type and cracking aging effect and aging effect mechanism, the GALL Report, Volume 2 line item shown is Item III.A5.2-b with ALRA Table 3.5.1.B, Item 3.5.1.B-23. In the table, Note D indicates that the component is different from the GALL Report line item. As documented in the Audit and Review Report, the staff requested that the applicant explain how this AMR line item component is different from the GALL Report when GALL Report Item III.A5.2-b is also for the component liners.

By letter dated December 1, 2005, the applicant stated that the note referenced should be Note B instead of Note D. The reference would be to Note A, except that the AMP shown takes exceptions to the GALL Report AMP. The applicant further stated that ALRA Table 3.5.3.B-2 was revised to change Note D to Note B for all AMR line item component liners with a cracking aging effect and aging effect mechanism.

The staff reviewed the applicant's response and found that the correction of Note D to Note B is acceptable because the proper note was assigned to this AMR line item.

On the basis of its review, the staff found that the applicant had appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

3.5B.2.1.2 Aging of Component Supports

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.B-2, for the expansion/grouted anchors component type and the loss of anchor capacity aging effect and aging effect mechanism, the GALL Report, Volume 2 line item shown is Item III.B1.2.3-a with ALRA Table 3.5.1.B, Item 3.5.1.B-29. The environment shown is concrete and the note states that it is consistent with the GALL Report. As documented in the Audit and Review Report, the staff requested that the applicant to explain how this AMR line item was consistent with the GALL Report when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment, and an aging effect and aging effect mechanism of reduction in anchor capacity. The logic of this AMR line item was not consistent with the GALL Report. This also applies to ALRA Tables 3.5.2.B-4, 3.5.2.B-5, 3.5.2.B-6, 3.5.2.B-8, 3.5.2.B-10, 3.5.2.B-11, and 3.5.2.B-13 for the component type of expansion/grouted anchors. The staff also requested that the applicant explain why, for ALRA Table 3.5.2.B-11 component type expansion/grouted anchors (wrought austenitic stainless steel) in raw water, ALRA Table 3.5.1.A, Item 3.5.1.A-29 was shown with a NMP2 component.

By letter dated December 1, 2005, the applicant stated that it made the ALRA consistent with the GALL Report for all of the expansion/grouted anchor AMR line items listed above. For all the AMR line items above, except in ALRA Table 3.5.2.B-11, the ALRA current line for carbon steel in concrete was revised. In its place, the component type is changed to concrete surrounding anchor bolts, the material of carbon steel was replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the lines will remain as they are currently displayed. For ALRA Table 3.5.2.B-11, the ALRA current line for wrought austenitic stainless steel in concrete was revised. In its place, the component type was changed to concrete surrounding anchor bolts, the material of wrought austenitic stainless steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with raw water and the rest of the line will remain as currently displayed except for the GALL Report item note and Table 1 line item. The ALRA Table 3.5.1.A, Item 3.5.1.A-29 was an error and the applicant revised the cell in the table to be blank. The cell for the GALL Report item is also blank and the note is changed to Note G. The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity, per the GALL Report; however, it is intended that these terms have the same meaning.

The staff reviewed the applicant's response and found that, after revision of the applicant's AMR line items as described above, these line items for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) are consistent with the GALL Report and are, therefore, acceptable.

On the basis of its review, the staff found that the applicant had appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.B-11, for component type expansion/grouted anchors (carbon and low alloy steel in air) and aging effect and aging effect mechanism loss of anchor capacity, the GALL Report, Volume 2 line item shown is Item III.B1.2.3-a with Table 3.5.1.B, Item 3.5.1.A-29. However, no environment was shown and the note states that it is consistent with the GALL Report. As documented in the Audit and Review Report, the staff requested that the applicant explain how this AMR line item was consistent with the GALL Report when the GALL Report line item had a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment and an aging effect and aging effect mechanism of reduction in anchor capacity. The logic of this AMR line item was not consistent with the GALL Report. Also, the staff requested that the applicant explain why the ALRA Table 3.5.1.B line item shown is Item 3.5.1.A-29 instead of Item 3.5.1.B-29.

By letter dated December 1, 2005, the applicant stated that it made the ALRA consistent with the GALL Report for the expansion/grouted anchor AMR line item listed above. The ALRA current line for carbon steel with no environment shown was revised. In its place, the component type was changed to concrete surrounding anchor bolts, the material of carbon steel is replaced with concrete (new line with the current line that starts with concrete), the missing environment was replaced with air and the rest of the line remains as currently displayed, except the Table 1 entry. The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report; however, it is intended that these terms have the same meaning. The Table 1 entry of Item 3.5.1.A-29 was an error and was revised to Item 3.5.1.B-29.

The staff reviewed the applicant's response and found that after revision of the applicant's AMR line item as described above, this line item for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) is consistent with the GALL Report and is therefore acceptable. The staff also found the correction of the reference to ALRA Table 3.5.1.B, Item 3.5.1.B-29 appropriate.

On the basis of its review the staff found that the applicant had appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

As documented in the Audit and Review Report, the staff noted that in ALRA Table 3.5.2.C-1, for the component type expansion/grouted anchors (carbon and low alloy steel in air) and aging effect and aging effect mechanism of loss of anchor capacity, the GALL Report, Volume 2 line item shown is Item III.B1.2.3-a with the Table 1 line items shown as Items 3.5.1.A-29 and 3.5.1.B-29. The environment shown is concrete and the note states that it is consistent with the GALL Report. As documented in the Audit and Review Report, the staff requested that the applicant explain how this AMR line item is consistent with the GALL Report, when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment and an aging effect and aging effect mechanism of reduction in anchor capacity. The logic of this AMR line item was not consistent with the GALL Report. This also applies to ALRA Table 3.5.2.C-1 for component type expansion/grouted anchors (wrought austenitic stainless steel in air).

By letter dated December 1, 2005, the applicant stated that it made the ALRA consistent with the GALL Report for all of its expansion/grouted anchor AMR line items listed above. For the AMR line item for expansion/ grouted anchors on Table 3.5.2.C-1 (Page 3.5-126) above, the

ALRA current line for carbon steel in concrete was revised. In its place, the component type was changed to concrete surrounding anchor bolts, the material of carbon steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the line remains as currently displayed. For the AMR line item for expansion/ grouted anchors on Table 3.5.2.C-1 (Page 3.5-127) above, the ALRA current line for wrought austenitic stainless steel in concrete was revised. In its place, the component type was changed to concrete surrounding anchor bolts, the material of wrought austenitic stainless steel was replaced with concrete (new line with the current line that starts with concrete), the environment of concrete was replaced with air and the rest of the line remains as currently displayed except the Table 1 line items. The Table 1 item should be Item 3.5.1.B-29 only since the line is for NMP2 only. The lines for aging management by the ASME Section XI IWF remain as they are currently entered on ALRA Table 3.5.2.C-1 (Pages 3.5-126 and 3.5-127). The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report; however, the applicant intended that these terms have exactly the same meaning.

The staff reviewed the applicant's response and found that after revision of the applicant's AMR line items, as described above, these line items for the component expansion/grouted anchor are consistent with the GALL Report and are therefore acceptable.

On the basis of its review, the staff found that the applicant had appropriately addressed the aging effect and aging effect mechanism, as recommended by the GALL Report.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant had demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Amended Application. In Section 3.5.2.C of its letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the structures and component supports components. The applicant provided information concerning how it will manage the following aging effects:

BWR Containment:

- aging of inaccessible concrete areas
- cracking, distortion, and increase in component stress level due to settlement; reduction of foundation strength due to erosion of porous concrete subfoundations, if not covered by structures monitoring program
- reduction of strength and modulus of concrete structures due to elevated temperature

- loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate
- loss of prestress due to relaxation, shrinkage, creep, and elevated temperature
- cumulative fatigue damage
- cracking due to cyclic loading and SCC

Class I Structures:

- aging of structures not covered by structures monitoring program
- aging management of inaccessible areas

Component Supports:

- aging of supports not covered by structures monitoring program
- cumulative fatigue damage due to cyclic loading

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant had claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.5.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.5B.2.2.1 BWR Containments

The staff reviewed Section 3.5.2.C.1 of its letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1, which addresses several areas discussed below.

Aging of Inaccessible Concrete Areas. The staff reviewed Section 3.5.2.C.1.1 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.1.

In Section 3.5.2.C.1.1 of its letter dated August 19, 2005, the applicant addressed aging of inaccessible concrete areas in BWR containments.

SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments; BWR Mark II concrete containments; and Mark III concrete and steel containments. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects and aging effects mechanisms for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

In Section 3.5.2.C.1.1 of its letter dated August 19, 2005, the applicant stated that, for NMP2, the aging of inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel are not significant for concrete components of the primary containment structure. The concrete was designed in accordance with

ACI 318-71 and ACI 318-77 and constructed in accordance with ACI 301, which meets the intent of ACI 201.2R-77. This ensures a durable concrete that is dense, well-cured, has low permeability, and for which cracking is well controlled. Additionally, NMP2 is not exposed to aggressive ground water. As part of the Structures Monitoring Program, a regularly scheduled ground water monitoring will be implemented to ensure that a benign environment is maintained.

In addition, in letter dated August 19, 2005, the applicant stated that, although evaluated as not significant, NMP2 credits the ASME Section XI Inservice Inspection (IWL) Program to monitor for aging of inaccessible concrete areas. Inaccessible concrete areas are compared against accessible concrete areas with similar environments. If warranted, additional inspections are performed. The staff reviewed the applicant's ASME Section XI Inservice Inspection (IWL) Program; the staff's evaluation is documented in SER Section 3.0.3.2.18.

On the basis of its audit and review, the staff found that cracking, spalling and increases in porosity and permeability of inaccessible containment concrete due to leaching of calcium hydroxide and aggressive chemical attack; and cracking, spalling, loss of bond, loss of material of inaccessible containment concrete due to corrosion of embedded steel are not plausible aging effects and aging effects mechanisms due to the nonexistence of these aging effect and aging effect mechanisms in accordance with the GALL Report. As documented in the Audit and Review Report, through interviews with the applicant's technical staff and review of applicable documentation, the staff found that the NMP2 concrete containment is designed in accordance with ACI 318 and constructed of concrete using ingredients conforming to ACI and ASTM standards, in accordance with the recommendations of the GALL Report. In addition, ground water sample testing monitoring has demonstrated that an aggressive environment does not exist at NMP2 for inaccessible concrete. NMPNS has demonstrated that aggregates used for containment concrete were in accordance with ACI 301, which meets the intent of ACI 201.2R-77 for good quality concrete. The staff determined that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for inaccessible containment concrete is not required.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.1. For those line items that apply to Section 3.5.2.C.1.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cracking, Distortion, and Increase in Component Stress Level due to Settlement; Reduction of Foundation Strength due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program. The staff reviewed Section 3.5.2.C.1.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.1.2.

In Section 3.5.2.C.1.2 of its letter dated August 19, 2005, the applicant addressed cracking, distortion, and increase in component stress level due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations in BWR containments.

SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments and BWR Mark II concrete containments and Mark III concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR and BWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included within the scope of the applicant's Structures Monitoring Program.

In Section 3.5.2.C.1.2 letter dated August 19, 2005, the applicant stated that, for NMP2, cracking, distortion, and an increase in component stress level due to settlement is not significant. The primary containment structure is founded on impervious rock. Although evaluated as not significant, NMP2 credits the Structures Monitoring Program to monitor for settlement. NMP2 does not utilize a de-watering system. The staff reviewed the applicant's Structures Monitoring Program; the staff's corresponding evaluation is documented in SER Section 3.0.3.2.21.

In Section 3.5.2.C.1.2 of its letter dated August 19, 2005, the applicant further stated that, for NMP2, reduction of foundation strength due to erosion of porous concrete subfoundation is not applicable. Porous concrete is not utilized in the construction of the primary containment structure.

On the basis of its audit and review, the staff found that cracking, distortion, and increase in component stress level due to containment settlement and reduction of containment foundation strength due to erosion of porous concrete subfoundations are not plausible aging effects and aging effects mechanisms due to the nonexistence of these aging effect and aging effect mechanisms. The applicant stated that the aging effects and aging effects mechanisms due to settlement are not expected at NMP2 for the containment structure since it is founded on impervious rock. In addition, porous concrete was not utilized in the construction of the primary containment structure. The staff determined that an AMP is not required since these aging effect and aging effect mechanisms do not occur at NMPNS. However, the applicant conservatively elected to use its Structures Monitoring Program to monitor for settlement, which the staff found acceptable.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.1.2. For those line items that apply to Section 3.5.2.C.1.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature</u>. The staff reviewed Section 3.5.2.C.1.3 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.3.

In Section 3.5.2.C.1.3 of its letter dated August 19, 2005, the applicant addressed reduction of strength and modulus of concrete structures due to elevated temperature in BWR containments.

SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments and BWR Mark II concrete containments and Mark III concrete and steel containments. The GALL Report recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits [i.e., general area temperature 66 °C (150 °F) and local area temperature 93 °C (200 °F)].

In Section 3.5.2.C.1.3 of its letter dated August 19, 2005, the applicant stated that, for NMP2, reduction of strength and modulus of concrete structures due to elevated temperature is not significant. In the primary containment structure, general area temperatures do not exceed 150 °F and local area temperatures do not exceed 200 °F. These temperatures are not sufficient to result in this aging effect or aging effect mechanism for the applicable components.

The applicant stated, in letter dated August 19, 2005, that, for the NMP2 primary containment, this aging effect and aging effect mechanism are not applicable to NMPNS. The applicant stated that during normal operation, all areas within the containment building do not experience elevated temperatures > 150 °F general and > 200 °F local. Therefore, change in material properties (reduction of strength and modulus of concrete) due to elevated temperature is not an aging effect or aging effect mechanism requiring management for the NMPNS containment concrete. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical staff that operating experience indicates that the containment concrete has never experienced any aging effects and aging effects mechanisms due to elevated temperatures.

On the basis that NMPNS does not have a containment concrete elevated temperature aging effect and aging effect mechanism, the staff found that this aging effect and aging effect mechanism are not applicable to NMPNS.

<u>Loss of Material due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate</u>. The staff reviewed Section 3.5.2.C.1.4 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.4.

In Section 3.5.2.C.1.4 of its letter dated August 19, 2005, the applicant addressed loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate in BWR containments.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of BWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect and aging effect mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

For NMP2, the ASME Section XI Inservice Inspection (IWE) Program is credited for managing aging effects and aging effects mechanisms due to corrosion of accessible primary containment structure carbon steel components comprising the containment pressure boundary. Inaccessible areas are compared against accessible areas with similar environments. If warranted, additional inspections are performed. The staff reviewed the applicant's ASME Section XI Inservice Inspection (IWE) Program; the staff's evaluation is documented in SER Section 3.0.3.2.17.

As documented in the Audit and Review Report, the staff noted that the GALL Report recommends further evaluation of plant-specific programs to manage this aging effect and aging effect mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied. In the GALL Report, Item B1.1.1-a states that, for inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following four specific 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 concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner.

(3) The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements.

(4) Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

The GALL Report states that if any of the four conditions cannot be satisfied, a plant-specific AMP for corrosion is recommended. As documented in the Audit and Review Report, the staff requested that the applicant provide an explanation for how each of the four conditions are satisfied at NMP2. The applicant addressed the four conditions as follows:

(1) NMP2 was designed and constructed with equivalent codes as specified in the GALL Report.

(2) The concrete is monitored in accordance with the applicant's ASME Section XI Inservice Inspection (IWE) and Structures Monitoring Programs.

(3) This condition is not applicable to the NMPNS design.

(4) This condition is not applicable to a BWR design.

On the basis of its audit and review, the staff determined that all of the conditions identified in the GALL Report are satisfied. The applicant stated that the NMP2 containment was designed and constructed with equivalent codes as those specified in the GALL Report. Accessible concrete of the containment structure is monitored for penetrating cracks under the applicant's ASME Section XI Inservice Inspection (IWE) and Structures Monitoring Programs. Operating experience demonstrates that the aging effect and aging effect mechanism of loss of material due to corrosion has not been significant for the NMP2 steel containment shell. The staff found that no additional plant-specific AMP is required to manage inaccessible areas of the steel containment shell.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.1.4. For those line items that apply to Section 3.5.2.C.1.4 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature. The staff reviewed Section 3.5.2.C.1.5 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.5.

The applicant stated, in Section 3.5.2.C.1.5 of its letter dated August 19, 2005, that, for the loss of prestress due to relaxation, shrinkage, creep and elevated temperature in BWR containments, this aging effect and aging effect mechanism are not applicable to NMP2. Prestressed tendons were not utilized in the construction of the primary containment structure for NMP2. As documented in the Audit and Review Report, the staff determined through discussions with the applicant's technical staff that the loss of prestress due to relaxation, shrinkage, creep and elevated temperature in BWR containments does not apply to NMP2 since its primary containment does not contain prestressed tendons.

On the basis that NMP2 does not have any components from this group, the staff found that this aging effect and aging effect mechanism are not applicable to NMP2.

Cumulative Fatigue Damage. In Section 3.5.2.C.1.6 of its letter dated August 19, 2005, the applicant stated that fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.6 documents the staff's review of the applicant's evaluation of this TLAA.

Cracking due to Cyclic Loading and SCC. The staff reviewed Section 3.5.2.C.1.7 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.1.7.

In Section 3.5.2.C.1.7 of its letter dated August 19, 2005, the applicant addressed cracking due to cyclic loading and SCC in BWR containments.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in all types of PWR and BWR containments. Cracking could also occur in vent line bellows, vent headers and downcomers due to SCC for BWR containments. A visual VT-3 examination would not detect such cracks. The GALL Report recommends further evaluation of the inspection methods implemented to detect these aging effects and aging effects mechanisms.

In Section 3.5.2.C.1.7 of its letter dated August 19, 2005, the applicant stated that, for NMP2, the ASME Section XI Inservice Inspection (Subsection IWE) Program and 10 CFR 50 Appendix J Program are credited for managing cracking due to cyclic loading and SCC of primary containment structure steel components. In addition, an augmented VT-1 visual examination will be performed on containment bellows using enhanced techniques qualified for detecting SCC.

The staff reviewed the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program and 10 CFR 50 Appendix J Program; the staff's evaluations are documented in SER Sections 3.0.3.2.17 and 3.0.3.1.7, respectively.

Based on the applicant's further evaluation, as recommended in the GALL Report for detecting cracking due to SCC, the staff found that the applicant had elected to perform augmented VT-1 visual examinations on containment bellows using enhanced techniques qualified for detecting SCC. The staff found that this is consistent with the GALL Report and is therefore acceptable.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.1.7. For those line items that apply to Section 3.5.2.C.1.7 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2.2 Class I Structures

The staff reviewed Section 3.5.2.C.2 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.2, which addresses several areas discussed below.

Aging of Structures Not Covered by Structures Monitoring Program. The staff reviewed Section 3.5.2.C.2.1 of the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.2.1.

In Section 3.5.2.C.2.1 of its letter dated August 19, 2005, the applicant addressed the aging of all Class I structures which are not covered by the Structures Monitoring Program.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the applicant's structures monitoring program. This includes: (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundation for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the applicant's structures monitoring program.

SRP-LR Section 3.5.2.2.2.1 further states that technical details of the aging management issue are presented in Subsection 3.5.2.2.1.2 for items (5) and (6) and Subsection 3.5.2.2.1.3 for item (8).

In Section 3.5.2.C.2.1 of its letter dated August 19, 2005, the applicant stated that there are no Group 6 structures (water control structures) at NMP2.

In addition, in letter dated August 19, 2005, the applicant stated that aging management of components in accessible areas of Class I structures will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect and aging effect mechanisms: freeze-thaw, leaching of calcium hydroxide, aggressive chemical attack, reaction with aggregates, corrosion of embedded steel, and corrosion of structural steel. The staff reviewed the applicant's Structures Monitoring Program; the staff's corresponding evaluation is documented in SER Section 3.0.3.2.21.

In the letter, the applicant further stated that, for NMP2, cracking, distortion, and an increase in component stress level due to settlement for Group 1-3, 5, 7-9 structures is not significant. Class I structures are founded on impervious rock. Although evaluated as not significant, NMP2 credits the Structures Monitoring Program for monitoring settlement. NMP2 does not utilize a de-watering system.

In the letter, the applicant stated that, for NMP2, reduction of foundation strength due to erosion of porous concrete subfoundation is not applicable since the Class I structures were designed and analyzed to ACI 318-71 and ACI 318-77. Nonetheless, NMP2 manages the aging of these components with the Structures Monitoring Program.

In the letter, the applicant stated that, for NMP2, loss of material due to corrosion of structural steel components for Group 1-5, 7-8 structures is managed by its Structures Monitoring Program. Although the NMP2 vent stack steel components and reactor cavity plug liner are not identified in the GALL Report, these components are also managed by the Structures Monitoring Program.

In addition, the applicant stated in the letter dated August 19, 2005, that for NMP2, loss of strength and modulus of concrete structures due to elevated temperatures for Group 1-5 structures is not significant. In Class I structures, general area temperatures do not exceed 150°F and local area temperatures do not exceed 200°F. These temperatures are not sufficient to result in this aging effect and aging effect mechanism for the applicable components.

Furthermore, in its letter, the applicant stated that, for NMP2, crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures is not applicable. No tank liners were identified as subject to an AMR.

On the basis of its review, the staff found that scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; and loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures are within the scope of license renewal and will be adequately managed by the applicant's Structures Monitoring Program.

As documented in the Audit and Review Report, the staff interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that these aging effects and aging effects mechanisms have not been observed or, when observed, corrective action was taken under the Structures Monitoring Program. The staff determined that the recommendations of the GALL Report have been satisfied and that a plant-specific AMP for these aging effects and aging effects mechanisms for Class I structures is not required.

On the basis of its audit and review, the staff found that reduction of foundation strength due to erosion of porous concrete subfoundations of Groups 1-3, 5,and 7-9 structures is not a plausible aging effect and aging effect mechanism due to the nonexistence of the aging effect and aging effect mechanism. The applicant stated that porous concrete subfoundations were not utilized below the building foundations for Groups 1-3, 5, and 5-9 structures. The staff determined that an AMP is not required since this aging effect and aging effect mechanism does not occur at NMP2. However, the applicant conservatively elected to manage the aging of these components with its Structures Monitoring Program.

The staff found the applicant's further evaluation for elevated temperatures acceptable since change in material properties due to elevated temperatures is an aging effect and aging effect mechanism that does not require management for NMP2 Groups 1-5 Class I structures.

In letter dated August 19, 2005, the applicant stated that the aging effects and aging effects mechanisms of crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for NMP2 Group 7 and 8 structures are not applicable since no tank liners were identified as subject to an AMR. On the basis of its audit and review, the staff determined that no AMP is required for the above aging effects and aging effects mechanisms for stainless steel liners for Group 7 and 8 structures.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.2.1. For those line items that apply to Section 3.5.2.C.2.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Aging Management of Inaccessible Areas. The staff reviewed Section 3.5.2.C.2.2 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.2.2.

In Section 3.5.2.C.2.2 letter dated August 19, 2005, the applicant addressed aging management of inaccessible areas of Class I structures.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects and aging effects mechanisms in inaccessible areas of Groups 1-3, 5, 7-9 structures, if specific conditions defined in the GALL Report cannot be satisfied.

In Section 3.5.2.C.2.2 of its letter dated August 19, 2005, the applicant stated that, for NMP2, cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are not significant. Ground water tests confirm that a below-grade aggressive environment does not exist. Although evaluated as not significant, the applicant credited the Structures Monitoring Program to monitor for aggressive chemical attack and corrosion of embedded steel. A regularly scheduled ground water monitoring program will be implemented to ensure that a benign environment is maintained. The staff reviewed the applicant's Structures Monitoring Program; the staff's corresponding evaluation is documented in SER Section 3.0.3.2.21.

As documented in the Audit and Review Report, the staff determined, through discussions with the applicant's technical staff and review of the ALRA, that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for inaccessible concrete of Class I (Groups 1-3, 5, 7-9) structures is not required for these nonexistent aging effect and aging effect mechanisms.

On the basis that NMPNS does not currently have an aggressive environment aging effect or aging effect mechanism for inaccessible concrete, with regularly scheduled ground water monitoring to be implemented to ensure the below-grade environment remains nonaggressive, the staff determined that these aging effects and aging effects mechanisms (cracking, spalling, increases in porosity and permeability, loss of bond, loss of material) are not applicable to NMPNS Groups 1-3, 5, 7-9 Class I structures.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.2.2. For those line items that apply to Section 3.5.2.C.2.2 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2.3 Component Supports

The staff reviewed Section 3.5.2.C.3 of its letter the applicant's letter dated August 19, 2005, against the criteria in SRP-LR Section 3.5.2.2.3, which addresses several areas discussed below.

Aging of Supports Not Covered by Structures Monitoring Program. The staff reviewed Section 3.5.2.C.3.1 of the applicant's letter dated August 19, 2005 against the criteria in SRP-LR Section 3.5.2.2.3.1.

In Section 3.5.2.C.3.1 of its letter dated August 19, 2005, the applicant addressed aging of component supports not covered by the Structures Monitoring Program.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support aging effect and aging effect mechanism combinations if they are not covered by the applicant's structures monitoring program. This includes: (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports; (2) loss of material due to environmental corrosion, for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the applicant's structures monitoring program.

In Section 3.5.2.C.3.1 of its letter dated August 19, 2005, the applicant stated that aging management of component supports will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect and aging effect mechanism combinations: reduction in concrete anchor capacity due to degradation of the surrounding concrete, loss of material due to environmental corrosion, and reduction/loss of isolation function due to degradation of vibration isolation elements.

The staff found that the applicant's Structures Monitoring Program covers reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1 through B5 supports; loss of material due to environmental corrosion, for Groups B2 through B5 supports; and reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. In accordance with the GALL Report, no further evaluation is required by the applicant and, therefore, no further evaluation has been provided.

The staff found that the applicant included the above aging effect and aging effect mechanism combinations within the scope of the Structures Monitoring Program and agreed that no further evaluation is required. The staff reviewed the applicant's Structures Monitoring Program; the staff's corresponding evaluation is documented in SER Section 3.0.3.2.21. The staff found that the applicant's Structures Monitoring Program is acceptable for managing the above aging effect and aging effect mechanism combinations of component supports for the GALL Report component support Groups B1 through B5, as those combinations are applicable.

Based on the programs identified above, the staff concludes that there is reasonable assurance that the applicant had met the criteria of SRP-LR Section 3.5.2.2.3.1. For those line items that apply to Section 3.5.2.C.3.1 of the applicant's letter dated August 19, 2005, the staff determined that the information in the application is consistent with the GALL Report and the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cumulative Fatigue Damage due to Cyclic Loading. Fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.6 documents the staff's review of the applicant's evaluation of this TLAA.

3.5B.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's Quality Assurance Program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that the applicant had adequately addressed the issues that were further evaluated. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.5.2.B-1 through 3.5.2.B-13 and Tables 3.5.2.C-1 and 3.5.2.C-2, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.5.2.B-1 through 3.5.2.B-13 and Tables 3.5.2.C-1 and 3.5.2.C-2, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and aging effect requiring management does not correspond to a line item in the GALL Report and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.5B.2.3.1 Structures and Component Supports NMP2 Primary Containment Structure – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-1

The staff reviewed ALRA Table 3.5.2.B-1, which summarizes the results of AMR evaluations for the primary containment structure component groups.

The staff's initial review of the original LRA Table 3.5.2.B-1 identified areas in which additional information was necessary. The applicant responded to the staff's RAIs as discussed below.

In RAI 3.5.B-1, dated December 9, 2004, the staff requested that the applicant provide information regarding the aging management of pressure boundary bellows by noting that in item 3.5.1.B-17 of the original LRA Table 3.5.1.B, the applicant identifies that the AMR results are consistent with the GALL Report, with the exceptions described in the ASME Section XI Inservice Inspection (Subsection IWE) Program. The GALL Report, under Item B1.1.1-d recommends further evaluation regarding the SCC of containment bellows. In the discussion of these items with the staff, the applicant asserted that crack initiation and growth due to SCC is not applicable to the NMP2 vent line bellows. The staff also noted that the NMP2 containment does not have vent line bellows. However, in similar environmental conditions, IN 92-20 indicates the existence of thermal growth and SCC of pressure boundary bellows. Therefore, the staff requested that the applicant provide additional information to address the effectiveness of the applicable aging management program(s) that detect (or would detect) degradation of stainless steel bellows in drywell and suppression chamber of the NMP2 containment.

In its response, by letter dated January 10, 2005, the applicant stated that although the penetration sleeves, penetration bellows, and dissimilar metal welds at NMP2 are not normally subjected to conditions that cause cracking due to cyclic loading and crack growth due to stress corrosion cracking, the original LRA will be revised to reflect the recommendations in NUREG-1611, Table 2, Item 12. The recommendations in NUREG-1611 identify stress corrosion cracking as an AERM by examination categories E-B and E-F of the ASME Section XI Inservice Inspection (Subsection IWE) Program (AMP B2.1.23) and by the 10 CFR 50 Appendix J Program (AMP B2.1.26). In addition, per NUREG-1611, an augmented VT-1 visual examination will be performed using enhanced techniques qualified for detecting SCC. This augmented inspection will be included as an enhancement to the ASME Section XI Inservice Inspection (Subsection IWE) Program. The associated revisions to the original LRA are shown in the response to RAI 3.5.A-1, dated January 10, 2005.

The applicant's proposal for revising the original LRA sections is documented in its response to RAI 3.5.A-1. The staff found the applicant's approach of revising the original LRA to incorporate the augmented inspection of the containment pressure retaining bellows in the NMP2 containment acceptable as proposed. A review of the ALRA indicates that the applicant had incorporated the proposed additions. Therefore, the staff's concern described in RAI 3.5.B-1 is resolved.

In RAI 3.5.B-2, dated December 9, 2004, the staff noted that item number 3.5.1.B-06 of original LRA Table 3.5.1.B states that the ASME Section XI Inservice Inspection (Subsection IWE) Program and 10 CFR 50 Appendix J Program are programs for manage aging of seals, gaskets, and moisture barriers. The original LRA Table 3.5.2.B discusses these components under a generic category of polymer in air. However, based on exception taken to the ASME Section XI Inservice Inspection (Subsection IWE) Program, this AMP will not be applicable for aging management of containment seals and gaskets. Therefore, the staff requested that the applicant explain the discrepancy.

Furthermore, the staff noted that, for seals and gaskets of equipment hatches and air-locks at NMP2, the leak rate testing program would monitor the aging degradation of seals and gaskets, as they are leak rate tested after each opening. Therefore, the staff requested that the applicant justify that Type B leak rate testing frequency is adequate for monitoring aging degradation of containment pressure boundary penetrations (mechanical and electrical) with seats and gaskets.

In response, by letter dated January 10, 2005, the applicant provided the following information:

> The inspection of the component type "Polymer in Air" is included in the ASME Section XI Inservice Inspection (Subsection IWE) Program ([original] LRA Section B2.1.23). The exception described in [original] LRA Section B2.1.23

identifies that the Subsection IWE inservice inspection (ISI) program for NMP2 is based on the 1998 Edition of ASME Section XI, rather than the 1992/1995 editions and addenda. This was found acceptable by the NRC in a safety evaluation report dated August 17, 2000. There is no exception taken to the performance of examinations for the subject polymeric components.

The aging management of the electrical penetrations and their associated polymeric components is addressed in the NMPNS [original] LRA supplemental letter NMP1L 1912, dated January 10, 2005. These components are managed by the ASME Section XI Inservice Inspection Program ([original] LRA Section B2.1.23) and the 10 CFR 50 Appendix J Program ([original] LRA Section B2.1.26). The mechanical primary containment penetrations for NMP2 are seal-welded to the liner and do not utilize polymeric seals or gaskets for pressure retention.

NMP2 uses Option B for testing of the containment under 10 CFR 50, Appendix J. Type B testing of containment penetrations follows the guidance provided in RG 1.163 and NEI 94-01. The testing frequency for these components is at least once per 30 months. However, under Option B, the test frequency may be extended to 60 months and then 120 months based upon component testing performance, service conditions and environment, penetration design, and safety impact of penetration failure. For those components with extended testing frequencies, an approximately even distribution is tested during each interval (i.e., 30 months) to minimize the impact of unanticipated random failures and increase the likelihood of detecting common-mode failures. Based on the above attributes, there is reasonable assurance that the Type B testing frequency is adequate for monitoring aging degradation of containment penetrations with seals and gaskets.

Based on its review, the staff found the applicant's response to RAI 3.5.B-2 acceptable. The applicant stated that there are no containment pressure boundary mechanical penetrations with resilient seals and approximately 25 percent of the pressure boundary electrical penetrations are Type B tested every 30 months in a way that would assure that each electrical penetration is Type B tested every 120 months. This is consistent with NEI 94-01 (as endorsed by RG 1.163) allows for 10-year interval for Type B testing, if they meet specific performance criteria. Therefore, the staff's concern described in RAI 3.5.B-2 is resolved. This information is reflected in the ALRA.

In RAI 3.5.B-3, dated December 9, 2004, the staff identified that the applicant is taking exceptions in the ASME Section XI Inservice Inspection (Subsection IWE) Program to preclude examinations of seals, gaskets, and bolting of pressure boundary joint points. Occasional SRV discharges, sustained elevated temperatures (may be < 150 °F), and high humidity, could contribute to degradation of containment pressure boundary. Only Type A leak rate testing and associated visual examination requirements of 10 CFR 50, Appendix J Program could be relied upon to detect defects and degradation of containment pressure boundary joint points. The test interval for Type A leak rate testing could be 10 to 15 years. Based on the above information, the staff requested that the applicant provide information regarding the activities and programs that are used for aging management and functional integrity of these pressure boundary joints for the NMP2 primary containment.

In its response, by letter dated January 10, 2005, the applicant provided the following information:

> The exceptions noted by the NRC for the Containment ISI program ([original] LRA Section B.2.1.23) do not preclude examinations of seals, gaskets, and bolting of pressure boundary joint points. By letter dated October 28, 1999, NMP submitted a relief request (RR-IWE/IWL-1) to the NRC which proposed the use of the 1998 Edition of ASME Section XI, Subsection IWE, in lieu of the 1992 Edition with the 1992 Addenda of Subsection IWE. The use of the 1998 Edition provides more practical requirements for the performance, training, qualification, and scheduling of examinations and provides a uniform set of requirements that eliminates the need for multiple relief requests. The NRC approved the relief request in a safety evaluation report (SER) dated August 17, 2000. As noted in the NRC SER, Examination Category E-D (Seals, Gaskets, and Moisture Barriers) and Examination Category E-G (Pressure Retaining Bolting) were eliminated from the 1998 Code. However, the examination of the pressure retaining bolting and moisture barriers is now included in Examination Category E-A, footnote (1)(d) and Item E1.30, respectively. The NRC also determined that the verification of Containment leak-tight integrity through 10 CFR 50, Appendix J testing provides an adequate method to verify the pressure integrity of bolted connections, seals, and gaskets.
>
> Containment pressure boundary joint points are examined and leak tested every two years in accordance with an NMP2 instrument surveillance procedure. This procedure measures leakage of Type B Appendix J Containment boundaries, which include Containment penetrations whose design incorporates resilient seals, gaskets or sealing compounds, piping penetrations fitted with expansion bellows, electrical penetrations fitted with flexible metal seal assemblies, air lock door seals, and doors with resilient seals or gaskets. This surveillance verifies that the leakage through resilient seals, gaskets, sealant compounds, piping penetrations, and electrical penetrations is maintained within specified values in accordance with the NMP2 Technical Specifications and the NMP2 Appendix J Testing Program Plan.

Based on its review, the staff found the examination process used by the applicant acceptable, as it provides assurance that the containment pressure boundary joints will retain their integrity during the period of extended operation. Therefore, the staff's concern described in RAI 3.5.B-3 is resolved.

In RAI 3.5.B-4, dated December 9, 2004, the staff requested that the applicant provide information regarding the aging management of primary containment liner and inaccessible areas by noting that the NMP2 primary containment structure is a steel lined reinforced concrete structure. The original LRA item 3.5.1.B-12, related to the primary containment liner, states that "Inaccessible areas are compared against accessible areas and where warranted, additional inspections are performed." Therefore, the staff requested that the applicant: (1) describe the operating experience related to the liner corrosion in the accessible, as well as inaccessible areas; (2) provide acceptance criteria used when the liner is left without repair; and (3) provide information regarding any augmented inspections that had been implemented as required by IWE-1240. Furthermore, the staff requested that the applicant provide this information for containment wall liner in drywell and suppression chamber, barrier slab liners, and for the liners above the insulation concrete.

In its response, by letter dated January 10, 2005, the applicant provided the following information:

> The NMP2 primary containment liner is comprised of the drywell and suppression pool liners. The AERM associated with [the original] LRA Table Item 3.5.1.B-12, "Primary Containment (BWR)," is addressed in the ASME Section XI Inservice Inspection (Subsection IWE) Program (original LRA Section B2.1.23). As stated in [the original] LRA Section B2.1.23, both industry and NMP plant-specific operating experience relating to the IWE ISI Program was reviewed.
>
> (1) The review of plant-specific operating experience revealed no deficiencies adjacent to inaccessible areas that warranted further evaluation. As a result of the latest inspection, the liner was found to be in good to excellent condition. The IWE inspections noted the existence of minor areas of surface corrosion and degraded coatings on the liner. Since the noted corrosion was very minor in nature, there was no structural integrity impact as a result of the corrosion. The degraded coatings were addressed via the NMPNS CAP.
>
> (2) For acceptance for continued service, components must comply with the rules of Article IWE-3000, which provides acceptance standards for components of steel containments and liners of concrete containments. For the containment steel shell or liner, material loss exceeding 10 percent of the nominal containment wall thickness, or material loss that is projected to exceed 10 percent of the nominal containment wall thickness before the next examination, must be documented. Such areas where conditions exceed this acceptance criteria are either: (1) subjected to a further detailed visual examination, (2) submitted to engineering for an acceptance evaluation, or (3) corrected by repair or replacement, in accordance with IWE-3000, IWE-3122, and 10 CFR 50.55a.
>
> (3) Containment surface areas requiring augmented examination are identified in Table IWE-2500-1, Examination Category E-C, which are those required by IWE-1240. When required, augmented ultrasonic examinations will be performed on Class MC components. These augmented exams will be performed and accepted to the requirements of the 1998 Edition of ASME Section XI, Subsection IWE. Detailed visual examinations of surface areas are identified by IWE-1242. The extent of examination shall be 100 percent for each inspection period until the areas examined remain essentially unchanged for the next inspection period. No augmented examinations have been identified for NMP2.
>
> (4) A general inspection of the suppression pool from the platform found the area to be in excellent condition. Platform beams located above the drywell floor were

found to be in excellent condition. The containment liner, reactor pedestal liner, and pre-cast concrete beam liner appeared to be in excellent condition.

Based on description of the process used by the applicant in identifying corrosion of liner and areas of augmented inspection, the staff found that the aging management of the NMP2 primary containment is acceptable. Therefore, the staff's concern described in RAI 3.5.B-4 is resolved.

In RAI 3.5.B-5 dated December 9, 2004, the staff requested that the applicant provide information regarding the aging management of the concrete and steel structures inside the primary containment. The staff noted that original LRA Table 3.5.2.B does not address load resisting reinforced concrete and steel structures within the drywell and suppression pool. These structures are likely to be subjected to high temperatures, water environment, and very limited accessibility (it is not clear, if the inside surfaces of pedestals are accessible). Therefore, the staff requested that the applicant provide the following information related to these structures:

- the range of actual temperatures recorded in the drywell, inner suppression pool, and outer suppression pool
- a summary of the results of the last inspections performed on the RPV pedestal (inside and outside), the star truss, and the reactor support skirt and its anchorages in the pedestal concrete

In its response by letter dated January 10, 2005, the applicant provided the following information:

> The normal operating temperature for the drywell is less than 150 °F. The average drywell air temperature is maintained between 100 °F and 150 °F by the Drywell Cooling System.
>
> The normal operating temperature for the suppression pool is less than 111 °F. The suppression pool air temperature is maintained less than 111 °F and the water temperature is maintained less than 85 °F. If either of these values is reached, suppression pool cooling is placed in service.
>
> The results of the last inspections performed on (1) the RPV pedestal (inside and outside), (2) the star truss, and (3) the reactor support skirt and its anchorages in the pedestal concrete, under the existing Structures Monitoring Program, show the structures to be in good condition. There were no instances of degradation reported for these components.

The staff found that the applicant's approach in controlling the drywell and suppression chamber and managing the aging of the structures inside the primary containment acceptable. Therefore, the staff's concern described in RAI 3.5.B-5 is resolved. This information is reflected in the ALRA.

In RAI 3.5.B-6, dated December 9, 2004, the staff requested that the applicant provide justification for not managing the aging of the fasteners and structural steel made of martensitic precipitation hardenable material. The staff indicated that the original LRA Table 3.5.2.C-1 does not address aging effects and AMPs for fasteners and structural steel that are made of martensitic precipitation hardenable material. The staff requested that the applicant discuss the stress corrosion potential of these fasteners and structural steel, considering the hardness of these materials, and that the fasteners are subjected to 100 percent moisture or occasional water environment due to pipe or valve leakage. In addition, the staff requested that the applicant provide the operating experience related to these items at NMP2.

In its response, by letter dated January 10, 2005, the applicant provided the following information:

> [Original] LRA Table 3.5.2.C-1 identifies structural steel (precipitation hardenable) in air (for NMP2 only) with no aging effect requiring management. The structural steel material is SA-564, Grade 630 (17-4PH). Precipitation hardened stainless steels contain alloying elements that form strengthening precipitates (particles) when heat treated for a specified time period, allowing these alloys to be hardened by heat treatment. Alloy 17-4PH is strengthened by forming martensite and by precipitation hardening. For nuclear applications, the typical minimum specified tempering temperature for SA-564, Grade 630 (17-4PH) is 1100°F, resulting in a yield strength of approximately 115 ksi. Throughout NMP2, the structural steel is in-scope for LR due to two intended functions: (1) structural support for NSR and (2) structural/functional support. The structural steel provides no safety-related functions for NMP2. For stress corrosion cracking to occur, significant moisture must be present. Martensitic, precipitation hardenable stainless steels are susceptible to stress corrosion cracking in most waters. However, stress corrosion cracking will not occur at temperatures < 140 °F even in a moist or occasionally wet environment. Many of the component supports are for HVAC equipment with the structural steel exposed to indoor air in various plant buildings, which will not see temperatures ≥ 140 °F. In addition, susceptibility to stress corrosion cracking increases with increasing yield strength, with most failures occurring at yield strengths ≥ 140 ksi. Since the yield strength of SA-564, Grade 630 (17-4PH) is approximately 115 ksi, it is very unlikely that stress corrosion cracking will occur. A review of the operating experience for NMP2 for the stress corrosion cracking of martensitic, precipitation hardenable stainless steels found no instances of this occurring.

Based on its review, the staff found the applicant's response to RAI 3.5.B-6 acceptable as the staff agrees that SCC of the components made from the martensitic precipitation hardenable stainless steels used at NMP2 is unlikely and that the applicant's position is consistent with the GALL Report. Therefore, the staff's concern described in RAI 3.5.B-6 is resolved.

In RAI 3.5.B-7, dated December 9, 2004, the staff noted that the original LRA Table 3.5.2.C-1 and the ASME Section XI Inservice Inspection (Subsection IWF) Program do not address aging management review related to Class MC supports. GALL Report Section XI.S3 recommends the use of Subsection IWF for examination of supports of MC components. Therefore, the staff requested that the applicant provide the results of the aging management review for: MC component supports within the NMP2 containment (including the supports submerged in water) and supports for piping penetrating through the containments designated as MC piping (if any). Furthermore, the staff requested that the applicant provide a summary of AMPs that will be used for managing the aging of these supports, including sample size, inspection frequency, and personnel qualification, etc.

In its response, by letter dated January 10, 2005, the applicant provided the following information:

> Class MC supports are addressed in [the original] LRA Table 3.5.2.C-1. Several line items in the table correspond to NUREG-1801, Volume 2, Item III.B1.3.1-a, which is for loss of material for carbon steel ASME Class MC supports. The description of the scope of the ASME Section XI Inservice Inspection (Subsection IWF) Program in [the original] LRA Section B2.1.25 inadvertently omitted Class MC supports. The [original] LRA will be revised to include Class MC supports in the scope description. The [revisions to the original] LRA are provided in the response to RAI 3.5.A-6 above.
>
> All NMP2 Class MC supports are included in the ASME Section XI Inservice Inspection (Subsection IWF) Program. Class MC supports fall into two component types: (1) "Structural Steel (Carbon and Low Alloy Steel) in Air," and (2) "Structural Steel (Wrought Austenitic Stainless Steel) in Air." Therefore, the only aging effect is loss of material due to general corrosion applicable only to the carbon/low alloy steel supports. NMP2 has no submerged Class MC supports.
>
> All component supports at NMP2 are examined in accordance with the requirements of Code Case N-491-1. The sample size and inspection frequency are as specified in Table 2500-1 of Code Case N-491-1, which requires 100 percent of Class MC supports to be examined each inspection interval, except that for multiple components other than piping, within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined. The examination method is a visual VT-3 examination.
>
> Nondestructive examination personnel at NMP2 are qualified by examination and so certified, in accordance with SNT-TC-1A, per ASME Section XI. Level I and Level II personnel are recertified by qualification examinations every 3 years. Level III personnel are recertified by qualification examinations once every 5 years.

The staff found the applicant's proposal to incorporate the aging management of NMP2 Class MC supports in ALRA Sections A2.1.13, and in B2.1.5 acceptable. A review of the these ALRA sections indicate that the applicant had incorporated the provisions as noted in its response to RAI 3.5A-6. Therefore, the staff's concern described in RAI 3.5.B-7 is resolved.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the primary containment structure components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.2 Structures and Component Supports NMP2 Reactor Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-2

The staff reviewed ALRA Table 3.5.2.B-2, which summarizes the results of AMR evaluations for the reactor building component groups.

The staff's review of the original LRA Table 3.5.2.B-2 identified areas in which additional information was necessary to complete the review. The applicant responded to the staff's RAIs as discussed below.

In RAI 3.5.B-11, dated December 9, 2004, the staff noted that the original LRA Item 3.5.1.B-21 in Table 3.5.1.B and Item 3.5.1.B-07 in Table 3.5.1.B state in the discussion columns that "ground water test data confirm that a below grade aggressive environment does not exist." Therefore, the staff requested that the applicant provide a quantitative summary of NMP2's past ground water test data to support the above assertion and to also to provide, if available, both the phosphate and phosphoric acid contents of the NMP2 ground water.

In its response, by letter dated January 10, 2005, the applicant stated:

> NMP1 and NMP2 are situated adjacent to a very large inland fresh water lake. Groundwater testing is currently performed every six (6) months for the NMP site. No evidence of aggressive ground water (pH<5.5, > 550 ppm chlorides, or sulfates >1500 ppm) has been found at NMP. Groundwater test data is consistently within the acceptable ranges for non-aggressive ground water as defined by NUREG-1801. Results from the ground water tests performed in April and October of 2003 from the two site test wells were as follows: pH 6.79-7.83; chloride 7.7-49 ppm; and sulfate 28-60 ppm. Due to the non-aggressive nature of the subsurface conditions, phosphate and phosphoric acid concentrations have not been part of the chemical analysis.

Based on its review, the staff found the applicant's response to RAI 3.5.B-11 acceptable because the ground water test data fully verify that NMPNS ground water is nonaggressive. Therefore, the staff's concern described in RAI 3.5.B-11 is resolved.

In RAI 3.5.B-8, dated December 9, 2004, the staff stated that in the original LRA Tables 3.5.2.B-2, 3.5.2.B-3, 3.5.2.B-4, 3.5.2.B-5, 3.5.2.B-6, 3.5.2.B-8, 3.5.2.B-10, 3.5.2.B-11, 3.5.2.B-12 and 3.5.2.B-13, the Structures Monitoring Program is credited to manage aging of concrete, concrete lean fill and treated wood in soil (both above and below the GWT), and polymer in soil below the GWT. Since these concrete elements and treated wood are inaccessible because of the presence of soil, the staff requested that the applicant discuss the specific provisions or methods stipulated in the Structures Monitoring Program that will be used to inspect or manage aging of these inaccessible components.

In its response, by letter dated January 10, 2005, the applicant stated:

> NMP [original] LRA Tables 3.5.2.B-2, 3.5.2.B-3, 3.5.2.B-4, 3.5.2.B-5, 3.5.2.B-6, 3.5.2.B-8, 3.5.2.B-10, 3.5.2.B-11, 3.5.2.B-12, and 3.5.2.B-13 credit the Structures Monitoring Program (SMP) to manage aging of concrete, concrete lean fill and treated wood in soil (both above and below the GWT), and polymer in soil below the GWT.
>
> The SMP implementing procedure provides instructions for the performance of inspections of opportunity when the inaccessible surface(s) of a buried structure is excavated or exposed. The use of NMP site-specific characteristics, industry experience data, and/or testing records of items under similar conditions is also employed.

Inspections of accessible areas adjacent to inaccessible areas are also utilized. As an example, the inspection of interior areas below grade can provide indications of degradation for polymer sealing materials if ground water in-leakage is starting to occur. As stated in [the original] LRA Section B2.1.28, enhancements to the SMP will include water tight penetration inspections.

Based on the information provided in the ALRA that no evidence of aggressive ground water has been found at NMPNS and that groundwater test data is consistently within the acceptable ranges for non-aggressive ground water as defined by the GALL Report, the staff found that the applicant's position for managing aging of concrete, concrete lean fill and treated wood in soil and polymer in soil below the GWT is consistent with the applicable staff position and is acceptable. Therefore, the staff's concern described in RAI 3.5.B-8 is resolved.

In RAI 3.5.B-13, dated December 9, 2004, the staff stated that the original LRA Tables 3.5.2.B-2 and 3.5.2.B-6 list aluminum alloys exposed to either air or treated water as items having no aging effects and no AMP is credited to manage their aging. Items such as cable trays, conduits, ducts, and tube tracks that are made of aluminum alloys might be exposed to a chemically aggressive or acidic outside environment resulting in aging of these components. Therefore, the staff requested that the applicant discuss past operating/inspection experience with respect to aging management of the above listed components and justify the NMP2 conclusion that no AMP is needed during the period of extended operation.

In its response, by letter dated January 10, 2005, the applicant stated:

> Cable trays, conduits, ducts, and tube tracks are not constructed of aluminum alloys at NMP2. For NMP2, Aluminum Alloy in Air" is the component type for overpressurization vent panels in the Reactor Building and the phase bus duct enclosure, which is part of Essential Yard Structures. A review of the NMP plant-specific operating experience did not identify any occurrences of degradation of aluminum alloy components in air or treated water. Therefore, no specific aging management program is required.

The staff found that the NMPNS plant-specific operating experience described in the applicant's response is adequate and acceptable. Therefore, the staff's concern described in RAI 3.5.B-13 is resolved.

Information provided by the applicant to the above staff RAIs has been incorporated in the ALRA submitted by letter dated July 14, 2005.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the reactor building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.3 Structures and Component Supports NMP2 Auxiliary Service Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-3

The staff reviewed ALRA Table 3.5.2.B-3, which summarizes the results of AMR evaluations for the auxiliary service building component groups.

The staff's initial review of the original LRA Table 3.5.2.B-3 identified areas in which additional information was necessary. The applicant responded to the staff's RAIs as discussed below.

In RAI 3.5.B-9, dated December 9, 2004, the staff stated that in the original LRA Tables 3.5.2.B-2, 3.5.2.B-4, 3.5.2.B-5, 3.5.2.B-6, 3.5.2.B-8, 3.5.2.B-10, 3.5.2.B-11, 3.5.2.B-13 and 3.5.2.C-1, the Structures Monitoring Program (SMP) is credited to monitor the loss of anchor capacity of expansion/grouted anchors (carbon and low alloy steel) in air. Therefore, the staff requested that the applicant discuss the methods used for checking of anchor bolt torque or bolt tightness to assure that there is no loss of anchor capacity for the above anchors and to ensure that the Structures Monitoring Program will clearly stipulate methods for monitoring the anchor capacity of expansion/grouted anchors.

In its response, by letter dated January 10, 2005, the applicant stated that:

> With respect to [original] LRA Tables 3.5.2.B-2, 3.5.2.B-4, 3.5.2.B-5, 3.5.2.B-6, 3.5.2.B-8, 3.5.2.B-10, 3.5.2.B-11, 3.5.2.B-13, and 3.5.2.C-1, the SMP is credited with monitoring the loss of anchor capacity of expansion/grouted anchors (carbon and low alloy steel) in air. Two AERMs are identified in the [original] LRA and NUREG-1801 for carbon steel expansion or grouted anchors: (1) loss of material due to general corrosion and (2) loss of anchor capacity due to local concrete aging mechanisms. The inspection method to determine if there is a potential for loss of anchor capacity of an expansion or grouted anchor is the identification of concrete degradation local to the anchor. If local concrete degradation is identified, additional inspections may be required as determined by evaluations performed under the NMPNS CAP.
>
> Checking of anchor bolt torque or bolt tightness is not routinely performed unless the potential for loss of anchor capacity due to local concrete aging mechanisms is identified.

The staff found that the methods described in the applicant's response above, for checking of NMPNS expansion anchor bolt to assure that there is no loss of anchor capacity for the anchors, is consistent with the applicable staff position and is acceptable. Therefore, the staff's concern described in RAI 3.5.B-9 is resolved.

In RAI 3.5.B-10, dated December 9, 2004, the staff stated that the original LRA Tables 3.5.2.B-2, 3.5.2.B-7 and 3.5.2.C-1 indicate that no AMP is needed for fasteners/structural steel (wrought austenitic stainless steel exposed to low flow treated water with temperature less than 140°F. GALL Report Section III, Item A5.2.b recommends the use of an appropriate water chemistry program to manage aging of stainless steel liners exposed to water. Therefore, the staff requested that the applicant explain the meaning of the "treated water referred to above and explain the NMP2 criteria (e.g., a water chemistry control program or equivalent used in quality control of the treated water). The staff also requested that the applicant provide information to justify the NMP2 conclusion that no AMP is needed for the listed items subject to the environment stipulated above.

In its response, by letter dated January 10, 2005, the applicant stated:

> NMP will revise [the original] LRA Tables 3.5.2.B-2, 3.5.2.B-7, and 3.5.2.C-1 to include crack initiation and growth due to SCC and loss of material due to crevice corrosion as

an AERM for the following component types: (1) "fasteners (wrought austenitic stainless steel) exposed to low flow treated water with temperature less than 140°F," and (2) "structural steel (wrought austenitic stainless steel) exposed to low flow treated water with temperature less than 140°F," and will credit the Water Chemistry Control Program described in [original] LRA Section B2.1.2. The supplemental letter that NMPNS has previously committed to submit by February 28, 2005 (reference NMPNS letter NMP1L 1902 dated December 21, 2004) will include the above-described table changes.

"Treated water" is defined in the original LRA Table 3.0-1 (footnote on page 3.0-9), as follows:

> The water source is demineralized water that is chemically treated to remove oxygen. Corrosion inhibitors can be added to the water. Administrative limits are placed on dissolved oxygen and contaminants, and in some cases suspended solids. The concentration of contaminants is controlled by a combination of filtration, ion exchangers, or feed-and bleed (dilution) operations.

The staff found that with the applicant's proposed revisions to the affected tables, as discussed above, are adequate and acceptable. Therefore, the staff's concern described in RAI 3.5.B-10 is resolved.

In RAI 3.5.B-12, dated December 9, 2004, the staff stated that the original LRA Table 3.5.2.B-6 credits NMP2's Structures Monitoring Program to manage aging of polymers situated in soil below the ground water table (GWT). Since these polymers are inaccessible, the staff requested that the applicant explain how, and at what frequency, the Structures Monitoring Program is used to manage both the cracking and the loss of strength aging effects of the polymers in soil below the GWT.

In its response, by letter dated January 10, 2005, the applicant stated that:

> The SMP is designed to perform periodic inspections of station structures and structural components to identify degradation and correct conditions prior to loss of function. The periodic inspections are performed on the accessible portions of the structures and structural components. Inspections of accessible areas adjacent to inaccessible areas provide an indirect assessment of the condition of the inaccessible areas. For example, if the inspection of interior areas below grade identifies ground water in-leakage, this condition could be an indication of degradation of polymer sealing materials. In this case, the evaluation of the in-leakage condition would include both the accessible and inaccessible areas and corrective actions would be taken as appropriate.
>
> The SMP also has a specific requirement to inspect inaccessible areas when the opportunity presents itself. When the inaccessible area becomes exposed or excavated, an inspection is performed under the SMP. The parameters monitored and acceptance criteria applied to the inaccessible area are the same as those applied to the accessible areas.

Based upon the above, the SMP provides reasonable assurance that the intended functions of the inaccessible portions of structures and structural components, including polymers below the ground water table, are maintained within the current licensing basis requirements.

The staff found that the applicant's response is consistent with the applicable staff position covering aging management of polymers situated in soil below the GWT and, as such, is acceptable. Therefore, the staff's concern described in RAI 3.5.B-12 is resolved.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the auxiliary service building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.4 Structures and Component Supports NMP2 Control Room Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-4

The staff reviewed ALRA Table 3.5.2.B-4, which summarizes the results of AMR evaluations for the control room building component groups.

The staff reviewed the information provided in ALRA Table 3.5.2.B-4, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Control Room Building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Control Room Building components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the control room building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.5 Structures and Component Supports NMP2 Diesel Generator Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-5

The staff reviewed ALRA Table 3.5.2.B-5, which summarizes the results of AMR evaluations for the diesel generator building component groups.

The staff reviewed the information provided in Table 3.5.2.B -5 of the ALRA, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Diesel Generator Building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Diesel Generator Building components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the diesel generator building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.6 Structures and Component Supports NMP2 Essential Yard Structures – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-6

The staff reviewed ALRA Table 3.5.2.B-6, which summarizes the results of AMR evaluations for the essential yard structures component groups.

The staff reviewed the information provided in Table 3.5.2.B -6 of the ALRA, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Essential Yard Structures components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Essential Yard Structures components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the essential yard structures components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.7 Structures and Component Supports NMP2 Fuel Handling System – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-7

The staff reviewed ALRA Table 3.5.2.B-7, which summarizes the results of AMR evaluations for the fuel handling system component groups.

The staff reviewed the information provided in ALRA Table 3.5.2.B-7, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Fuel Handling System components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Fuel Handling System components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the fuel handling system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.8 Structures and Component Supports NMP2 Main Stack – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-8

The staff reviewed ALRA Table 3.5.2.B-8, which summarizes the results of AMR evaluations for the main stack component groups.

The staff reviewed the information provided in Table 3.5.2.B -8 of the ALRA, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Main Stack components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Main Stack components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the main stack component components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.9 Structures and Component Supports NMP2 Material Handling System – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-9

The staff reviewed ALRA Table 3.5.2.B-9, which summarizes the results of AMR evaluations for the material handling system component groups.

The staff reviewed the information provided in Section 3.5.2.B.9 and Table 3.5.2.B -9 of the ALRA, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Material Handling System components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Material Handling System components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the material handling system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.10 Structures and Component Supports NMP2 Radwaste Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-10

The staff reviewed ALRA Table 3.5.2.B-10, which summarizes the results of AMR evaluations for the radwaste building component groups.

The staff reviewed the information provided in ALRA Table 3.5.2.B-10, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Radwaste Building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Radwaste Building components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the radwaste building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.11 Structures and Component Supports NMP2 Screenwell Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-11

The staff reviewed ALRA Table 3.5.2.B-11, which summarizes the results of AMR evaluations for the screenwell building component groups.

The staff reviewed the information provided in ALRA Table 3.5.2.B -11, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Screenwell Building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Screenwell Building components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the screenwell building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.12 Structures and Component Supports NMP2 Standby Gas Treatment Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-12

The staff reviewed ALRA Table 3.5.2.B-12, which summarizes the results of AMR evaluations for the standby gas treatment building component groups.

The staff reviewed the information provided in ALRA Table 3.5.2.B-12, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 standby gas treatment building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Standby Gas Treatment Building components acceptable.

On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the aging effects, and the AMPs credited for managing the aging effects for the NMP2 standby gas treatment building components that are not addressed by the GALL Report, so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.13 Structures and Component Supports NMP2 Turbine Building – Summary of Aging Management Evaluation – ALRA Table 3.5.2.B-13

The staff reviewed ALRA Table 3.5.2.B-13, which summarizes the results of AMR evaluations for the turbine building component groups.

The staff reviewed the information provided in ALRA Table 3.5.2.B -13, and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Turbine Building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Turbine Building components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the turbine building components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3

3.5B.2.3.14 Structures and Component Supports Component Supports – Summary of Aging Management Evaluation – ALRA Table 3.5.2.C-1

The staff reviewed ALRA Table 3.5.2.C-1, which summarizes the results of AMR evaluations for the Component Supports component groups.

The staff's review of original LRA Table 3.5.2.C-1 identified an area in which additional information was necessary. The applicant responded to the staff's RAI as discussed below.

The staff initial review in RAI 3.5.B-7, dated December 9, 2004, the staff noted that the original LRA Table 3.5.2.C-1 and the ASME Section XI Inservice Inspection (Subsection IWF) Program do not address AMR related to Class MC supports. The GALL Report, Section XI.S3 recommends the use of Subsection IWF for examination of supports of MC components. Therefore, the staff requested that the applicant provide the results of the AMR for MC component supports within the NMP2 containment (including the supports submerged in water) and supports for piping penetrating through the containments designated as MC piping (if any). Furthermore, the staff requested that the applicant provide a summary of program(s) that will be used for managing the aging of these supports, including sample size, inspection frequency, and personnel qualification, etc.

The applicant's response and the staff's resolution to RAI 3.5.B-7 are provided in SER Section 3.5B.2.3.1.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the component supports components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.15 Structures and Component Supports Fire Stops and Seals – Summary of Aging Management Evaluation – ALRA Table 3.5.2.C-2

The staff reviewed ALRA Table 3.5.2.C-2, which summarizes the results of AMR evaluations for the Fire Stops and Seals component groups.

The staff reviewed the information provided in Table 3.5.2.C-2 of the ALRA and determined that the applicant has adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the NMP2 Fire Stops and Seals components that are not addressed by the GALL Report. The staff found the applicant's AMR results for NMP2 Fire Stops and Seals components acceptable.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects associated with the fire stops and seals components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.3 Conclusion

The staff concludes that the applicant provided sufficient information to demonstrate that the effects of aging for the NMP2 structures and component supports components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable USAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the structures and component supports, as required by 10 CFR 54.21(d).

3.6 Aging Management of Electrical and Instrumentation and Controls

This section of the SER documents the staff's review of the applicant's AMR results for the electrical and instrumentation and controls (I&C) components and component groups associated with the following NMPNS commodities:

- cables and connectors
- non-segregated/switchyard bus
- containment electrical penetrations
- switchyard components

3.6.1 Summary of Technical Information in the Application

In ALRA Section 3.6, the applicant provided AMR results for the electrical and I&C systems components and component groups. In ALRA Table 3.6.1, Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components, the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the electrical and I&C components and component groups.

The applicant incorporated the applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.6.2 Staff Evaluation

The staff reviewed ALRA Section 3.6 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the electrical and I&C components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

During the weeks of September 19, and October 24, 2005, the staff performed an onsite audit of AMRs, to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report;

however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in SER Section 3.0.3. Details of the staff's audit are described in its Audit and Review report for the NMPNS ALRA, dated January 18, 2006.

The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in SRP-LR Section 3.6.2.2 summarized in SER Section 3.6.2.2.

The staff also performed a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's evaluations are summarized in SER Section 3.6.2.3.

Finally, the staff reviewed the AMP summary descriptions in the Unit 1 UFSAR and Unit 2 USAR supplements to ensure that they adequately described the programs credited with managing or monitoring aging for the electrical and instrumentation and controls components.

Table 3.6-1 below provides a summary of the staff's evaluation of components, aging effects and aging effects mechanisms, and AMPs listed in ALRA Section 3.6, that are addressed in the GALL Report.

Table 3.6-1 Staff Evaluation for Electrical and Instrumentation and Controls Systems Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements (Item Number 3.6.1-01)	Degradation due to various aging mechanisms	Environmental qualification of electric components	TLAA	This TLAA is evaluated in Section 4.4, "Environmental Qualification (EQ)"

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in ALRA	Staff Evaluation
Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements (Item Number 3.6.1-02)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure caused by thermal/ thermoxidative degradation of organics; radiolysis and photolysis [ultraviolet (UV) sensitive materials only] of organics; radiation-induced oxidation; moisture intrusion	Aging management program for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	Non-EQ Electrical Cables and Connections Program (B2.1.29)	Consistent with GALL, which recommends no further evaluation (See Section 3.6.2.1)
Electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance (IR) (Item Number 3.6.1-03)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced IR; electrical failure caused by thermal/ thermoxidative degradation of organics; radiation-induced oxidation; moisture intrusion	Aging management program for electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements	Non-EQ Electrical Cables and Connections used in Instrumentation Circuits Program (B2.1.30)	Consistent with GALL, which recommends no further evaluation (See Section 3.6.2.1)
Inaccessible medium-voltage (2 kV to 15 kV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements (Item Number 3.6.1-04)	Formation of water trees; localized damage leading to electrical failure (breakdown of insulation), caused by moisture intrusion and water trees	Aging management program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements	Non-EQ Inaccessible Medium-Voltage Cables Program (B2.1.31)	Consistent with GALL, which recommends no further evaluation, NMP2 only (see Section 3.6.2.1)
Electrical connectors not subject to 10 CFR 50.49 EQ requirements that are exposed to borated water leakage (Item Number 3.6.1-05)	Corrosion of connector contact surfaces caused by intrusion of borated water	Boric acid corrosion	Not Applicable	Not applicable, PWR only

The staff's review of the NMPNS component groups follows one of several approaches. One approach, as documented in Section 3.6.2.1, involved the staff's review of the AMR results for components in the electrical and instrumentation and controls that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.6.2.2, involved the staff's review of the AMR results for components in the electrical and I&C systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.6.2.3, involved the staff's review of the AMR results for components in the electrical and instrumentation and controls that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the electrical and I&C components is documented in SER Section 3.0.3.

3.6.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In ALRA Section 3.6.2.1, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the electrical and I&C components:

- Non-EQ Electrical Cables and Connections Program
- Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program
- Non-EQ Inaccessible Medium-Voltage Cables Program

Staff Evaluation. In ALRA Table 3.6.2.C-1 through 3.6.2.C-4, the applicant provided a summary of AMRs for the electrical and I&C components, and identified which AMRs it considered to be consistent with the GALL Report..

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes (A through F) described how the information in the tables aligns with the information in the GALL Report. For ALRA Table 3.6.2.C-1 through 3.6.2.C-4, the applicant provided Notes A and C. The staff audited those AMRs with Notes A and C, which indicated that the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note C indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the ALRA, as documented in the NMPNS audit and review report. The staff did not repeat its review of the matters described in the GALL Report; however, the staff did verify that the material presented in the ALRA was applicable and that the applicant had identified the appropriate GALL Report AMRs.

The staff reviewed the ALRA to confirm that the applicant: (1) provided a brief description of the system, components, materials, and environment; (2) stated that the applicable aging effects were reviewed and evaluated in the GALL Report; and (3) identified those aging effects for the electrical and I&C systems components that are subject to an AMR. On the basis of its audit and review, the staff determined that, for AMRs not requiring further evaluation, as identified in ALRA Table 3.6.1, the applicant's references to the GALL Report are acceptable and no further staff review is required.

Conclusion. The staff evaluated the applicant's claim of consistency with the GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff concludes that there is reasonable assurance that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff concludes that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR54.21(a)(3).

3.6.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation Is Recommended

Summary of Technical Information in the Amended Application. In Section 3.6.2.C of a letter dated August 19, 2005, the applicant provided further evaluation of aging management as recommended by the GALL Report for the electrical and I&C systems components. The applicant provided information concerning how it will manage the following aging effects:

- electrical equipment subject to environmental qualification

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.6.2.2. Details of the staff's audit are documented in the staff's Audit and Review Report. The staff's evaluation of the aging effects is discussed in the following sections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

In Section 3.6.2.C.1 of a letter dated August 19, 2005, the applicant stated that environmental qualification is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). SER Section 4.4 documents the staff's review of the applicant's evaluation of this TLAA.

3.6.2.2.2 Quality Assurance for Aging Management of Non-Safety-Related Components

SER Section 3.0.4 provides the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that the applicant adequately addressed the issues that were further evaluated. The staff found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Amended Application. In ALRA Tables 3.6.2.C-1 through 3.6.2.C-4, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report, or that are not addressed in the GALL Report.

In ALRA Tables 3.6.2.C-1 through 3.6.2.C-4, the applicant indicated, via Notes F through J, that the combination of component type, material, environment, and AERM does not correspond to a line item in the GALL Report, and provided information concerning how the aging effect will be managed. Specifically, Note F indicates that the material for the AMR line item component is not evaluated in the GALL Report. Note G indicates that the environment for the AMR line item component and material is not evaluated in the GALL Report. Note H indicates that the aging effect for the AMR line item component, material, and environment combination is not evaluated in the GALL Report. Note I indicates that the aging effect identified in the GALL Report for the line item component, material, and environment combination is not applicable. Note J indicates that neither the component nor the material and environment combination for the line item is evaluated in the GALL Report.

Staff Evaluation. For component type, material, and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation. The staff's evaluation is discussed in the following sections.

3.6.2.3.1 Electrical and I&C Systems Cables and Connectors – Summary of Aging Management Evaluation – ALRA Table 3.6.2.C-1

In ALRA Tables 3.6.2.C-1 through Table 3.6.2.C-4, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations not consistent with the GALL Report or not addressed in the GALL Report.

In ALRA Tables 3.6.2.C-1 through Table 3.6.2.C-4 the applicant indicated via Note J that neither the identified component nor the material-environment combination is evaluated in the GALL Report and provided information for how the aging effect will be managed. Specifically Note J indicated that neither the component nor the material-environment combination for the line item is evaluated in the GALL Report. For component type and material-environment combination not evaluated in the GALL Report the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that intended functions will be maintained consistent with the CLB during the period of extended operation.

The staff's evaluation is addressed in the following sections.

Electrical and I&C Systems Cables and Connectors

The staff reviewed ALRA Table 3.6.2.C-1, which summarizes aging management evaluations for cables and connectors categorized into component types: (1) conductor insulation for electrical cables and connectors, (2) conductor insulation for electrical cables in circuits sensitive to reduction in conductor insulation resistance, (3) conductor connectors, and (4) fuse holders. The conductor insulation for electrical cables and connectors, electrical cables in circuits sensitive to reduction in conductor insulation resistance, and fuse holders excluding metallic clamps are evaluated in Section 3.6.2.1. The staff evaluations for conductor connectors and metallic clamps of fuse holders are provided in this section.

Conductor Connectors

Technical Information in Application - In the ALRA, the applicant stated that conductor connectors include splices (butt or bolted), crimp-type lugs, and terminal blocks connecting cable conductors to other cables or electrical devices. The applicant credited the Non-EQ Electrical Cable Metallic Connections Inspection Program with managing the aging effects of the conductor connectors.

Aging Effect - In ALRA Table 3.6.2.C-1 the applicant identified loosening of bolted connections as the AERM.

Aging Management Program - The applicant credited the Non-EQ Electrical Cable Metallic Connections Inspection Program with managing the potential aging effect for conductor connectors.

Staff Evaluation.

Aging Effect - In ALRA Table 3.6.2.C-1 the applicant identified loosening of bolted connections as the AERM. The staff agreed that the applicant in the ALRA correctly identified the aging effects of conductor connectors. Loosening of the bolted connections can be caused by thermal cycling, ohmic heating, electrical transients, vibrations, chemical contamination, corrosion, and oxidation

Aging Management Program - The applicant will credit the Non-EQ Electrical Cable Metallic Connections Inspection Program to manage the potential aging effect for conductor connectors. The staff evaluation of this AMP is in SER Section 3.0.3.3.5.

The staff's review concludes that the applicant adequately identified the aging effects and that its inspection program adequately detects loosening of conductor connectors to ensure that the component's intended functions will be maintained consistent with the CLB for the period of extended operation as.required by 10 CFR 54.21(a)(3).

Fuse Holders

Technical Information in Application. In the ALRA, the applicant stated that only fuse holders located outside active devices and not parts of larger assemblies are included in the program. The applicant also stated that the fuse holders typically are constructed of blocks of rigid insulating material like phenolic resins. Metallic clamps are attached to the blocks to hold each end of the fuse. The clamps can be spring-loaded clips that allow fuse ferrules or blades to slip in or they can be bolted lugs to which fuse ends are bolted. The clamps typically are made of copper. In the ALRA Table 3.6.2.C-1 Material column the applicant categorized the fuse holder components into insulator materials and copper alloy clamps. The applicant stated that the aging of the fuse holder insulation material will be managed under Non-EQ Electrical Cables and Connection Program (Section B2.1.29) evaluated in Section 3.6.2.1. The metallic clamp parts of the fuse holders are evaluated in this section. The applicant stated in Table 3.6.2.C-1 that the metallic clamps of the fuse holders are subject to Fuse Holder Inspection Program.

Staff Evaluation.

Aging Effect - In ALRA Table 3.6.2.C-1 the applicant identified loss of electrical continuity as the AERM. The staff agreed that the applicant in the ALRA correctly identified the aging effects for fuse holder metallic clamps.

The loss of electrical continuity in the fuse holder metallic clamps can be caused by one or more of the following aging stressors: moisture, fatigue, ohmic heating, mechanical stress, vibration, thermal cycling, electrical transients, chemical contamination, oxidation, and corrosion.

Aging Management Program - The applicant stated that fuse holder metallic clamps may be tested using either thermography or contact resistance. The staff evaluation of this Fuse Holder Inspection Program is in SER Section 3.0.3.3.4

The staff's review concludes that the applicant adequately identified the aging effects and that its adequate AMP for fuse holder clamps reasonably assures maintenance of the component's intended functions consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3).

3.6.2.3.2 Electrical and I&C Systems Non-Segregated/ Switchyard Bus – Summary of Aging Management Evaluation – ALRA Table 3.6.2.C-2

The ALRA Table 3.6.2.C-2 summarizes aging management evaluation for (1) Non-segregated Bus Insulators, (2) Non-Segregated Bus, (3) Non-Segregated Bus Connectors, (4) Non-Segregated Bus Insulation, (5) Switchyard Bus Conductors, (6) Switchyard Bus Connectors, (7) Containment Electrical Penetrations, (8) High Voltage Insulators, (9) Transmission Conductors, and (10) Transmission Conductor Connections.

The staff evaluation of these items is as follows:

- electrical and I&C systems non-segregated phase bus
- switchyard bus conductors
- switchyard bus connectors
- high voltage insulators
- transmission conductors
- transmission conductor connections
- electrical and I&C systems containment electrical penetrations

Electrical and I&C Systems Non-Segregated Phase Bus. The phase bus is used to connect two or more elements (equipment like switchgear and transformers) of an electrical circuit. The isolated phase bus is an electrical bus in which each phase conductor is enclosed by an individual metal housing separated from an adjacent conductor housing by an air space. A non-segregated phase bus is an electrical bus constructed with all phase conductors in a common enclosure without barriers (only air space) between the phases.

In the ALRA, the applicant stated that the materials of construction for the phase bus components are:

- aluminum
- cement
- metal
- porcelain
- steel
- various organic polymers

The applicant also stated in the ALRA that phase bus components are exposed to an air environment.

In ALRA Table 3.6.2.C-2 the applicant identified loss of insulation resistance and loosening of bolted connections as aging effects and aging effects mechanisms of phase bus components requiring aging management.

The applicant credited the Non-Segregated Bus Inspection Program with managing the potential aging effects and aging effects mechanisms for the phase bus components. The staff evaluation of this AMP is in SER Section 3.0.3.3.3

Interim Staff Guidance (ISG)-17, "Proposed Aging Management Program (AMP) XI.E4, 'Periodic Inspection of Bus Ducts,'" includes enclosed bus and enclosure assemblies as the structure and/or component of the metal enclosed bus. During the audit and review the staff noted that ALRA Table 3.6.2.C-2 does not include this component. The staff requested that the applicant provide justification for not including the enclosure assembly in the structure and/or component category.

In its letter dated December 1, 2005, the applicant stated that it will revise ALRA Table 3.6.2.C-2 to include the component types bus duct enclosure and seals and gaskets. The applicant stated that the intended function for both components is shelter/protection with the materials of aluminum for the enclosure and polymers for the seals and gaskets both in an environment of air. The applicant also stated in this letter that there are no aging effects and aging effects mechanisms requiring management for the aluminum enclosure and the aging effects and aging effects mechanisms of the seals and gaskets are cracking, hardening, and shrinkage to be managed by the Structures Monitoring Program. There are no notes for the bus duct enclosure. Note H is for the seals and gaskets.

The staff performed an onsite audit of AMRs during the weeks of September 19 and October 24, 2005, for Non-Segregated Bus items and confirmed that the applicant had identified the applicable aging effects and aging effects mechanisms and listed the appropriate combination of material, environments, and AMPs that will mange the aging effects and aging effects mechanisms adequately. The staff agreed that the applicant correctly identified the aging effects and aging effects mechanisms of phase bus components. In addition the staff found that there are no aging effects and aging effects mechanisms requiring management for the aluminum enclosure. The staff also found cracks, foreign debris, excessive dust build-up, and evidence of water intrusion as additional aging effects and aging effects mechanisms adequately managed by the Non-Segregated Bus Inspection Program. The applicant credited its Non-Segregated Bus Inspection Program with aging management of the in-scope non-segregated phase bus and its Structures Monitoring Program with managing the aging effects and aging effects mechanisms of the enclosure seals and gaskets. The staff's review and evaluations of these programs are documented in SER Section 3.0.3.3.3.

The staff performed other evaluations in reviewing the ALRA:

Switchyard Bus Conductors

Technical Information in the Application. The applicant identified aluminum as the component and air as environment for switchyard bus conductors.

Aging Effect - The applicant stated "None" in the AERM column for switchyard bus conductors.

Aging Management Program - The applicant stated "None" in the AMP column for switchyard bus conductors.

Staff Evaluation.

Aging Effect - By letter dated November 29, 2005, the staff requested additional information for the statement "None" in the AERM column for switchyard bus conductors. By letter dated December 5, 2005, the applicant stated that the switchyard bus conductors are made of aluminum. The NMPNS environment is nonaggressive with little air pollution and no heavy industry or saltwater. In a nonaggressive environment aluminum forms a passive oxide layer which arrests further oxidation/corrosion and loss of material (LOM) does not occur. NMPNS operating experience indicates no wind-induced abrasion and fatigue failure of the switchyard bus conductors. Tubular conductors are used at NMPNS and the wind speed encountered at NMPNS is not high enough to degrade them. The staff agreed that there is no AERM for switchyard bus conductors.

Aging Management Program - By letter dated November 29, 2005, the staff requested additional information for the statement "None" in the AMP column for switchyard bus conductors. By letter dated December 2005, the applicant stated that (1) there are no corrosion-related AMPs because aluminum forms an oxide layer which arrests further oxidation, (2) in the operating experience at NMPNS no wind-induced abrasion or fatigue failure of these conductors has been observed, and (3) because of the design of the tubular conductors significantly higher wind conditions than those that typically occur at NMPNS would be needed to cause wind-related degradation.

Conclusion. The staff agrees that based on the justifications provided by the applicant, no AMP is required for the switchyard bus conductor line item in Table 3.6.2.C-2.

Switchyard Bus Connectors

Technical Information in the Application. The applicant identified aluminum and steel as materials and air as environment for switchyard bus connectors.

Aging Effect - The applicant stated "Loosening of Bolted Connections" in the AERM column for switchyard bus connectors.

Aging Management Program - The applicant stated "Preventive Maintenance Program" in the AMP column for switchyard bus connectors.

Staff Evaluation.

Aging Effect - The staff agreed that the applicant in the ALRA correctly identified the aging effect of the switchyard bus connectors.

Aging Management Program - The applicant's current Preventive Maintenance Program does not address maintenance of electrical components. By letter dated November 29, 2005, the staff requested additional information for inspections of electrical components in the Preventive Maintenance Program. By letter dated December 5, 2005, the applicant stated that under the Preventive Maintenance Program the transmission conductor connections undergo visual inspections, thermography testing, and corona measurement to detect loosened connections so they can be retightened or otherwise corrected as necessary.

With the commitment (NMP1 Commitment 31 and NMP2 Commitment 29) from the applicant that under the Preventive Maintenance Program, as discussed in SER Section 3.0.3.3.1, the transmission conductor connections undergo visual inspections, thermography testing, and corona measurement the staff found that the Preventive Maintenance Program is an adequate AMP for switchyard bus connectors.

Conclusion. On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects of the non-segregated/switchyard bus components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.2.3.3 Electrical and I&C Systems Containment Electrical Penetrations – Summary of Aging Management Evaluation – ALRA Table 3.6.2.C-3

In the ALRA Table 3.6.2.C-3 the applicant summarized aging management evaluations for Switchyard Components categorized into component types (1) High Voltage Insulators, (2) Transmission Conductors, and (3) Transmission Conductor Connections.

High Voltage Insulators

Technical Information in the Application. The applicant identified cement, porcelain, and metal as materials and air as the environment for high voltage insulators.

Aging Effect - The applicant stated "None" in the AERM column for all three materials.

Aging Management Program - The applicant stated "None" in the AMP column for all three materials.

Staff Evaluation.

Aging Effect - By letter dated November 29, 2005, the staff requested additional information for the statement "None" in the AMP column for cement, porcelain, and metal. By letter dated December 5, 2005, the applicant stated that to be conservative it would revise Table 3.6.2.C-4 for consistency with GALL Report Revision 1. The three line items for high voltage insulators at the top of Table 3.6.2.C-4 were revised to include 2 AERM line items, one with the AERM column entry "Loss of Insulation Resistance" and the other with the AERM column entry "Loss of Material."

IN 93-95 documents degradation of insulator performance and ultimate loss of power due to salt build-up on the insulators for plants located in saltwater marine environments. The applicant stated that NMPNS is located on a lake, not in a saltwater marine environment. Further, the applicant stated that its periodic inspections of its Preventive Maintenance Program indicate no loss of material (LOM) or mechanical wear on transmission conductors due to wind. The staff found this revision consistent with the GALL Report Revision and acceptable.

Aging Management Program - By letter dated November 29, 2005, the staff requested additional information for the statement "None" in the AMP column for cement, porcelain, and metal. By letter dated December 5, 2005, the applicant stated that to be conservative it would revise Table 3.6.2.C-4 to state "Preventive Maintenance Program" in the AMP column. The applicant stated that its Preventive Maintenance Program includes visual inspections, thermography, and corona measurement.

Conclusion. On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects of the switchyard components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Transmission Conductors

Technical Information in the Application. The applicant identified aluminum conductor, steel reinforced as the material and air as the environment for transmission conductors.

Aging Effect - The applicant stated "None" in the AERM column for transmission conductors.

Aging Management Program - The applicant stated "None" in the AMP column for transmission conductors.

Staff Evaluation.

Aging Effect - By letter dated November 29, 2005, the staff requested additional information for the statement "None" in the AMP column for transmission conductors. By letter dated December 5, 2005, the applicant stated that plant operating experience and the design of these conductors indicate no loss of conductor strength due to corrosion to the extent necessary to affect the ability of the conductors to perform their intended function. They are fabricated of stranded aluminum wound around a steel stranded core with no organic insulating material around them. For aluminum core steel reinforced conductors any degradation would begin as a loss of zinc from the galvanized steel core wire strands. Corrosion rates depend on suspended particle chemistry, sulfur dioxide (SO_2) concentration in air, precipitation, fog chemistry, and meteorological conditions, a very slow process even slower in rural areas with less concentration of suspended particles and SO_2 in the atmosphere than urban areas. NMPNS is in a rural area.

The National Electric Safety Code (NESC) requires that tension on installed conductors be a maximum of 60 percent of the ultimate conductor strength. The NESC also sets the maximum tension to which a conductor can be subject under heavy load requirements including wind, ice, and temperature. Ontario Hydroelectric performed tests of 80-year old transmission conductors that showed a 30 percent loss of conductor strength. These were typical transmission conductors that can reach 1000 feet in length. With 30 percent loss there is still significant margin between the NESC requirement and the actual tested conductor strength. At NMPNS transmission conductor runs are shorter than those included in the Ontario Hydroelectric test. The longest transmission conductor run at NMPNS is approximately 515 feet. Because NMPNS is located in a rural area, the tension of these shorter runs would be less than what is typical in transmission conductor runs, and the Ontario Hydroelectric tests for 80-year old conductors demonstrated significant margins between NESC requirements and test results the applicant's opinion is that for the period of extended operation the AERM of loss of conductor strength would not affect the intended function of these conductors significantly.

Based on the applicant's site-specific data the staff concludes that there is reasonable assurance that corrosion of transmission conductors is a very slow aging process even slower in rural areas with generally fewer suspended particles and lower sulphur dioxide concentration in the air than urban areas; therefore, loss of conductor strength due to transmission conductor corrosion is not an AERM.

Conclusion. On the basis of its review, as discussed above, the staff concludes that the applicant has demonstrated the transmission conductors have no AERM. The staff concludes that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Transmission Conductor Connections

Technical Information in the Application. The applicant identified aluminum and steel as materials and air as the environment for transmission conductor connections.

Aging Effect - The applicant stated "Loosening of Bolted Connections" in the AERM column for transmission conductor connections.

Aging Management Program - The applicant stated "Preventive Maintenance Program" in the AMP column for transmission conductor connections.

Staff Evaluation.

Aging Effect - The staff agreed that the applicant in the ALRA correctly identified the aging effect of the transmission conductor connections.

Aging Management Program - By letter dated November 29, 2005, the staff requested additional information for the statement "Preventive Maintenance Program" in the AMP column. By letter dated December 2005, the applicant stated that under the Preventive Maintenance Program the transmission conductor connections undergo visual inspections, thermography testing, and corona measurement to detect loosened connections so they can be retightened or otherwise corrected as necessary.

Based on the applicant's information that its Preventive Maintenance Program includes visual inspections and thermography or corona measurement the staff concludes that there is reasonable assurance that the applicant's AMP is adequate for transmission conductor connections.

Conclusion. On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects of the transmission conductors connections components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.2.3.4 Switchyard Components – Summary of Aging Management Evaluation – ALRA Table 3.6.2.C-4

During the staff audit and review during the weeks of September 19 and October 24, 2005, the staff reviewed ALRA Table 3.6.2.C-4, which summarizes the results of AMR evaluations for the containment electrical penetrations component groups.

The applicant stated in ALRA Section 3.6.2.1.3 that the construction materials for the containment electrical penetration are various organic polymers. The containment electrical penetrations are exposed to an adverse local environment of heat or radiation and air. The aging effects and aging effects mechanisms of the containment electrical penetration requiring management are loss of insulation resistance and loss of tightness. The applicant credited the ASME Section XI Inservice Inspection (Subsection IWE), Non-EQ Cables and Connections, and 10 CFR Appendix J Programs with managing the aging effects and aging effects mechanisms for the containment penetrations.

In ALRA Section 3.6.2.1.3 the applicant stated that the penetration assembly primary insulation materials are various organic polymers. During the audit and review it was not clear to the staff why the metals and inorganic materials (cable fillers, epoxies, potting compounds, connector pins, plugs, and facial grommets) of non-EQ electrical/I&C penetration assemblies did not require an AMR.

In its letter dated December 1, 2005, the applicant stated that electrical penetrations at NMP contain no cable fillers, epoxies, potting compounds, connector pins, plugs, or facial grommets within the steel sleeve and that the penetration interior is inerted with nitrogen.

The applicant further stated that aging of inaccessible seal material on the ends of the sleeves is managed by its 10 CFR Appendix J Program. The staff found the applicant's response acceptable because containment electrical penetrations at NMP contain no organic materials and the potential aging effects and aging effects mechanisms of penetration wiring insulation will be addressed by the Non-EQ Cables and Connections Program. In addition the leak test performed as required by the applicant's Appendix J Program will test the boundary function of the non-EQ electrical and I&C penetrations. The applicant's Non-EQ Electrical Cables and Connections and 10 CFR Appendix J Programs are evaluated in SER Sections 3.0.3.1.8 and 3.0.3.1.7, respectively.

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated that the aging effects of the containment electrical penetrations components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by *10 CFR 54.21(a)(3).*

3.6.3 Conclusion

The staff concludes that the applicant provided sufficient information to determine that the effects of aging for the electrical and instrumentation and controls components, that are within the scope of license renewal and subject to an AMR, will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR and USAR supplemental program summaries and concludes that they adequately describe the AMPs credited for managing of the electrical and instrumentation and controls required by 10 CFR 54.21(d).

3.7 Conclusion for Aging Management Review Results

The staff reviewed the information in ALRA Section 3, "Aging Management Review Results," and Appendix B, "Aging Management Programs and Activities." On the basis of its review, the staff concludes that the applicant had demonstrated that the aging effects will be adequately managed so that intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the applicable NMP1 UFSAR and NMP2 USAR supplements program summaries and concludes that the supplements adequately describe the AMPs credited with managing aging, as required by 10 CFR 54.21(d).

The staff concludes that there is reasonable assurance that the activities authorized by the renewed licenses will continue to be conducted in accordance with the CLB, and any changes made to the CLB, for compliance with 10 CFR 54.21(a)(3) are in accordance with the Atomic Energy Act of 1954, as amended, and NRC regulations.

SECTION 4

TIME-LIMITED AGING ANALYSES

4.1 Identification of Time-Limited Aging Analyses

This section discusses the identification of time-limited aging analyses (TLAAs). Constellation Energy Group, LLC (CEG or the applicant) discusses the TLAAs in Sections 4.2 through 4.7 of its amended license renewal application (ALRA). Safety evaluation report (SER) Sections 4.2 through 4.8 document the review of the TLAAs conducted by the staff of the U.S. Nuclear Regulatory Commission (NRC or the staff).

TLAAs are certain plant-specific safety analyses that involve time-limited assumptions defined by the current operating term. Pursuant to Title 10, Section 54.21(c)(1), of the *Code of Federal Regulations* [10 CFR 54.21(c)(1)], the applicant for license renewal must provide a list of TLAAs, as defined in 10 CFR 54.3.

In addition, pursuant to 10 CFR 54.21(c)(2), an applicant must provide a list of plant-specific exemptions granted under 10 CFR 50.12 that are based on TLAAs. For any such exemptions, the applicant must provide an evaluation that justifies the continuation of the exemptions for the period of extended operation.

4.1.1 Summary of Technical Information in the Amended Application

To identify the TLAAs, the applicant evaluated calculations for the Nine Mile Point Nuclear Station (NMPNS) against the six criteria specified in 10 CFR 54.3. The applicant indicated that it had identified the calculations that met the six criteria by searching the current licensing basis (CLB). The CLB includes the Nine Mile Point Unit 1 (NMP1) updated safety analysis report (UFSAR), Nine Mile Nuclear Point Unit 2 (NMP2) updated safety analysis report (USAR), engineering calculations, technical reports, engineering work requests, licensing correspondence, and applicable vendor reports. In ALRA Table 4.1-1, "Time-Limited Aging Analyses Applicable to NMPNS," the applicant listed the applicable TLAAs in the following categories:

- reactor vessel neutron embrittlement analysis
- metal fatigue analysis
- environmental qualification (EQ)
- containment liner plate, metal containments, and penetrations fatigue analysis
- other plant-specific TLAAs

Pursuant to 10 CFR 54.21(c)(2), the applicant stated that it did not identify any exemptions granted under 10 CFR 50.12 that were based on a TLAA, as defined in 10 CFR 54.3.

4.1.2 Staff Evaluation

In ALRA Section 4.1, the applicant identified the TLAAs applicable to NMP1 and NMP2. The staff reviewed the information to determine if the applicant had provided adequate information to meet the requirements of 10 CFR 54.21(c)(1) and 10 CFR 54.21(c)(2).

As defined in 10 CFR 54.3, TLAAs are analyses that meet the following six criteria:

(1) involve systems, structures, and components that are within the scope of license renewal, as delineated in 10 CFR 54.4(a),

(2) consider the effects of aging,

(3) involve time-limited assumptions defined by the current operating term (40 years),

(4) are determined to be relevant by the applicant in making a safety determination,

(5) involve conclusions, or provide the basis for conclusions, related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b),

(6) are contained or incorporated by reference in the current licensing basis (CLB).

The applicant provided a list of common TLAAs from NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), dated July 2001. The applicant listed those TLAAs applicable to NMP1 and NMP2 in ALRA Table 4.1-1, "Time-Limited Aging Analyses Applicable to NMPNS."

As required by 10 CFR 54.21(c)(2), an applicant must provide a list of all the exemptions granted under 10 CFR 50.12 that are based on a TLAA and evaluated and justified for continuation through the period of extended operation. In its ALRA, the applicant stated that each active exemption was reviewed to determine whether the exemption was based on a TLAA. The applicant did not identify any TLAA-based exemptions. On the basis of the information provided by the applicant with regard to the process used to identify TLAA-based exemptions, as well as the results of the applicant's search, the staff concludes that there is reasonable assurance that the applicant identified no TLAA-based exemptions that are justified for continuation through the period of extended operation, in accordance with 10 CFR 54.21(c)(2).

4.1.3 Conclusion

On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has provided an acceptable list of TLAAs, as required by 10 CFR 54.21(c)(1). The staff has also confirmed that no exemptions to 10 CFR 50.12 have been granted on the basis of a TLAA, as required by 10 CFR 54.21(c)(2).

4.2 Reactor Vessel Neutron Embrittlement Analysis

During plant service, neutron irradiation reduces the fracture toughness of ferritic steel in the reactor pressure vessel (RPV) beltline region of light-water nuclear power reactors. Areas of review to ensure that the RPV has adequate fracture toughness to prevent ductile or brittle failure during normal and off-normal operating conditions for NMP1 and NMP2 are

(1) upper-shelf energy (USE), (2) pressure-temperature (P-T) limits/adjusted reference temperature (ART), (3) Boiling Water Reactor Vessel and Internals Project (BWRVIP)-05 analysis for elimination of circumferential weld inspection, and (4) analysis of the axial weld failure probability. The adequacy of the analyses for these four areas is reviewed for the period of extended operation.

The ART is defined as the sum of the initial (unirradiated) reference temperature (initial RT_{NDT}), the mean value of the adjustment in reference temperature caused by irradiation (delta RT_{NDT}), and a margin term. The delta RT_{NDT} is the product of a chemistry factor (CF) and a fluence factor. The CF is dependent upon the amount of copper and nickel in the material and may be determined from the tables in Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," or from surveillance data. The fluence factor is dependent upon the neutron fluence. The margin term is dependent upon whether the initial RT_{NDT} is a plant-specific or a generic value and whether the CF was determined using the tables in RG 1.99, Revision 2, or surveillance data. The margin term is used to account for uncertainties in the values of the initial RT_{NDT}, the copper and nickel contents, the fluence, and the calculation methods. Revision 2 of RG 1.99 describes the methodology to be used in calculating the margin term. The mean RT_{NDT} is the sum of the initial RT_{NDT} and the delta RT_{NDT} without the margin term. The delta RT_{NDT} and ART calculations meet the criteria of 10 CFR 54.3(a); therefore, they are considered as TLAAs.

The ART values are used in the analysis for the ART for the RPV material due to neutron embrittlement and the P-T limits analysis. The mean RT_{NDT} values are used in the analysis of the circumferential weld examination relief and the axial weld failure probability.

Appendix G of 10 CFR Part 50 provides the staff's criteria for maintaining acceptable levels of USE for the RPV beltline materials of operating reactors throughout the licensed lives of the facilities. The rule requires RPV beltline materials to have a minimum USE value of 75 ft-lbs in the unirradiated condition and to maintain a minimum USE value above 50 ft-lbs throughout the life of the facility, unless it can be demonstrated through analysis that lower values of USE would provide an acceptable margin of safety against fracture equivalent to those required by the American Society of Mechanical Engineers (ASME) Code Section XI, Appendix G. The rule also mandates that the methods used to calculate USE values must account for the effects of neutron irradiation on the material's USE values and must incorporate any relevant RPV surveillance capsule data that are reported through implementation of a plant's 10 CFR Part 50, Appendix H, RPV material surveillance program.

RG 1.99, Revision 2, provides an expanded discussion regarding the calculation of Charpy USE values and describes two methods for determining Charpy USE values for RPV beltline materials, depending on whether or not a given RPV beltline material is represented in the plant's RPV material surveillance program. If surveillance data are not available, the Charpy USE is determined in accordance with Position 1.2 in RG 1.99, Revision 2. If surveillance data are available, the Charpy USE should be determined in accordance with Position 2.2 in RG 1.99, Revision 2. These methods refer to RG 1.99, Revision 2, Figure 2, which indicates that the percentage drop in Charpy USE is dependent on the amount of copper in the material and the neutron fluence. Since the analyses performed in accordance with 10 CFR Part 50 Appendix G are based on a flaw with a depth equal to one-quarter of the vessel wall thickness (1/4t), the neutron fluence used in the Charpy USE analysis is the neutron fluence at the 1/4t depth location.

The applicant described its evaluation of this TLAA in ALRA Section 4.2, "Neutron Embrittlement of the Reactor Vessel and Internals." In order to demonstrate that neutron embrittlement does not significantly impact RPV and vessel internals integrity during the license renewal term, the applicant included discussion of the following topics related to neutron embrittlement in the ALRA:

- Upper-Shelf Energy (Section 4.2.1),
- Pressure-Temperature Limits/Adjusted Reference Temperatures (Section 4.2.2),
- Elimination of Circumferential Weld Inspection (NMP1 only) (Section 4.2.3),
- Axial Weld Failure Probability (Section 4.2.4).

4.2.1 Upper-Shelf Energy

4.2.1.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.2.1, the applicant summarized the evaluation of the USE calculations for the period of extended operation. RPV materials undergo a transition in fracture behavior from brittle to ductile as the temperature of the material increases. Charpy V-notch tests are conducted in the nuclear industry to monitor changes in the fracture behavior during irradiation. Neutron irradiation to fluences above approximately 1×10^{17} n/cm^2 causes an upward shift in the ductile-to-brittle transition temperature and a drop in USE. To satisfy the acceptance criteria for USE contained in 10 CFR 50, Appendix G, the RPV beltline materials must have a Charpy USE of no less than 50 ft-lbs throughout the life of the RPV unless it can be demonstrated that lower values of Charpy USE will provide margins of safety against fracture equivalent to those required by the ASME Code Section XI, Appendix G. Appendix B of BWRVIP-74-A, "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines," presents an equivalent margin analysis establishing the minimum USE limits for beltline materials used in boiling water reactor (BWR)/2 through BWR/6 RPV designs, as well as the plant applicability verification form for equivalent margin analysis corresponding to irradiation for 54 effective full power years (EFPY). The minimum USE values, equivalent margin analysis USE limit criteria, and bounding criteria for decrease in Charpy USE were accepted by the NRC in the safety evaluation (SE) for BWRVIP-74-A.

4.2.1.2 Staff Evaluation

Section IV.A.1.a, Appendix G of 10 CFR Part 50 requires, in part, that the RPV beltline materials have Charpy USE values in the transverse direction for base metal and along the weld for weld material of no less than 50-ft-lbs, unless it is demonstrated in a manner approved by the Director, Office of Nuclear Reactor Regulation, that lower values of Charpy USE will ensure margins of safety against fracture equivalent to those required by ASME Code Section XI, Appendix G.

By letter dated April 30, 1993, the Boiling Water Reactor Owners Group (BWROG) submitted NEDO-32205-A, "Equivalent Margin Analysis for Low Upper Shelf Energy in BWR/2 Through BWR/6 Vessels," to demonstrate that BWR RPVs could meet margins of safety against fracture equivalent to those required by ASME Code Section XI, Appendix G for Charpy USE values less than 50 ft-lbs. In a letter dated December 8, 1993, the staff concludes that there is reasonable assurance that the topical report demonstrated that the evaluated materials have margins of safety against fracture equivalent to ASME Code Section XI, Appendix G, in accordance with 10 CFR Part 50, Appendix G. In that report, the BWROG derived through statistical analysis the unirradiated USE values for materials that originally did not have documented unirradiated Charpy USE values. Using these statistically-derived Charpy USE values, the BWROG predicted the USE values through 40 years of operation in accordance with RG 1.99, Revision 2. According to this RG, the decrease in USE is dependent upon the amount of copper in the material and the neutron fluence predicted for the material. The BWROG analysis determined that the minimum allowable Charpy USE value in the transverse direction for base metal and along the weld for weld material was 35 ft-lbs.

General Electric (GE) performed an update to the USE equipment margin analysis (EMA), which is documented in Electric Power Research Institute (EPRI) TR-1008872, "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines," BWRVIP-74-A, June 2003. The staff's approval of EPRI TR-1008872 was documented in a letter from Mr. W. H. Bateman to Mr. C. Terry, dated September 16, 2003. The analysis in EPRI TR-1008872 determined the reduction in the unirradiated Charpy USE resulting from neutron irradiation using the methodology in RG 1.99, Revision 2. Using this methodology and a correction factor of 65 percent for conversion of the longitudinal properties to transverse properties, the lowest Charpy USE at 54 EFPY for all BWR/3-6 plates was projected to be 45 ft-lbs. The correction factor for specimen orientation in plates is based on NRC Branch Technical Position MTEB 5-2. The EMA acceptance criteria specified in the staff-approved report for BWRVIP-74-A, are based on the percent reduction in the unirradiated Charpy USE values resulting from neutron radiation using the methodology in RG 1.99, Revision 2. The acceptance criteria that are specified in the BWRVIP-74-A report indicate that the maximum allowable reduction in USE value is 29.5 percent for the BWR/2 plates, 23.5 percent for the BWR/3-6 plates, and 39 percent for the BWR/2-6 welds.

<u>Staff's Assessment of the NMP1 USE Evaluation</u>. Since the analysis in the BWRVIP-74-A report is a generic analysis, the applicant submitted plant-specific information in ALRA Table 4.2-1a for NMP1. In addition, its letter dated March 22, 2004, demonstrates in greater detail that the limiting beltline materials of the NMP1 RPV will meet the criteria in the BWRVIP-74-A report at the end of the license renewal period.

The applicant, in ALRA Section 4.2 and in the March 22, 2004, letter (as referenced in the ALRA), demonstrated compliance with all the requirements of 10 CFR Part 50, Appendix G, related to the USE (determined by Charpy impact tests) for all RPV beltline materials. The staff's safety evaluation (SE) dated April 26, 1994, concluded that the NMP1 RPV plates have an adequate margin of safety against fracture until a projected end of license of 25 EFPY for all levels of conditions (A, B, C, and D) and meet the criteria in ASME Section XI, Code Case N-512. Since the predicted USE for the limiting plate will fall below 50 ft-lbs before the end of the current license, and during the period of extended operation, the applicant used an EMA in accordance with the requirements of ASME Section XI Code Case N-512 to demonstrate that the RPV has margins of safety against fracture equivalent to those required by ASME Section XI, Appendix G, to support operation beyond 25 EFPYs and operation during the period of extended operation. The applicant proposed to use the staff-approved generic EMA analysis (BWRVIP-74-A) for the evaluation of the USE values of the beltline plate and weld materials of the NMP1 RPV.

In order to demonstrate that the BWRVIP-74-A methodology is applicable to the NMP1 RPV, the applicant, by letter dated March 22, 2004, provided a comparison of the results of the BWRVIP-74-A and the MPM Technology Inc. EMA analyses in relation to the initial USE values, the material joule-resistance (J-R) curves, the stresses, and the $J_{applied}$ values, and it identified the difference in the results of the two analyses. These attributes are discussed below:

(1) The initial USE values, as discussed above, will affect the projected USE values of the irradiated beltline materials. The initial USE values that were used in the BWRVIP-74-A report and in the MPM analyses are 49 ft-lbs and 52 ft-lbs, respectively. Based on these values, the staff concludes that the initial USE value that was used in the BWRVIP-74-A EMA analysis would provide more conservative results than the MPM EMA analysis.

(2) The applicant compared the USE-J_{IC} correlations shown in the two analyses. The staff previously determined in its SE dated April, 26, 1994, that a USE value of 40 ft-lbs, would provide an acceptable $J_{0.1}$ (the J value at 0.1 inch of crack extension) value for the RPV material, whereby the material would have an adequate margin of safety against fracture. The $J_{0.1}$ values for the BWRVIP-74-A and MPM analyses that correspond to 40 ft-lbs are 222 in-lb/in^2 and 298 in-lb/in^2, respectively. Based on these values, the staff concludes that the $J_{0.1}$ values from the BWRVIP-74-A analysis are more conservative than the $J_{0.1}$ values from the MPM analysis. Therefore, the staff agreed with the applicant that the BWRVIP-74-A J-R curves bound the MPM J-R curves. This conclusion justifies the use of the BWRVIP-74-A EMA analysis for the evaluation of the USE of the NMP1 RPV beltline materials.

(3) Since both the analyses used the same transient (100 °F/hr cooling rate) in calculating the stresses under service loadings A and B, the staff agreed with the applicant's conclusion that the stress calculations did not affect the difference in the EMA values of the BWRVIP-74-A and MPM analyses for service loadings A and B. In the SE, dated April 26, 1994, the staff established that the calculated stresses under service loadings C and D were not limiting. Therefore, the applicant did not perform stress calculations for service loadings C and D.

(4) The staff reviewed the $J_{applied}$ values of the limiting beltline materials of NMP1 and determined that the minor difference (4.2 percent) between the results from the BWRVIP-74-A and MPM analyses is acceptable.

The staff reviewed the submitted calculations related to the aforementioned attributes and found that the application of the BWRVIP-74-A methodology in the assessment of USE for NMP1 RPV beltline materials is comparable MPM's methodology. Therefore, the staff concludes that the evaluation, described below, of USE for the RPV beltline materials at NMP1 using the BWRVIP-74-A EMA is acceptable.

The staff reviewed the applicant's projections of the NMP1 USE values for the RPV beltline materials that are provided in ALRA Table 4.2-1a. The staff noted that the USE values are based on irradiation for 54 EFPY, which corresponds to an average capacity factor of 90 percent over 60 years. This is consistent with the bounding analyses in the BWRVIP-74-A report and is conservative with respect to the NMP1 operating history to date. The applicant projected that the peak vessel fluence at the inside surface for NMP1 at the end of 54 EFPY would be 5.21×10^{18} n/cm^2 (E > 1.0 MeV) and the vessel fluence at the 1/4t location (i.e., at a location 1/4 of the way through the RPV wall from the clad-to-base metal boundary) would be

3.39 x 10^{18} n/cm^2 (E > 1.0 MeV). The staff also noted that neutron transport modeling was carried out in (r-θ) and (r-z) geometry using the DORT two-dimensional discrete ordinates code and the BUGLE-96 cross section library. In addition, the staff noted that NMP1 uses an NRC staff-approved fluence methodology. In its SE dated October 27, 2003, the staff concludes that the applicant used a staff-approved method that includes the attributes described in RG 1.190. Therefore, the staff found the proposed vessel fluence at the inside surface as well as at the 1/4t location to be acceptable for the calculation of the USE at 54 EFPY.

The projections of USE for the NMP1 RPV's limiting beltline plates and weld materials were made based on percentage decrease in USE as determined by RG 1.99, Revision 2, at 1/4t of the vessel wall. The acceptable USE (measured in transverse orientation) value for BWR/2 plates and weld materials based on the BWRVIP-74-A analysis is 35 ft-lbs. The application of the staff-approved BWRVIP-74-A methodology for projecting the USE values entails the use of the following variables:

- copper content of the beltline plate and weld materials
- neutron fluence at 1/4t of the vessel at the beltline region
- initial USE values of the beltline materials
- percent of decrease from initial USE value for the extended period of operation (54 EFPY)
- projected USE value at 54 EFPY
- acceptable USE values at 54 EFPY, in accordance with the BWRVIP-74-A criteria

These values are listed in Tables 4.2 and 4.3 of the March 22, 2004, letter, as referenced in the ALRA, and in ALRA Table 4.2-1a. The staff has confirmed the validity of these values and concludes that the NMP1 limiting beltline weld will remain above 50 ft-lbs through 54 EFPY. Therefore, the staff determined that the NMP1 limiting beltline weld USE value will meet the requirements of 10 CFR Part 50, Appendix G, through the period of extended operation.

However, the USE values for both of the NMP1 limiting RPV beltline plates are projected to fall below 50 ft-lbs before the end of the period of extended operation. Table 4.3 of the March 22, 2004, letter indicates that the projected values for both of the NMP1 limiting beltline plates (G-8-1 and G-307-4) will remain above the BWRVIP-74-A minimum allowable USE of 35 ft-lbs through the period of extended operation) and, therefore, have margins equivalent to those of ASME Section XI, Appendix G. The projected USE value for the NMP1 beltline plate G-8-1 for 54 EFPY is 40 ft-lbs, which exceeds the minimum value of 35 ft-lbs specified in the BWRVIP-74-A EMA analysis. The projected USE value for the NMP1 beltline plate G-307-4 is 37.2, which exceeds the minimum required value of 35 ft-lbs by 5.9 percent. SER Table 4.2-1 provides the staff's summary of the RV USE analysis for NMP1 and NMP2.

The applicant stated that there is a difference of 4.2 percent in predicting the USE values between the EMA analyses using BWRVIP-74-A and those using the MPM Technology methodologies. This difference in value falls within the margin of 5.9 percent for the predicted USE value of the most limiting beltline plate material. Therefore, the staff concludes that there is reasonable assurance that applicability of the BWRVIP-74-A EMA analysis to the NMP1 beltline materials is acceptable. In addition, the staff found that this analysis provides reasonable assurance that these materials have margins of safety against fracture equivalent to those required by 10 CFR Part 50, Appendix G.

Staff's Assessment of the NMP2 USE Evaluation. ALRA Table 4.2-2a includes the projected USE values for the RPV beltline materials for NMP2. The applicant based these values on irradiation for 54 EFPY, which corresponds to an average capacity factor of 90 percent over 60 years and is consistent with the bounding analyses in BWRVIP-74-A. The applicant indicated that the projected USE values for the limiting beltline weld materials and the limiting beltline plate materials for NMP2 will remain above 50 ft-lbs throughout the period of extended operation, based on a projected fluence value of 9.70×10^{17} n/cm^2 (E > 1.0 MeV) at the 1/4t location. The staff compared the initial USE values and the percentage of copper for all the plates and weld metals in the beltline region of NMP2 to those values in the reactor vessel integrity database (RVID) and confirmed that the values were conservative or consistent with the values in the RVID.

The staff noted that in NMP2 the most limiting beltline material, Plate C-3147-1, has a projected USE value of 62.3 ft-lbs, which is above the 50 ft-lb criterion. SER Table 4.2-1 provides the staff's summary of the RV USE analysis for NMP1 and NMP2. Since the USE value for the limiting beltline material at the expiration of the extended license is projected to be above 50 ft-lbs, the USE values for the NMP2 limiting beltline materials comply with the criteria of 10 CFR Part 50, Appendix G. Therefore, the staff found that the USE values for NMP2 are acceptable.

Table 4.2-1 Reactor Vessel USE Analysis Summary for NMP1 and NMP2

RV Beltline Component	Acceptance Criterion for USE	Component Value for 54 EFPY	Acceptable (Y/N)
NMP1 Lower Shell Plate (Heat No. G-8-1)	Percent Drop < 29.5 percent drop in the USE ft-lb value (1)	19.2 Percent Drop in USE ft-lb	Yes [TLAA satisfies 10 CFR 54.21(c)(1)(ii)]
NMP1 Upper Shell Plate (Heat No. G-307-4)	Percent Drop < 29.5 percent drop in the USE ft-lb value (1)	24.9 Percent Drop in USE ft-lb	Yes [TLAA satisfies 10 CFR 54.21(c)(1)(ii)]
NMP1 Circumferential Weld (SAW) (Heat No.1248)	Projected USE > 50 ft-lbs	64 ft-lbs	Yes [TLAA satisfies 10 CFR 54.21(c)(1)(ii)]
NMP2 Number 2 Shell Plate (Heat No. C3147-1)	Projected USE > 50 ft-lbs	62.3 ft-lbs	Yes [TLAA satisfies 10 CFR 54.21(c)(1)(ii)]

RV Beltline Component	Acceptance Criterion for USE	Component Value for 54 EFPY	Acceptable (Y/N)
NMP2 Number 1 Shell Plate (Heat No. C3147-2)	Projected USE > 50 ft-lbs	76.5 ft-lbs	Yes [TLAA satisfies 10 CFR 54.21(c)(1)(ii)]
NMP2 Axial Weld (SAW) (Heat No. 5P5657/0931)	Projected USE > 50 ft-lbs	74 ft-lbs	Yes [TLAA satisfies 10 CFR 54.21(c)(1)(ii)]

NOTE:

(1) Acceptance criteria for beltline plates and welds established by elastic-plastic fracture mechanics analysis in BWRVIP-74-A (as discussed in BWRVIP-74 SE pages 4-10, 4-11 and 4-15).

4.2.1.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of USE calculations in ALRA Sections A1.2.1.1 and A2.2.1.1, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that there is reasonable assurance that the summary descriptions of the applicant's actions to address the USE calculations are adequate.

4.2.1.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that for the USE TLAA, the analyses have been projected to the end of the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the USE TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.2 Pressure-Temperature (P-T) Limits

4.2.2.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.2.2, the applicant summarized the evaluation of the P-T limits for the period of extended operation. Appendix G of 10 CFR 50 requires that the RPV be operated within established P-T limits during heatup and cooldown. These limits specify the maximum allowable pressure as a function of reactor coolant temperature. NMP1 and NMP2 technical specifications (TSs) contain P-T limit curves for heatup, cooldown, inservice leakage testing, and hydrostatic testing, and they limit the maximum rate of change of reactor coolant temperature. The P-T limit curves are periodically revised to account for changes in fracture toughness of the RPV components due to anticipated neutron embrittlement effects for higher accumulated fluences. Calculation of P-T limit curves using the projected fluence at the end of the period of extended operation would result in unnecessarily restrictive operating curves; however, projection of the ART, which is used in development of the curves, to the end of the period of extended operation provides assurance that development of P-T limit curves will be feasible up to the maximum predicted EFPY. There are no regulatory requirements for the maximum ART for BWRs. The need to minimize the ART is driven by operational considerations.

Calculations that project ART values at NMP satisfy the criteria of 10 CFR 54.3(a). As such, any related analysis is a TLAA. Projections of ART values for beltline materials, based on extrapolation using the most recent fluence results and fracture toughness data from surveillance capsule and P-T operating curve reporting, are found in ALRA Tables 4.2-3 and 4.2-4 for NMP1 and NMP2, respectively. The NMP1 values were computed for 46 EFPY, based on adding irradiation corresponding to an average capacity factor of 90 percent during the 20-year period of extended operation to the 28 EFPY exposure currently projected for the end of the original license term. The NMP2 values are based on irradiation for 54 EFPY, which corresponds to an average capacity of 90 percent over 60 years.

By letter dated October 27, 2003, the staff concludes that the supporting fluence calculations were performed using methods consistent with RG 1.190. For NMP1 and NMP2, projections of the ART values for the beltline materials have been made for the period of extended operation, providing reasonable assurance that it will be possible to prepare P-T curves that will permit continued plant operation. The P-T curves (and the related technical specifications) will continue to be updated either as required by 10 CFR Part 50, Appendix G to assure that the operational limits will remain valid at the current cumulative neutron fluence levels, or on an as-needed basis to provide appropriate operational flexibility. Therefore, re-evaluation of the P-T limits to consider the period of extended operation by using 10 CFR Part 50, Appendix G will be performed by the applicant in accordance with 10 CFR Part 54.21(c)(1)(iii), as clarified by the applicant's response dated December 5, 2005.

4.2.2.2 Staff Evaluation

By letters dated November 15, 2002, and August 15, 2003, the applicant submitted its current P-T limit curves for NMP1 and NMP2, respectively, that were calculated for exposures within the 32 EFPY operating period anticipated during the original 40-year plant licenses. The staff approved the P-T limit curves for NMP1 and NMP2 by SEs dated October 27, 2003, and January 27, 2004, respectively. The applicant plans to update its P-T limit curves, either as required by 10 CFR Part 50, Appendix G, to assure the operational limits remain valid at the current cumulative neutron fluence levels, or on an as-needed basis to provide appropriate operational flexibility. The staff found the applicant's plan to manage the P-T limits acceptable because the change in P-T curves will be implemented by the license amendment process (i.e., modifications of technical specifications) and will meet the requirements of 10 CFR 50.60 and 10 CFR Part 50, Appendix G. This is consistent with SRP-LR Section 4.2.2.1.3; therefore, the staff found this acceptable.

4.2.2.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of P-T limits in ALRA Sections A1.2.1.2 and A2.2.1.2, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the P-T limits are adequate.

4.2.2.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that for the P-T limits TLAA the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the P-T limits TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.2.3 Elimination of Circumferential Weld Inspection (NMP1 Only)

4.2.3.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.2.3, the applicant summarized the evaluation of the elimination of circumferential weld inspections for the period of extended operation. Relief from RPV circumferential weld examination requirements under GL 98-05, "Boiling Water Reactor Licensees Use Of The BWRVIP-05 Report To Request Relief From Augmented Examination Requirements On Reactor Pressure Vessel Circumferential Shell Welds," is based on probabilistic assessments that predict an acceptable probability of failure per reactor operating year. The analysis is based on RPV metallurgical conditions as well as flaw indication sizes and frequencies of occurrence that are expected at the end of the licensed operating period. By letter dated April 7, 1999, the NRC granted such relief to NMP1 for the remainder of its current 40-year license term. NMP2 has not submitted a relief request for the remainder of its 40-year licensed operating period. Therefore, the supporting evaluation applies only to NMP1. The associated circumferential weld examination relief analysis for NMP1 satisfies the criteria of 10 CFR 54.3(a); as such, this analysis is considered a TLAA.

The applicant provided the following disposition with respect to the conditional probability of vessel failure:

> Appendix E of the Final Safety Evaluation of the BWR Vessel and Internals Project, BWRVIP-05 Report, documented an evaluation of the impact of plant life extension from 32 EFPY to 64 EFPY on the conditional probability of vessel failure, P(FIE). This assessment reported that combining the P(FIE) due to circumferential weld failure with the frequency of cold overpressurization events results in a total vessel failure frequency as high as 5×10^{-7}/yr at 64 EFPY. In the SER for BWRVIP-74-A, the NRC staff determined that the analysis provides a technical basis for relief from the current inservice inspection requirements of ASME Section XI for volumetric examination of circumferential welds as they may apply for the license renewal period.
>
> Assumptions made in accepting the analysis discussed above are: (1) that the applicable neutron fluence is the end-of-life mean fluence, and (2) that the applicable chemistry values are mean values based on vessel types. The results of a scoping evaluation using comparable plant-specific parameters (presented in Table 4.2-5) indicate that projected values of mean and upper bound RT_{NDT} for the limiting circumferential weld at NMP1 is below the bounding mean RT_{NDT} determined by the NRC staff. Thus, there is

reasonable assurance the P(FIE) due to NMP1 RPV circumferential weld failure is bounded by the NRC analysis.

4.2.3.2 Staff Evaluation

The technical basis for relief is discussed in the staff's final SE concerning the BWRVIP-05 report, which is enclosed in a July 28, 1998, letter from Mr. G. C. Lainas, NRC, to Mr. C. Terry, BWRVIP Chairman. In this letter, the staff concludes that since the failure frequency for circumferential welds in BWR plants is significantly below the criterion specified in RG 1.154, "Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors," the continued inspection would result in a negligible decrease in an already acceptably low value of RPV failure. Therefore, elimination of the inservice inspection (ISI) for RPV circumferential welds is justified.

The staff's letter indicated that BWR applicants may request relief from ISI requirements of 10 CFR 50.55a(g) for the volumetric examination of circumferential RPV welds by demonstrating that (1) at the expiration of the license, the circumferential welds satisfy the limiting conditional failure probability for circumferential welds in the staff's July 28,1998, SE, and (2) the applicants have implemented operator training and established procedures that limit the frequency of cold over-pressure events to the frequency specified in the staff's July 28, 1998, SE. The letter indicated that the requirements for inspection of circumferential RPV welds during an additional 20-year license renewal period would be re-assessed, on a plant-specific basis, as part of any BWR LRA. Therefore, the applicant must request relief from inspection of circumferential welds during the license renewal period per 10 CFR 50.55a.

Section A.4.5 of the BWRVIP-74-A report indicates that the staff's SE for the BWRVIP-05 report conservatively evaluated the BWR RPVs to 64 EFPY, which is 10 EFPY greater than what is realistically expected for the end of the license renewal period. The staff used the mean RT_{NDT} value for materials to evaluate failure probability of BWR circumferential welds at 32 and 64 EFPY in the staff's SE dated July 28, 1998. The neutron fluence used in this evaluation was the neutron fluence at the weld inside surface.

Since the staff's analysis discussed in the BWRVIP-74-A report is a generic analysis, the applicant submitted plant-specific information to demonstrate that the NMP1 beltline materials meet the criteria specified in the report. To demonstrate that the NMP1 vessel has not become embrittled beyond the basis for the relief, the applicant, in ALRA Table 4.2-5, supplied material data at 64 EFPY for the limiting NMP1 circumferential welds so that the staff could compare it with the material data of the 64 EFPY reference case. The reference case can be found in Appendix E of the staff's SE of the BWRVIP-05 report.

The NMP1 material data included amounts of copper and nickel, CF, the neutron fluence, delta RT_{NDT}, initial RT_{NDT}, and mean RT_{NDT} values of the limiting circumferential weld at 64 EFPY. The staff has verified the data for the copper and nickel content and the initial RT_{NDT} values for NMP1 beltline materials by comparing them with the corresponding data in the RVID maintained by the NRC. The 64 EFPY mean RT_{NDT} value for NMP1 is 22.3 °F. The staff has checked the applicant's calculations for the 64 EFPY mean RT_{NDT} value for the NMP1 circumferential weld using the data presented in ALRA Table 4.2-5 and found them accurate. The 64 EFPY mean RT_{NDT} value for NMP1 is less than the 64 EFPY mean RT_{NDT} value of 113.2 °F used by the NRC for determining the conditional failure probability of a circumferential weld. It should be noted that the 64 EFPY mean RT_{NDT} value from the staff's SE dated July 28, 1998, is for a Combustion Engineering weld, which is applicable to NMP1, since Combustion Engineering welded the circumferential welds in the NMP1 vessel. Since the NMP1 64 EFPY mean RT_{NDT} value is less than the 64 EFPY value from the staff SE dated July 28, 1998, the staff concludes that the NMP1 RPV conditional failure probabilities are bounded by the staff analysis. SER Table 4.2-2 describes the staff's analysis of the NMP1 RV circumferential weld inspection relief.

The applicant stated that the procedures and training used to limit cold over-pressure events will be the same as those approved by the NRC when NMP1 requested the relief for the current license period, by letter dated December 10, 1998, "Proposed Alternatives for Examination of Reactor Pressure Vessel Shell Welds." The applicant stated that the procedures and training requirements identified in the NMP1 request to use the BWRVIP-05 report are provided in the document, "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Alternatives for Examination of Reactor Pressure Vessel Shell Welds, Nine Mile Point Nuclear Station, Unit 1," (attached to NRC letter to Niagra Mohawk Power Corporation dated April 7, 1999). The applicant further stated that the original LRA Section 4.2.3, and the associated UFSAR supplement Section A1.2.1.3, reference the SE letters identified above. The staff found this acceptable because the applicant identified the requested references and will include them in ALRA Section 4.2.3 and the associated UFSAR supplement Section A1.2.1.3.

The applicant indicated in the ALRA (Commitment Item 3 for NMP1) that it will apply for relief from circumferential weld inspections for the period of extended operation. In addition, the applicant indicated that supporting analyses, procedural controls, and operator training will be completed prior to the period of extended operation to confirm that the RPV circumferential weld failure probability remains acceptable for the period of extended operation.

The staff found that the applicant's evaluation for this TLAA is acceptable because the NMP1 64 EFPY conditional failure probabilities for the RPV circumferential welds are bounded by the NRC analysis in the staff's SE dated July 28, 1998, and the applicant will be using procedures and training to limit cold over-pressure events during the period of extended operation. This analysis satisfies the evaluation requirements of the staff's SE dated July 28,1998; however, the applicant is still required to request relief for the circumferential weld examination for the extended period of operation in accordance with 10 CFR 50.55a.

Table 4.2-2 RV Circumferential Weld Inspection Relief Analysis

RV Material	TLAA Basis	Acceptance Criterion (°F)	NMP1 Value (°F)	NMP2 Value (°F)
Limiting Circumferential Weld	BWRVIP-05 Mean RT_{NDT} Value in °F	< 113.2	22.3 (NMP) 22.4 (Staff)	N/A

- NMP2 has not submitted a relief request for the elimination of circumferential weld inspections for the remainder of its 40-year licensed operating period, therefore, the TLAA for the circumferential welds does not apply to NMP2.

- TLAAs for the circumferential weld mean RT_{NDT} values were in all cases determined to be acceptable under 10 CFR 54.21(c)(1)(i) or (ii).

4.2.3.3 UFSAR Supplement

The applicant provided a UFSAR supplement summary description of its TLAA evaluation of the elimination of circumferential weld inspections in ALRA Section A1.2.1.3. On the basis of its review of the UFSAR supplement, the staff concludes that the summary description of the applicant's actions to address the elimination of circumferential weld inspection is adequate.

4.2.3.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that for the elimination of circumferential weld inspection TLAA, the analyses have been projected to the end of the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the elimination of circumferential weld inspection TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.2.4 Axial Weld Failure Probability

4.2.4.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.2.4, the applicant summarized the evaluation of the axial weld failure probability for the period of extended operation. In the safety evaluation (SE) presented in the "Supplement to Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report," the staff indicated that the RPV failure frequency due to failure of the limiting axial welds in the BWR fleet at the end of 40 years of operation is less than 5×10^{-6} per reactor year, given the assumptions on flaw density, distribution, and location described in the SE. .

4.2.4.2 Staff Evaluation

In its July 28, 1998, letter to Mr. C. Terry, the BWRVIP Chairman, the staff identified a concern about the failure frequency of axially-oriented welds in BWR RPVs. In response to this concern, the BWRVIP supplied evaluations of axial weld failure frequency in letters dated December 15, 1998, and November 12, 1999. The staff's SE on these analyses is enclosed in a March 7, 2000, letter from Mr. J. Strosnider, NRC, to Mr. C. Terry, BWRVIP Chairman. By letter dated October 18, 2001, the staff issued "Acceptance for Referencing of EPRI Proprietary Report TR-113596, 'BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (BWRVIP-74-A)' and Appendix A, 'Demonstration of Compliance with the Technical Information Requirements of the License Renewal Rule (10 CFR 54.21),'" which endorsed the axial weld failure probability analysis for the period of extended operation.

The staff noted that the NMP1 and NMP2 RPVs are fabricated by Combustion Engineering. The staff performed a generic analysis for Combustion Engineering-fabricated RPVs using the Pilgrim Nuclear Power Plant as a model. The Pilgrim Nuclear Power Plant model demonstrated that a mean RT_{NDT} of 114 °F resulted in a failure frequency of 5 x 10^{-6} per reactor-year of operation. The applicant calculated, and the staff confirmed, that the limiting axial weld mean RT_{NDT} value for NMP1 and NMP2 at 64 EFPY is less than 114 °F. SER Table 4.2-3 describes the staff's analysis of the NMP1 and NMP2 RV axial weld failure probability. The results of these calculations support the conclusion that the failure frequencies for NMP1 and NMP2 will be less than 5 x 10^{-6} per reactor-year of operation at the end of their period of extended operation. Therefore, this analysis is acceptable.

Table 4.2-3 RV Axial Weld Probability of Failure Analysis

RV Material	TLAA Basis	Acceptance Criterion (°F)	NMP1 Value (°F)	NMP2 Value (°F)
Limiting Axial Weld	BWRVIP-05 Mean RT_{NDT} Value in °F	< 114.0	31.3 (NMP) 31.0 (Staff)	-5.0 (NMP) -5.0 (Staff)

4.2.4.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of axial weld failure probability in ALRA Sections A1.2.1.4 and A2.2.1.3, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the axial weld failure probability are adequate.

4.2.4.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that for the axial weld failure probability TLAA, the analyses have been projected to the end of the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the axial weld failure probability TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.3 <u>Metal Fatigue Analysis</u>

A metal component subjected to cyclic loading at loads less than the static design load may fail due to fatigue. Metal fatigue of components is evaluated based on an assumed number of transients or cycles for the current operating term. The validity of such metal fatigue analysis is reviewed for the period of extended operation.

The applicant discussed the fatigue design of NMPNS components in ALRA Section 4.3. The applicant indicated that designated plant events used for the fatigue design of components were counted and categorized. ALRA Table 4.3-1 lists NMP1 design transients and Table 4.3-2 lists NMP2 design transients. A linear projection of transient cycles indicated that the number of some events, such as heatup and cooldowns, may exceed the number used for the design of the components during the period of extended operation. The applicant indicated that locations with a design baseline fatigue usage greater than 0.4 would require additional evaluation. The applicant committed to implement FatiguePro fatigue monitoring software for locations that require additional evaluation to demonstrate acceptable fatigue usage prior to the period of extended operation.

4.3.1 Reactor Vessel Fatigue Analysis

4.3.1.1 Summary of Technical Information in the Amended Application

The applicant discussed the design of the NMP1 and NMP2 reactor vessels in ALRA Section 4.3.1. The NMP1 reactor vessel was designed to the ASME Boiler and Pressure Vessel Code, Section I-1962; and the NMP2 reactor vessel was designed to the ASME Boiler and Pressure Vessel Code, Section III, 1971 Edition through Winter 1972 Addenda. The applicant indicated that the fatigue usage of the pressure boundary components of both units was evaluated using ASME Section III methods. ALRA Table 4.3-3 lists the limiting design cumulative usage factors (CUFs) for the NMP1 vessel components, and Table 4.3-4 lists the limiting design CUFs for the NMP2 vessel components. The applicant indicated that transients contributing to fatigue usage of these vessel components will be monitored by the NMPNS Fatigue Monitoring Program (FMP). The FMP is described in ALRA Appendix B. The applicant concluded that the effects of fatigue on the intended function(s) of RPV components will be adequately managed by the FMP in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.1.2 Staff Evaluation

Components of the NMP2 reactor coolant pressure boundary (RCPB), including the RPV, were designed to the Class 1 requirements of the ASME Code. The Class 1 requirements contain explicit criteria for the fatigue analysis of components. In addition, fatigue of the NMP1 reactor pressure vessel was evaluated using ASME Section III fatigue criteria.

The specific design criterion for fatigue analysis of RCPB components involves calculating the CUF. The fatigue damage in the component caused by each thermal or pressure transient depends on the magnitude of the stresses caused by the transient. The CUF sums the fatigue damage resulting from each transient. The design criterion requires that the CUF not exceed 1.0.

The staff's review of the original LRA Section 4.3.1 identified areas in which additional information was necessary to complete the review of the reactor vessel fatigue analysis. The applicant responded to the staff's RAIs as discussed below.

In RAI 4.3.1-3, dated November 10, 2004, the staff stated that the original LRA Table 4.3-1 lists the design transients for NMP1 and confirmed that these design transients are the same as the design transients listed in NMP UFSAR Table V-5. In the RAI, the staff stated that Note 2 to the original LRA Table 4.3-1 indicated that a number of the transients were not counted/monitored prior to 2000. The note contained the statement: "Data listed for allowable design transients are incremental values for the balance of the original license term." Therefore, the staff requested that the applicant clarify the intent of that statement. The staff also requested that the applicant indicate the method used to estimate the number of cycles prior to the year 2000 for those design transients identified by Note 2.

The applicant's response, by letter dated December 6, 2004, has been subsequently incorporated in the ALRA as discussed below.

The applicant modified the footnotes to the original LRA Table 4.3-1 in its ALRA submittal. Note 4 to the revised table indicates that only transients affecting the feedwater nozzle were originally monitored because the feedwater nozzle was considered the bounding fatigue usage location for the NMP1 RPV. The applicant's July 14, 2005, revised response to RAI 4.3.1-3 stated that the transients not monitored prior to the year 2000 involve operation of the shutdown cooling and emergency cooling systems that affect the reactor recirculation nozzles. The applicant discovered, in the year 2000, that these shutdown cooling and emergency cooling transients had not been accounted for in the original fatigue calculations. According to the applicant, only the transients associated with the emergency condenser (EC) initiation on an isolated loop and EC initiation on an idle loop produced any significant fatigue usage. The applicant indicated that an evaluation of the nozzles for these EC initiation transients resulted in CUFs below 0.1. The applicant further indicated that a review of the NMP1 operating history found that the number of EC initiations listed in ALRA Table 4.3-1, used for the fatigue evaluation, is conservative for 40 years of plant operation. The applicant concluded that the fatigue usage of recirculation nozzles will remain well within the allowable limit during the period of extended operation. On the basis of the information provided by the applicant, the staff agreed that the fatigue usage of the reactor recirculation nozzles will remain well within the allowable limit during the period of extended operation. The staff found the applicant had adequately demonstrated that the analyses of the recirculation nozzles remain valid for the period of extended operation. Therefore, the staff's concern described in RAI 4.3.1-3 is resolved.

In RAI 4.3.1-4, dated November 10, 2004, the staff stated that the original LRA Table 4.3-2 lists the design transients for NMP2. The table does not list the 75 percent power reduction that is listed in USAR Table 3.9B-1. Therefore, the staff requested that the applicant explain why this transient was not included in the original LRA Table 4.3-2 of the application.

In its response, by letter dated December 6, 2004, the applicant indicated that the daily reduction to 75 percent power was combined with weekly reduction to 50 percent power for counting purposes. The combined transients are listed as power changes greater than or equal to 25 percent in the original LRA Table 4.3-2. The applicant listed the smallest number of cycles for either transient (2000 cycles for the reduction to 50 percent power) as the allowable number for the combined transients. Therefore, the staff concludes that the applicant used a conservative value for the number of allowable cycles for the combined transients. The staff found that the applicant's FMP adequately addresses the NMP2 design transients listed in USAR Table 3.9B-1. Therefore, the staff's concern described in RAI 4.3.1-4 is resolved.

In RAI 4.3.1-1, dated November 10, 2004, the staff stated that in the original LRA Section 4.3.1, the applicant indicated that the fatigue usage of RPV components will be monitored at critical locations for NMP1 and NMP2. The applicant stated that the transients contributing to the fatigue usage will be monitored by the FMP. The applicant further indicated that these locations would include the components identified in NUREG/CR-6260. Original LRA Tables 4.3-3 and 4.3-4 list the RPV locations that will be monitored by the FMP. These tables do not list all of the locations identified in NUREG/CR-6260. Therefore, the staff requested that the applicant clarify that all locations identified in NUREG/CR-6260 will be monitored by the FMP. The staff also requested that the applicant provide a complete list of all locations that will be monitored by the FMP for NMP1 and NMP2.

In its response, by letter dated December 6, 2004, the applicant stated that Tables 1 and 2 contain a comparison of the NMP1 and NMP2 locations monitored by the FMP with those listed in NUREG/CR-6260. The applicant indicated that some of the monitored locations for NMP1 are described in the original LRA Section 4.3.4. The applicant stated that NMP1 does not have a residual heat removal (RHR) system; therefore, the NMP1 shutdown cooling return line was selected as an alternative line for the environmental fatigue assessment. The staff found the shutdown cooling return line an acceptable alternative to the RHR line listed in NUREG/CR-6260. The staff concludes that the applicant's FMP monitors the NUREG/CR-6260 locations or acceptable alternatives at NMP1.

Table 2 of the applicant's response lists the NUREG/CR-6260 locations for a newer vintage BWR. The applicant indicated that most of the NUREG/CR-6260 locations that will be monitored for NMP2 are listed in the original LRA Table 4.3-4 or discussed in Section 4.3.4. The applicant also indicated that the NMP2 feedwater line Class 1 piping is listed in the original LRA Table 4.3-5. The staff noted that the NMP2 RHR locations are actually discussed in the original LRA Section 4.3.2 and not Section 4.3.4. The staff review of the original LRA Section 4.3.2 and Tables 4.3-4 and 4.3-5 confirmed that all of the NUREG/CR-6260 locations have been addressed by the applicant. The staff found that the applicant's FMP monitors the locations listed in NUREG/CR-6260 at NMP2. Therefore, the staff's concern described in RAI 4.3.1-1 is resolved.

In RAI 4.3.1-2, dated November 10, 2004, the applicant stated that the original LRA Tables 4.3-3 and 4.3-4 indicate that stress-based fatigue monitoring will be used to track the fatigue usage for the NMP1 and NMP2 feedwater nozzles. Therefore, the staff requested that the applicant describe the method used to estimate the fatigue usage of these nozzles prior to implementation of the stress-based fatigue monitoring.

In its response, by letter dated December 6, 2004, the applicant indicated that a baseline fatigue usage value would be established from a calculation using the number of cycles accumulated to date. The fatigue usage developed from the stress-based monitoring will be added to this baseline value. The applicant also indicated that the results from the stress-based monitoring will be used to confirm the conservatism of the baseline fatigue usage value. Based on industry experience with stress-based fatigue monitoring, the staff expected that stress-based fatigue monitoring would confirm the conservatism of the applicant's baseline fatigue usage value. The staff found the applicant's method of estimating the fatigue usage of the feedwater nozzles prior to implementation of the stress-based fatigue monitoring acceptable. Therefore, the staff's concern described in RAI 4.3.1-2 is resolved.

4.3.1.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of reactor vessel fatigue analysis in ALRA Sections A1.2.2.1 and A2.2.2.1, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the reactor vessel fatigue analysis are adequate.

4.3.1.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that for the RPV fatigue TLAA, the effects of aging on the intended functions will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR and USAR supplements contain an appropriate summary description of the RPV fatigue TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.3.2 ASME Section III Class 1 Piping and Components Fatigue Analysis (NMP2 Only)

4.3.2.1 Summary of Technical Information in the Amended Application

The applicant discussed the design of the remaining NMP2 RCPB components in ALRA Section 4.3.2. These components were evaluated using the ASME Section III Class 1 fatigue criteria. The applicant indicated that the bounding piping locations would by monitored by the FMP. The bounding locations are listed in ALRA Table 4.3-5. The applicant stated that the effects of fatigue on the intended functions of ASME Class 1 piping and components will be adequately managed by the FMP in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.2.2 Staff Evaluation

The NMP2 RCPB (ASME Section III, Class 1) piping components were explicitly evaluated for fatigue. As discussed in the previous section of this SER, the applicant monitors critical fatigue locations with the FMP. The applicant indicated that, in addition to meeting the ASME criterion that the CUF remain less than 1.0, the CUF should not exceed 0.1 in the break exclusion zone. In ALRA Table 4.3-5, the applicant listed the limiting locations for fatigue usage, including the limiting fatigue usage locations in the pipe break exclusion zone. The applicant indicated that the FMP will monitor these locations. The applicant also indicated that piping components equivalent to those identified in NUREG/CR-6260 would also be monitored by the FMP. The applicant's selection of the NUREG/CR-6260 locations is discussed in the previous section of this SER. The staff found that these locations, combined with the locations listed in ALRA Table 4.3-4, including the additional NUREG/CR-6260 locations discussed ALRA Section 4.3.2, provide an acceptable sample of critical components to monitor the fatigue usage of the NMP2 RCPB during the period of extended operation.

4.3.2.3 USAR Supplement

The applicant provided a USAR supplement summary description of its TLAA evaluation of ASME Section III Class 1 piping and components fatigue analysis in ALRA Section A2.2.2.2. On the basis of its review of the USAR supplement, the staff concludes that the summary description of the applicant's actions to address the ASME Section III Class 1 piping and components fatigue analysis is adequate.

4.3.2.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that, for the

ASME Section III Class 1 piping and components fatigue analysis TLAA, the effects of aging on the intended functions will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the ASME Section III Class 1 piping and components fatigue analysis TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.3.3 Feedwater Nozzle and Control Rod Drive Return Line (CRDRL) Nozzle Fatigue and Cracking Analyses

4.3.3.1 Summary of Technical Information in the Amended Application

The applicant discussed the feedwater (FW) nozzle and the control rod drive return line (CRDRL) nozzle fatigue and cracking analyses in ALRA Section 4.3.3. Cracking has occurred in FW and CRDRL nozzles at several BWRs. NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," identified actions to address the problem. The applicant indicated that the NMP1 FWS was modified to meet requirements of NUREG-0619 because of cracking detected in 1977. The applicant stated that no reportable indications were identified during subsequent inspections. The applicant also indicated that revised fatigue and crack growth analyses were performed in 1999 based on updated plant data. An annual fatigue usage of 0.003 was calculated. The applicant stated that no cracking was found in the NMP1 CRDRL nozzle.

The applicant indicated that the NMP2 FW nozzles employ the improved interference fit sparger design discussed in NUREG-0619. The improved design is less susceptible to fatigue cracking. However, linear projections of the number of startup and shutdown cycles indicate that the CUF could exceed 1.0 prior to the period of extended operation. Additionally, the applicant stated that indications detected in dissimilar welds associated with the NMP2 FW nozzles had been repaired by a weld overlay process. The applicant indicated that a conservative number of startup and shutdown cycles was assumed for the crack growth analysis. The applicant stated that the CRDRL nozzle was cut and capped at NMP2 eliminating the fatigue cracking concern for NMP2.

The applicant indicated that transients contributing to the fatigue usage of the NMP1 and NMP2 FW nozzles would be tracked by the NMPNS FMP and, if necessary, that corrective actions would be implemented. The applicant concluded that the effects of fatigue on the intended function(s) of FW and CRDRL nozzles will be adequately managed by the FMP in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.3.2 Staff Evaluation

The applicant performed evaluations to address generic industry and plant-specific concerns related to FW and CRDRL nozzle cracking described in NUREG-0619. FW nozzle cracking was detected at NMP1 in 1977. The applicant implemented several modifications to minimize potential cracking, including incorporation of an improved thermal sleeve/feedwater sparger design. The evaluation of the new design included fatigue and flaw growth analyses. The applicant updated these analyses in 1999. The applicant relies on the FMP to track the transients associated with these analyses. The staff found the applicant's FMP will adequately manage the fatigue and flaw growth analyses of the NMP1 thermal sleeve/feedwater sparger design during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

The applicant projected that the fatigue usage of the NMP1 CRDRL nozzle will remain significantly below 1.0 during the period of extended operation. The staff found that the fatigue usage of the CRDRL nozzle had been adequately projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). In addition, the applicant indicated that NMP1 will continue to perform enhanced inspections of the CRDRL nozzle in accordance with NMP1 commitments related to NUREG-0619.

The staff's review of the original LRA Section 4.3.3 identified an area in which additional information was necessary to complete the review of the feedwater nozzle and control rod drive return line (CRDRL) nozzle fatigue and cracking analyses. The applicant responded to the staff's RAI as discussed below.

In RAI 4.3.3, dated February 22, 2005, the staff requested that the applicant explain how the flaw growth analysis of the FW and CRDRL nozzles was dispositioned for the period of extended operation.

The applicant's July 14, 2005, response to RAI 4.3.3, indicated that the crack growth analysis, using estimated transient cycles, predicted that the postulated flaw would not grow to an unacceptable value during the period of extended operation. The applicant performed a crack growth analysis of the NMP1 CRDRL nozzle in 1994 to demonstrate that small surface flaws would not grow to unacceptable values within the original 40-year license period. The staff also found that the applicant had adequately projected the NMP1 CRDRL crack growth analysis to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). In addition, the applicant indicated that it would rely on its enhanced ultrasonic inspections performed at each 10-year inservice inspection interval to detect CRDRL nozzle cracking. The applicant's inspection program is described in ALRA Section B2.1.37. The applicant's CRDRL nozzle inspection program will provide assurance that small surface flaws in the CRDRL nozzle will not grow to unacceptable values during the period of extended operation.

The applicant stated that a linear projection of the NMP2 startup/shutdown cycles to date indicates that the number assumed in the original design may be exceeded prior to the period of extended operation. As a consequence, the fatigue usage of the FW nozzles may exceed the allowable limit during the period of extended operation. The applicant also stated that indications in the dissimilar metal weld associated with the NMP2 FW nozzles had been repaired by a weld overlay process. The applicant will track the fatigue usage of the FW nozzle with the FMP, and will reassess the original fatigue crack growth calculation if necessary. The staff found that the applicant's FMP, which tracks the number of startup/shutdown cycles, will adequately manage the fatigue and crack growth analyses of the NMP2 FW nozzles during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

The applicant indicated that the NMP2 CRDRL nozzle was cut and capped, thus eliminating the fatigue concern with the NMP2 CRDRL nozzle. The staff agreed with the applicant's assessment.

The applicant indicated that transients contributing to the fatigue usage of NMP1 and NMP2 FW nozzles will be tracked by the NMPNS FMP during the period of extended operation. It was indicated that the FMP will be consistent with GALL Report, Section X.M.1, "Metal Fatigue of Reactor Coolant Pressure Boundary," prior to the period of extended operation. The applicant also stated that corrective actions such as reanalysis, enhanced inspection, or repair/replacement will be implemented if fatigue trending shows that acceptable fatigue usage cannot be maintained during the period of extended operation.

GALL Report, Section X.M.1 recommends that the applicant take appropriate corrective actions to prevent the CUF, including reactor coolant environmental effects, from exceeding the design Code limit during the period of extended operation. Acceptable corrective actions include a more rigorous analysis of the component to demonstrate that the design Code limit will not be exceeded, and repair or replacement of the component. However, the recommendations of the GALL Report, Section X.M.1 does not specify enhanced inspection as an acceptable corrective action. The staff noted that the use of an enhanced inspection program, in lieu of meeting the design fatigue usage, will require prior staff review and approval. An AMP using enhanced inspection would be a departure from the design basis CUF, described in the UFSAR and, therefore, would require a separate license amendment pursuant to 10 CFR 50.59.

On the basis of the above discussion, the staff found the applicant's FMP will adequately manage the fatigue usage and crack growth of the NMP1 and NMP2 FW nozzles during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). However, the staff notes that enhanced inspection would be a departure from the design basis CUF, described in the UFSAR and, therefore, would require a NRC approval pursuant to 10 CFR 50.59. The staff's concern described in RAI 4.3.3 is resolved.

4.3.3.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of FW nozzle and CRDRL nozzle fatigue and cracking analysis in ALRA Sections A1.2.2.2 and A2.2.2.3, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the FW nozzle and CRDRL nozzle fatigue and cracking analysis are adequate.

4.3.3.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the NMP1 and NMP2 FW nozzle fatigue and cracking analyses TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff further concludes that the applicant has provided an acceptable evaluation to demonstrate that the NMP1 CRDRL nozzle fatigue and crack growth analyses have been adequately projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). The staff also concludes that the UFSAR and USAR supplements contain appropriate summary descriptions of the FW nozzle and the CRDRL nozzle fatigue and cracking analyses TLAA evaluations for the period of extended operation, as required by 10 CFR 54.21(d).

4.3.4 Non-ASME Section III Class 1 Piping and Components Fatigue Analysis

4.3.4.1 Summary of Technical Information in the Amended Application

Non-ASME Section III Class 1 piping and components were designed to ASA B31.1 and ASME Section III Class 2 and 3 criteria. The piping components require that a stress reduction factor be applied to the allowable thermal bending stress range if the number of full range cycles exceeds 7,000. The B31.1 criteria were used in the design of the NMP1 RCPB piping. The applicant identified several NMP1 systems for further detailed fatigue analyses. These include locations listed in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components." The applicant committed to develop baseline CUFs for these systems prior to the period of extended operation.

The applicant indicated that, if fatigue monitoring of ASME Class 1 piping at NMP2 indicates higher fatigue usage than expected, then the non-ASME Class 1 piping will be evaluated for possible fatigue concerns. The applicant concludes that the effects of fatigue on the intended function(s) of non-ASME Class 1 piping and components included in the FMP will be adequately managed by the FMP in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.4.2 Staff Evaluation

The applicant indicted that the NMP1 RCPB piping was designed to the ASA B31.1-1955 piping code, which did not require an explicit fatigue analysis of piping system components. The applicant committed to develop baseline fatigue usage factors for the following selected portions of the following NMP1 systems prior to the period of extended operation:

- feedwater/high pressure coolant injection system,
- core spray system,
- reactor water cleanup system,
- reactor recirculation system and associated shutdown cooling lines

The staff found the applicant's commitment to develop baseline fatigue usage factors for the systems listed above acceptable. The applicant indicated that locations where the baseline fatigue usage factor exceeds 0.4 would be monitored by the NMPNS FMP during the period of extended operation. As discussed in SER Section 4.3.1.2, the applicant selected the NUREG/CR-6260 locations or acceptable alternatives for fatigue monitoring at NMP1. Therefore, the staff found that the locations listed above, combined with the reactor vessel locations listed in ALRA Table 4.3-3, provide an acceptable sample of critical components to monitor the fatigue usage of the NMP1 RCPB components during the period of extended operation.

The staff found that the applicant's FMP will adequately manage the fatigue usage of the NMP1 RCPB components during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

The design of the remaining NMP1 and NMP2 non-ASME Section III Class 1 piping systems are governed by criteria that limit the number of full range stress cycles due to thermal bending to 7000 cycles. The applicant indicated that if the fatigue monitoring of Class 1 piping indicates higher fatigue usage than expected, the non-Class 1 piping will be evaluated for possible fatigue concerns. The staff noted that the applicant's program monitors locations of high fatigue usage. The staff found that these locations provide a reasonable sample to monitor the potential fatigue usage of the non-ASME Class 1 piping systems at NMP1 and NMP2 because the monitored locations include the expected plant thermal transient cycles, including plant startup/shutdown cycles. The staff found that the applicant's FMP, which tracks the number of expected thermal transient cycles, will adequately manage the fatigue of the NMP1 and NMP2 non-ASME Section III Class 1 piping during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.4.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of non-ASME Section III Class 1 piping and components fatigue analysis in ALRA Sections A1.2.2.3 and A2.2.2.4, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the non-ASME Section III Class 1 piping and components fatigue analysis are adequate.

4.3.4.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the non-ASME Section III Class 1 piping and components fatigue analysis TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR and USAR supplements contain appropriate summary descriptions of the non-ASME Section III Class 1 piping and components fatigue analysis TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.5 Reactor Vessel Internals Fatigue Analysis

4.3.5.1 Summary of Technical Information in the Amended Application

The applicant discussed the fatigue analysis of the reactor vessel internals (RVI) in ALRA Section 4.3.5. The applicant indicated that fatigue analysis was not a design requirement for the RVI at NMPNS. However, fatigue analyses were performed for the core shroud repair at NMP1 and certain locations in the NMP2 RVI. ALRA Table 4.3-6 lists the CUFs associated with these locations. The applicant committed to further evaluation of those locations where the CUF exceeds 0.4 prior to the period of extended operation and to take appropriate correctives actions if necessary. The applicant concluded that the effects of fatigue on the intended function(s) of the RVI will be adequately managed by the FMP in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.5.2 Staff Evaluation

Even though fatigue analysis of the RVI is not a design requirement at NMPNS, the applicant evaluated certain locations at NMP1 and NMP2. These locations are listed in ALRA Table 4.3-6. The NMP1 locations include the core shroud vertical weld repair clamps and the core shroud stabilizer tie-rod assemblies. The applicant reported a relatively low fatigue usage (less than 0.1) for repair clamps for the 40-year design life. The staff concludes that the fatigue usage will remain within the allowable limit for the period of extended operation. The applicant also indicated that the tie-rods were designed for a 25-year design life.

The staff's review of the original LRA Section 4.3.6 identified an area in which additional information was necessary to complete the review of the reactor vessel internals fatigue analysis. The applicant responded to the staff's RAI as discussed below.

In RAI 4.3.6, dated February 22, 2005, the staff requested that the applicant provide additional information regarding the disposition after the 25-year design life.

In its response, by letter dated July 14, 2005, the applicant indicated that the 25-year design life was based on the original license expiration plus 10 years. The applicant also indicated that the 25-year design life was not based on a design limitation relative to any specific component of the tie-rod assembly. The applicant stated that the projected fatigue usage of the tie-rods would remain well within the allowable limit of 1.0 during the period of extended operation. The staff concludes that the applicant has demonstrated that the NMP1 RVI fatigue analyses will remain valid for the period of extended operation. Therefore, the staff found that the fatigue usage of the tie-rods has been adequately projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). In addition, the applicant indicated that potential for cracking of the RVI components will be managed by the BWRVIP. The BWRVIP is described in ALRA Section B2.1.8.

The applicant indicated that the controlling loading for the NMP2 RVI locations is flow-induced vibrations and other dynamic loads. The applicant committed, as stated in Commitment Item 6 in the ALRA, dated July 14, 2005, to evaluate all locations where the 40-year design CUF exceeds 0.4 prior to the period of extended operation. The applicant indicated that corrective actions would be taken if the RVI evaluation does not demonstrate acceptable fatigue usage. Corrective actions acceptable to the staff are part of the NMPNS FMP. The staff found the applicant's commitment to further evaluation of the limiting NMP2 RVI internal locations prior to the period of extended operation acceptable. In addition, the applicant indicated that the potential for RVI cracking is managed by the BWRVIP described in ALRA Section B2.1.8. Therefore, the staff's concern described in RAI 4.3.6 is resolved.

4.3.5.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of RVI fatigue analysis in ALRA Sections A1.2.2.4 and A2.2.2.5, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the RVI fatigue analysis are adequate.

4.3.5.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the RVI fatigue analysis TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR and USAR supplements contain appropriate summary descriptions of the RVI fatigue analysis TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.3.6 Environmentally Assisted Fatigue

4.3.6.1 Summary of Technical Information in the Amended Application

The applicant indicated that NMP1 and NMP2 will assess the impact of the reactor coolant environment on a sample of components, including locations equivalent to those listed in NUREG/CR-6260. The applicant indicated that the evaluation would be completed prior to the period of extended operation. The applicant concludes that the effects of environmentally assisted fatigue will be adequately managed for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.6.2 Staff Evaluation

The applicant indicated that the FMP will continue during the period of extended operation and will assure that design cycle limits are not exceeded. The applicant's FMP tracks transients and cycles of RCS components that have explicit design transient cycles to assure that these components remain within their design basis. Generic safety issue (GSI)-166, "Adequacy of the Fatigue Life of Metal Components," raised concerns regarding the conservatism of the fatigue curves used in the design of the RCS components. Although GSI-166 was resolved for the current 40-year design life of operating components, the staff identified GSI-190, "Fatigue Evaluation of Metal Components for 60-year Plant Life," to address license renewal. The NRC closed GSI-190 in December, 1999, concluding:

> The results of the probabilistic analyses, along with the sensitivity studies performed, the iterations with industry (NEI and EPRI), and the different approaches available to the licensees to manage the effects of aging, lead to the conclusion that no generic regulatory action is required, and that GSI-190 is closed. This conclusion is based primarily on the negligible calculated increases in core damage frequency in going from 40 to 60 year lives. However, the calculations supporting resolution of this issue, which included consideration of environmental effects, and the nature of age-related degradation indicate the potential for an increase in the frequency of pipe leaks as plants continue to operate. Thus, the staff concludes that, consistent with existing requirements in 10 CFR 54.21, licensees should address the effects of coolant environment on component fatigue life as aging management programs are formulated in support of license renewal.

The applicant committed to assess the impact of the reactor coolant environment on a sample of critical component locations, including the locations equivalent to those identified in NUREG/CR-6260 prior to the period of extended operation as part of the NMPNS FMP. The applicant indicated that the FMP will be consistent with NUREG-1801, Section X.M.1, "Metal Fatigue of Reactor Coolant Pressure Boundary," prior to the period of extended operation. The guidance of GALL Report, Section X.M.1 is that the applicant should take appropriate corrective actions to prevent the CUF, including reactor coolant environmental effects, from exceeding the design Code limit during the period of extended operation. Acceptable corrective actions include a more rigorous analysis of the component to demonstrate that the design Code limit will not be exceeded, and repair or replacement of the component. The staff discussed the applicant's selection of the NUREG/CR-6260 locations in SER Section 4.3.1.2 The staff found the applicant's commitment to assess the impact of the reactor coolant environment on a sample of critical NMP1 and NMP2 components prior to the period of extended operation acceptable.

4.3.6.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of environmentally assisted fatigue in ALRA Sections A1.2.2.5 and A2.2.2.6, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address environmentally assisted fatigue are adequate.

4.3.6.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that, for the environmentally assisted fatigue TLAA, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the environmentally assisted fatigue TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.3.7 Fatigue of the Emergency Condenser (NMP1 Only)

4.3.7.1 Summary of Technical Information in the Amended Application

The applicant discussed the fatigue analysis of the NMP1 emergency condenser in ALRA Section 4.3.7. The applicant indicated that a fatigue analysis of the emergency condenser was performed after tubing failures attributed to thermal cycling were identified in 1997. The applicant listed the fatigue usage for the limiting locations in Table 4.3-7. The applicant indicated that the NMPNS FMP will track the transients specific to the emergency condensers. The applicant concluded that the effects of fatigue on the intended function(s) of the NMP1 emergency condensers will be adequately managed in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3.7.2 Staff Evaluation

The applicant indicated that the NMP1 emergency condensers were designed in accordance with ASME Section III Class 2 and 3 criteria, which do not require an explicit fatigue analysis for thermal transients. However, tubing failures in 1997 were attributed to thermal fatigue resulting from leakage past the condensate return line. As part of its corrective action, the applicant identified applicable thermal transients and performed a fatigue analysis of the condensers. The limiting locations are shown in ALRA Table 4.3-7. The applicant indicated that these locations would be monitored by the NMPNS FMP. The staff found that the applicant's FMP will adequately manage the fatigue usage of the NMP1 condensers during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.7.3 UFSAR Supplement

The applicant provided a UFSAR supplement summary description of its TLAA evaluation of fatigue of the emergency condenser in ALRA Section A1.2.2.6. On the basis of its review of the UFSAR supplement, the staff concludes that the summary description of the applicant's actions to address the fatigue of the emergency condenser is adequate.

4.3.7.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding fatigue of the emergency condenser TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the emergency condenser TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.4 Environmental Qualification

4.4.1 Electrical Equipment EQ

The NRC has established nuclear station EQ requirements in 10 CFR 50, Appendix A, Criterion 4, and 10 CFR 50.49, which specifically require that an EQ program be established to demonstrate that certain electrical components located in "harsh" plant environments (i.e., those areas of the plant that could be subject to the harsh environmental effects of a loss-of-coolant accident (LOCA), high-energy line breaks (HELBs), or post-LOCA radiation) are qualified to perform their safety function in those harsh environments after the effects of in-service aging. Section 50.49 of 10 CFR requires that the effects of significant aging mechanisms be addressed as part of environmental qualification. For the purpose of license renewal, only those components with a qualified life of 40 years or greater would be TLAAs.

The staff reviewed ALRA Section 4.4.1, "Electrical Equipment EQ," in which the applicant described the technical bases and justification for the NMPNS EQ Program, together with other plant programs and processes that adequately manage the effects of aging on the intended function(s) of electrical components for the period of extended operation. The staff reviewed this section of the ALRA to determine whether the applicant had demonstrated that the effects of aging on the intended function(s) of the electrical equipment will be adequately managed through the NMPNS EQ Program, together with other programs and processes, during the period of extended operations as required by 10 CFR 54.21(c)(1)(iii).

4.4.1.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.4.1, the applicant summarized the evaluation of electrical equipment EQ for the period of extended operation. Section 50.49 of 10 CFR requires that certain SR and NSR electrical equipment remain functional during and after identified DBEs. To establish reasonable assurance that this equipment can function when exposed to postulated harsh environmental conditions, applicants are required to determine the equipment's qualified life and to develop a program that maintains the qualification of that equipment. Determination of qualified life is an ongoing activity that considers both normal and accident operating environments.

4.4.1.2 Staff Evaluation

The staff reviewed ALRA Section 4.4.1 to determine whether the applicant had submitted adequate information to meet the requirement of 10 CFR 54.21(c)(1). For the electrical equipment identified in ALRA Table 4.1-1, the applicant used 10 CFR 54.21(c)(1)(iii) in its TLAA evaluation to demonstrate that the aging effects of EQ equipment will be adequately managed during the period of extended operation. The staff reviewed the EQ Program to determine whether it will assure that the electrical and I&C components covered under this program will continue to perform their intended functions consistent with the CLB for the period of extended operation. The staff's evaluation of the components' qualification focused on how the EQ Program manages the aging effects to meet the requirements delineated in 10 CFR 50.49.

The applicant's program activities establish, demonstrate, and document the level of qualification, qualified configuration, maintenance, surveillance, and replacement requirements necessary to meet 10 CFR 50.49. Qualified life is determined for equipment within the scope of the EQ Program and appropriate actions, replacement or refurbishment, are taken prior to or at the end of qualified life of the equipment so that aging limits or acceptable margins are not exceeded.

4.4.1.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of electrical equipment EQ in ALRA Sections A1.2.3.1 and A2.2.3.1, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address electrical equipment EQ are adequate.

4.4.1.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the electrical equipment EQ TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR and USAR supplements contain appropriate summary descriptions of the electrical equipment EQ TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.4.2 Mechanical Equipment EQ (NMP2 Only)

The staff has established nuclear station EQ requirements in 10 CFR 50, Appendix A, Criterion 4, which require that an EQ Program be established to demonstrate that nonmetallic subcomponents comprising SR mechanical equipment located in "harsh" plant environments (i.e., those areas of the plant that could be subject to the harsh environmental effects of a LOCA, HELB, or post-LOCA radiation) are qualified to perform their safety function in those harsh environments after the effects of in-service aging. For the purpose of license renewal, only those components with a qualified life of 40 years or greater would be TLAAs.

The staff reviewed ALRA Section 4.4.2, "Mechanical Equipment EQ (NMP 2 Only)," in which the applicant described the technical bases and justification for the NMPNS EQ Program, together with other plant programs and processes that adequately manage the effects of aging on the intended function(s) of mechanical components for the period of extended operation. The staff reviewed this section of the ALRA to determine whether the applicant had demonstrated that the effects of aging on the intended function(s) of the mechanical equipment will be adequately managed through the NMPNS EQ Program, together with other programs and processes, during the period of extended operations as required by 10 CFR 54.21(c)(1)(iii).

4.4.2.1 Summary of Technical Information in the Application

The applicant stated the NMPNS EQ Program has been established to designate equipment, demonstrate qualification, and ensure that the correct preventive and corrective maintenance activities are conducted to maintain equipment qualification (refer to Appendix B3.1). Furthermore, when required by ongoing analyses of updated or revised test data, accident profiles, or normal operating environments, re-evaluation of qualified life determinations are conducted in accordance with EQ Program requirements.

The applicant confirmed that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. For components within the scope of the NMPNS EQ Program, analyses of thermal exposure, radiation exposure, and mechanical cycle aging that cannot be shown to remain valid for the period of extended operation will be reviewed as part of the ongoing EQ Program to extend the qualification of components before reaching the aging limits established in the applicable evaluation, or the components will be refurbished or replaced. Therefore, the effects of aging on components included in the EQ Program will be adequately managed in accordance with 10 CFR 54.21(c)(1)(iii).

4.4.2.2 Staff Evaluation

The staff reviewed ALRA Section 4.4.2 to determine whether the applicant submitted adequate information to meet the requirement of 10 CFR 54.21(c)(1). For the mechanical equipment identified in ALRA Table 4.1-1, the applicant used **10 CFR** 54.21(c)(1)(iii) in its TLAA evaluation to demonstrate that the aging effects of EQ equipment will be adequately managed during the period of extended operation. The staff reviewed the EQ Program to determine whether it will assure that the nonmetallic materials used in SR mechanical equipment covered under this program will continue to perform their intended functions consistent with the CLB for the period of extended operation. The staff's evaluation of the components' qualification focused on how the EQ Program manages the aging effects to meet the requirements delineated in 10 CFR 50, Appendix A.

The applicant's program activities establish, demonstrate, and document the level of qualification, qualified configuration, maintenance, surveillance, and replacement requirements necessary to meet 10 CFR 50 Appendix A. Qualified life is determined for equipment within the scope of the EQ Program and appropriate actions, replacement or refurbishment, are taken prior to or at the end of qualified life of the equipment so that aging limits or acceptable margins are not exceeded.

The staff also reviewed the USAR supplement for this TLAA and concludes that it provided an adequate summary description of the TLAA to satisfy 10 CFR 54.21(d).

The staff concludes that there is reasonable assurance that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1), that, for the environmental qualification of electrical equipment TLAA, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.4.2.3 USAR Supplement

The applicant provided a USAR supplement summary description of its TLAA evaluation of mechanical equipment EQ in ALRA Section A2.2.3.2. On the basis of its review of the USAR supplement, the staff concludes that the summary description of the applicant's actions to address mechanical equipment EQ is adequate.

4.4.2.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the mechanical equipment EQ TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the USAR supplement contains an appropriate summary description of the mechanical equipment EQ TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.5 Concrete Containment Tendon Prestress Analysis

The NMP1 and NMP2 containments do not employ prestressed concrete designs; therefore, this TLAA is not applicable to NMPNS.

4.6 Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis

4.6.1 Torus Shell and Vent System Fatigue Analysis (NMP1 Only)

NMP1 is a BWR with a Mark I containment. The Mark I containment consists of a freestanding steel containment drywell, vent system, and steel pressure suppression chamber (torus). Large-scale testing of the Mark III containment and in-plant testing of Mark I primary containment systems identified additional hydrodynamic loads that were not considered in the original design of the NMP1 containment. The Mark I Owners Group initiated the Mark I Containment Program to develop a generic load definition and structural analysis techniques. The staff evaluation of the generic load definition and structural assessment techniques is contained in NUREG-0661, "Safety Evaluation Report, Mark I Containment Long Term Program, Resolution of Generic Technical Activity A-7," July 1980. The Mark I Containment Long Term Program evaluation of hydrodynamic loads included fatigue analyses of the torus and vent system and fatigue analyses of the torus attached piping.

NMP2 is a BWR with a Mark II containment. The Mark II containment is a reinforced concrete structure consisting of a drywell chamber located above a pressure suppression chamber. Except at various penetrations, the primary containment liner is a continuous membrane that functions as a leak-tight barrier to the release of fission products. The liner is attached to the concrete wall. The design process assumes that the liner does not carry any loads.

The containment liner plates, penetration sleeves (including dissimilar metal welds), and penetration bellows may be designed in accordance with the requirements of ASME Code Section III. If a plant's code of record requires a fatigue analysis, then this analysis may be a TLAA and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions will be adequately managed for the period of extended operation.

The adequacy of the fatigue analyses of the metal containment, containment liner plates (including welded joints), penetration sleeves, dissimilar metal welds, and penetration bellows is reviewed for the period of extended operation. The fatigue analyses of the pressure boundary of process piping are reviewed in SER Section 4.3, following the guidance in SRP-LR Section 4.3.

4.6.1.1 Summary of Technical Information in the Amended Application

The applicant discussed the NMP1 torus shell and vent system fatigue analysis in ALRA Section 4.6.1. The applicant indicated that a fatigue evaluation was performed for the torus shell and external support structure and vent header system for hydrodynamic loads associated with LOCA and safety relief valve (SRV) discharge events. The applicant indicated that the evaluations were performed in accordance with ASME Section III, Division I (with addenda through 1977) and Code Case N–197. ALRA Table 4.6-1 provides the bounding fatigue usage factors for the NMP1 torus shell. The applicant concluded that the fatigue analyses either (1) remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i), or (2) have been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

4.6.1.2 Staff Evaluation

The applicant indicated that the NMP1 torus shell and vent header system were evaluated as part of the Mark I Containment Program. The evaluation included fatigue analyses of the torus shell and vent header system. These analyses were summarized in the NMP1 Mark I containment plant-unique analysis report (PUAR). The applicant indicated that the design-basis accident (DBA) was the major load contributing to the high stresses in the vent header system. By letter dated December 20, 2005, the applicant indicated that the controlling fatigue usage factor was 0.86 at the vent header/vent pipe spherical intersection. Since the DBA is a one-time event, the applicant concluded that the vent system analysis remains valid for the period of extended operation. The staff concurred with the applicant that the DBA should be considered a one-time event for the period of extended operation. As discussed in ALRA Section 4.6.2, the number of SRV actuations may exceed the number assumed in the Mark I program evaluation during the period of extended operation (520 estimated versus 500 used in the evaluation). On the basis of the applicant's statement that most of the fatigue usage is due to the DBA loading, the staff concludes that additional SRV actions during the period of extended operation will not have a significant impact on the controlling usage factor for the vent header system. Therefore, the staff found that the applicant has demonstrated that the vent header system analysis remains valid for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(i).

The applicant indicated that the fatigue usage for the torus shell was insignificant. The applicant provided 60-year CUF values for the limiting locations on the torus shell. The applicant increased the fatigue usage resulting from normal operations by a factor of 1.5 to account for the period of extended operation. The maximum 60-year CUF is less than 0.1. The staff concludes that the applicant performed an adequate evaluation to demonstrate that the fatigue usage will not exceed its allowable limit during the period of extended operation. Therefore, the staff found that the applicant has projected the torus shell analysis for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

4.6.1.3 UFSAR Supplement

The applicant provided a UFSAR supplement summary description of its TLAA evaluation of the torus shell and vent system fatigue analysis in ALRA Section A1.2.4.1. On the basis of its review of the UFSAR supplement, the staff concludes that the summary description of the applicant's actions to address the torus shell and vent system fatigue analysis is adequate.

4.6.1.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), regarding the vent header system fatigue analysis TLAA, that the analyses remain valid for the period of extended operation. The applicant has also provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), regarding the torus shell, that the analyses have been projected to the end of the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the vent header system fatigue analysis TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.6.2 Torus Attached Piping Analysis (NMP1 Only)

4.6.2.1 Summary of Technical Information in the Amended Application

The applicant discussed the NMP1 torus attached piping (TAP) fatigue evaluation in ALRA Section 4.6.2. The applicant indicated that fatigue analysis of TAP was performed as part of the generic Mark I Containment Program. The applicant indicated that the bounding CUF was less than 0.5 for the plant design life; therefore, the CUF would remain less than 1.0 for the period of extended operation. The applicant stated that the generic analysis considered SRV actuations, operating basis earthquakes, and accident conditions. The applicant indicated that the number of SRV actuations assumed for the analysis may be exceeded during the period of extended operation. The applicant committed to monitor the number of SRV actuations with the NMPNS FMP. The applicant concluded that the TAP fatigue analysis will be managed by the FMP during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.6.2.2 Staff Evaluation

The staff's review of the original LRA Section 4.6.2 identified an area in which additional information was necessary to complete the review of the torus attached piping analysis. The applicant responded to the staff's RAI as discussed below.

In RAI 4.6.2-1, dated November 10, 2004, the staff stated that the applicant indicated that the existing fatigue usage factors for the NMP1 TAP are less than 0.5 and that, therefore, the fatigue usage factors will remain less than 1.0 for 60 years of plant operation. The staff requested that the applicant identify the location containing the bounding fatigue usage for the TAP and that the applicant list the design transients, including the number used in the fatigue analysis and associated fatigue usage, for this bounding location. In addition, the staff requested that the applicant provide the number of these design transients that have been experienced since initial plant operation.

In its response, by letter dated December 6, 2004, the applicant indicated that a bounding analysis of TAP applicable to all BWRs was documented in MPR-751, "Augmented Class 2/3 Fatigue Evaluation Method and Results for Typical Torus Attached and SRV Piping Systems," November 1982. The applicant indicated that two NMP1 piping systems were included in the evaluation. The applicant reported relatively low 40-year CUFs (< 0.1) for these two systems. The applicant stated that a conservative extrapolation of the CUFs to 60 years still yields a relatively low CUF.

The above response did not explain why the estimated fatigue usage for NMP1 TAP is conservative given that the number of past SRV actions is unknown, Therefore, in a follow-up to RAI 4.6.2-1, dated February 22, 2005, the staff requested that the applicant explain why the number of design transients have been experienced and why the number assumed in the fatigue evaluation is bounding given that SRV actuations have not been tracked.

The applicant's July 14, 2005, response and revised ALRA provided additional TAP details. The TAP was designed for SRV actuations, operating basis earthquakes, and accident conditions. The applicant's FMP did not monitor the number of past SRV actuations. The applicant reviewed records pertaining to SRV actuations to estimate the number of past actuations. On the basis of its estimation of past SRV actuations, the applicant indicated that the projected number of SRV actuations may exceed the number assumed in the TAP fatigue analysis during the period of extended operation (520 estimated versus 500 used in the evaluation). The applicant indicated that the FMP will monitor the number of SRV actuations during the period of extended operation to ensure that the fatigue usage of the TAP remains within its design limits. The staff found that the applicant's FMP, which tracks the number of SRV actuations, will adequately manage the fatigue usage of the TAP during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). Therefore, the staff's concern described in RAI 4.6.2-1 is resolved.

4.6.2.3 UFSAR Supplement

The applicant provided a UFSAR supplement summary description of its TLAA evaluation of the TAP analysis in ALRA Section A1.2.4.2. On the basis of its review of the UFSAR supplement, the staff concludes that the summary description of the applicant's actions to address the TAP analysis is adequate.

4.6.2.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the TAP analysis TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TAP analysis evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.6.3 Torus Wall Thickness (NMP1 Only)

4.6.3.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.6.3, the applicant discussed the corrosion allowance for the NMP1 torus wall thickness. The NMP1 torus suppression chamber is constructed of Grade B steel plates with a certified minimum thickness of 0.460 inches. The original corrosion allowance of 0.0625 inches was reduced based on the addition of hydrodynamic loads resulting from LOCA and SRV actuation. The revised minimum wall thickness is 0.431 inches. NMP1 is required to monitor the torus wall thickness and corrosion rate in order to establish reasonable assurance that the minimum wall thickness is not reached. The applicant indicated that the NMP1 Torus Corrosion Monitoring Program monitors the torus shell thickness to ensure that it is maintained within acceptable limits. The applicant stated that the effects of loss of material on the intended function(s) of the torus shell will be adequately managed in accordance with 10 CFR 54.21(c)(1)(iii).

4.6.3.2 Staff Evaluation

The NMP1 Torus Corrosion Monitoring Program has been developed to monitor the torus shell material thickness and ensure it is maintained within acceptable limits. This program is based on a commitment to periodically monitor torus condition as described in an NRC SE dated August 11, 1994 (reference 4.8-63 in the ALRA). The corrosion monitoring activity included in this TLAA is completed through the Torus Corrosion Monitoring Program described in ALRA Section B3.3. The staff found that the Torus Corrosion Monitoring Program will adequately manage the aging effects such that the intended function(s) of the torus shell and support structure will be maintained consistent with the CLB for the period of extended operation. The staff evaluation of the Torus Corrosion Monitoring Program is contained in SER Section 3.0.3.3.7

4.6.3.3 UFSAR Supplement

The applicant provided a UFSAR supplement summary description of its TLAA evaluation of the torus wall thickness in ALRA Section A1.2.4.3. On the basis of its review of the UFSAR supplement, the staff concludes that the summary description of the applicant's actions to address the torus wall thickness is adequate.

4.6.3.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the torus wall thickness TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the torus wall thickness TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.6.4 Containment Liner Analysis (NMP2 Only)

4.6.4.1 Summary of Technical Information in the Amended Application

The applicant discussed the NMP2 containment liner analysis in ALRA Section 4.6.4. The applicant indicated that the fatigue analysis of the NMP2 containment liner was performed in accordance with ASME Section III. The applicant projected the fatigue analysis of the liner to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

4.6.4.2 Staff Evaluation

The staff's review of the original LRA Section 4.6.4 identified an area in which additional information was necessary to complete the review of the containment liner analysis. The staff's RAI and the applicant's response thereto are discussed below.

RAI 4.6.4-1, dated November 10, 2004, stated that the original LRA Section 4.6.4 stated that a revised analysis performed prior to the period of extended operation would demonstrate that the 60-year CUF values for all controlling locations would remain less than 1.0. The staff requested that the applicant provide the current design CUF values for the controlling containment liner locations. The staff also requested that the applicant explain the basis for the statement that the revised analysis would demonstrate that the 60-year CUF values for all controlling locations would remain less than 1.0, given that the revised analysis had not been completed.

In its response, by letter dated December 6, 2004, the applicant indicated that SRV actuation is the primary contributor to fatigue usage of the containment liner. The applicant indicated that SRV actuations are occurring at a much slower rate than assumed in the liner analysis. The applicant multiplied the 40-year CUF by 1.5 to obtain an estimate for 60 years of plant operation. The projected CUF is well below the allowable limit of 1.0. The ALRA reflects this evaluation. The staff found the applicant's evaluation conservative since the SRV actuations are occurring at a much lower rate than was assumed in the liner fatigue evaluation. The staff found that the applicant had projected the containment liner analysis for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(ii). Therefore, the staff's concern described in RAI 4.6.4-1 is resolved.

4.6.4.3 USAR Supplement

The applicant provided a USAR supplement summary description of its TLAA evaluation of containment liner analysis in ALRA Section A2.2.4.1. On the basis of its review of the USAR supplement, the staff concludes that the summary description of the applicant's actions to address the containment liner analyses is adequate.

4.6.4.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), regarding the containment liner analyses TLAA, that the analyses have been projected to the end of the period of extended operation. The staff also concludes that the USAR supplement contains an appropriate summary description of the containment liner analyses TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.6.5 Fatigue of Primary Containment Penetrations

4.6.5.1 Summary of Technical Information in the Amended Application

The applicant discussed the evaluation of the primary containment penetrations in ALRA Section 4.6.5. The applicant indicated that the NMP1 drywell was designed as a Class B vessel in accordance with ASME Code, Section III, 1965 Edition. Therefore, a fatigue analysis of the drywell and its penetrations was not required. However, the NMP1 TAP penetrations were evaluated for fatigue as part of the Mark 1 Containment Program. The applicant projected the NMP1 TAP penetration fatigue analysis to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

The applicant indicated that the ASME Class 1 and Class MC portions of the NMP2 penetrations were evaluated for fatigue. The applicant identified bounding penetration fatigue locations in ALRA Table 4.6-4. The applicant indicated that the fatigue usage of these locations would be managed by the NMPNS FMP. The applicant stated that fatigue of the NMP2 primary containment penetrations would be adequately managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.6.5.2 Staff Evaluation

The applicant indicated that the Mark I containment PUAR did not report a fatigue usage factor for the NMP1 TAP penetrations. The PUAR contained an assessment of the bounding TAP locations and concludes the penetrations were acceptable for fatigue. Since the PUAR did not report the fatigue usage factors, the applicant estimated the fatigue usage for these penetrations using loads and stress cycles reported in the PUAR. The resulting fatigue usages were well within the allowable limit of 1.0. The applicant then estimated the 60year fatigue usage for the TAP penetrations by multiplying the calculated 40-year fatigue usage by 1.5. The staff concludes that the applicant performed an adequate evaluation to demonstrate that the fatigue usage would not exceed its allowable limit during the period of extended operation. Therefore, the staff found that the applicant had projected the PUAR torus penetration analysis for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

The applicant's December 20, 2005, submittal identified that additional fatigue analyses had been performed for 26 TAPs. The applicant indicated that the fatigue analyses assumed 10,000 stress cycles at the maximum stress level to account for all loading conditions. The applicant stated that the stresses caused by the SRV actuations were only a fraction of the maximum stress that was used for the fatigue evaluation. The applicant then stated that the TAP fatigue evaluations remain valid for the period of extended operation. The staff agreed with the applicant's conclusion that a small increase in the number of SRV actuations during the period of extended operation would not have a significant impact on the fatigue usage of the TAPs if the actual stresses caused by the SRV actuations was only a fraction of the total stress used for the evaluation. On the basis of the applicant's assertion that the stresses due to the SRV actuations are only a fraction of the maximum stress that was used in the fatigue evaluation, the staff found that the applicant has adequately demonstrated that the analyses remain valid for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(i).

The applicant indicated that the NMP2 Class 1 and Class MC penetration assemblies were evaluated for fatigue. The applicant indicated that the fatigue usage for the majority of the penetration assemblies was bounded by the attached piping. The bounding piping locations are monitored by the NMPNS FMP. The applicant identified six penetrations, in ALRA Table 4.6-4, that were not bounded by the attached piping. The applicant indicated that these penetrations would be monitored by the NMPNS FMP. The staff found that the applicant's FMP, which tracks the number of expected thermal transient cycles, will adequately manage the fatigue of the NMP2 containment penetrations during the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.6.5.3 UFSAR and USAR Supplements

The applicant provided UFSAR and USAR supplement summary descriptions of its TLAA evaluation of fatigue of primary containment penetrations in ALRA Sections A1.2.4.4 and A2.2.4.2, respectively. On the basis of its review of the UFSAR and USAR supplements, the staff concludes that the summary descriptions of the applicant's actions to address the fatigue of primary containment penetrations are adequate.

4.6.5.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(i) and 10 CFR 54.21(c)(1)(ii), regarding the fatigue of the NMP1 primary containment penetrations TLAA, that the analyses either would remain valid for the period of extended operation or had been projected to the end of the period of extended operation. The applicant has also provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of aging on the intended function(s) of the NMP2 primary containment penetrations will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR and USAR supplements contain appropriate summary descriptions of the NMP1 primary containment penetrations evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.6.6 Downcomer and Safety/relief Valve Discharge Line Fatigue Evaluation (NMP2 Only)

4.6.6.1 Summary of Technical Information in the Amended Application

In its annual update date December 20, 2005, the applicant discussed the evaluation of the NMP2 downcomer and safety/relief valve discharge lines in ALRA Section 4.6.6. The NMP2 downcomers consists of 121 pipes open to the drywell and submerged 9.5 ft below the low water level (operating minimum) of the suppression pool, providing a flow path for uncondensed steam into the pool. A fatigue analysis using ASME Section III Class 1 rules was performed for the downcomers. The applicant projected the analysis of the NMP2 downcomers to the end of the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(ii)

The applicant also discussed the fatigue evaluation of the SRV line penetrations. The applicant indicated that 18 SRV lines penetrate the drywell floor via flued head type penetrations. A fatigue analysis of these penetrations was performed using ASME Section III Class 1 rules. The applicant estimated that the fatigue usage would remain below 1.0 during the period of extended operation. Since the estimated usage was only slightly less than the allowable limit of

1.0, the applicant committed to perform additional analysis to remove excess conservatism, or monitor the fatigue usage of the penetrations using the FMP.

4.6.6.2 Staff Evaluation

The applicant indicated that the downcomers were analyzed for a number of load conditions that included plant upset conditions in combination with various pipe breaks. The plant upset loads include SRV actuations. The applicant multiplied the fatigue usage due to the plant upset loads by a factor of 1.5 to project the fatigue usage to the end of the period of extended operation. The applicant then added this projected upset fatigue usage to the largest fatigue usage obtained from the pipe break loading conditions. The resulting fatigue usage was well below the allowable limit of 1.0. The staff found that the applicant adequately projected the fatigue analysis of the NMP2 downcomers to the end of the period of extended operation by increasing the fatigue usage of those events that are expected to occur more than once in the life of the plant by a factor of 1.5.

The applicant indicated that the SRV penetration analysis included both upset and pipe break loads. The upset loads include SRV actuations. The applicant multiplied the fatigue usage due to the upset loads by a factor of 1.5 to project the fatigue usage to the end of the period of extended operation. The applicant then added this projected upset fatigue usage to the fatigue usage obtained from the pipe break loading conditions. The resulting fatigue usage was below the allowable limit of 1.0. Even though the projected fatigue usage is less than the allowable limit, the applicant committed to either perform further analysis to remove excess conservatism in the calculated fatigue usage factor, or implement fatigue monitoring of the SRV penetrations prior to the period of extended operation. The staff found the applicant's approach to either perform additional analysis or institute fatigue monitoring prior to the period of extended operation acceptable alternatives to manage the fatigue usage of the SRV penetrations.

4.6.6.3 USAR Supplement

The applicant provided a USAR supplement summary description of its TLAA evaluation of the torus attached piping analysis in ALRA Section A2.2.4.3. On the basis of its review of the USAR supplement, the staff concludes that the summary description of the applicant's actions to address the torus attached piping analysis is adequate.

4.6.6.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that for the NMP2 downcomer analyses have been projected to the end of the period of extended operation. The staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the SRV discharge line fatigue analysis, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the USAR supplement contains an appropriate summary description of this TLAA evaluation, sufficient to satisfy the requirements of 10 CFR 54.21(d).

4.7 Other Plant-Specific TLAAs

In ALRA Section 4.7, the applicant provided its evaluation of plant-specific TLAAs. The TLAAs evaluated include the following:

- RPV biological shield (NMP2 only)
- main steam isolation valve corrosion allowance (NMP2 only)
- stress relaxation of core plate hold-down bolts (NMP2 only)
- reactor vessel and reactor vessel closure head weld flaw evaluations (NMP1 only)

4.7.1 RPV Biological Shield (NMP2 Only)

4.7.1.1 Summary of Technical Information in the Application

In ALRA Section 4.7.1, the applicant identified the fracture mechanics analysis (FMA) for the biological shield wall (BSW) at Nine Mile Point Nuclear Station, Unit 2 (NMP2) as a TLAA that meets the definition for a TLAA in 10 CFR 54.3.

The accumulation of high energy neutrons on nuclear reactor materials is a time-dependent parameter. Inspections of the biological shield wall performed by the applicant revealed the presence of weld fabrication defects (cracks) in the BSW's ferritic steel shell. The applicant performed a dynamic crack growth FMA of the defects to determine whether the BSW was acceptable for continued service or whether the cracks would require repair. The results of the FMA demonstrated that the majority of the flaws were acceptable, although a small number of flaws were unacceptable and subsequently repaired by the applicant. A supporting calculation was performed to estimate the amount of neutron fluence exposure to the BSW's cylindrical shells and to re-evaluate the conclusions of the original FMA for flaws left in service using the estimated neutron fluence exposure. Since the acceptability of the FMA is dependent on the accumulated neutron fluence dose exposure, the applicant concluded that the FMA was a TLAA for the NMP2 ALRA.

The staff reviewed ALRA NMP2 Section 4.7.1, and by letter dated December 23, 2005, the staff requested additional information in aRAI 4.7.1B-1 regarding the applicant's calculation methodology. The applicant provided its response by letters dated January 11, 2006, as supplemented by letter dated March 23, 2006, and in a docketed email response dated March 29, 2006. These submittals provide information to support the conclusion that ALRA Sections 4.7.1 and A.2.2.5.1 could be deleted from the NMP2 ALRA. The staff evaluated these submittals and the applicant's basis for deleting Sections 4.7.1 and A.2.2.5.1 from the ALRA in Sections 4.7.1.2 and 4.7.1.3 of this SER.

4.7.1.2 Staff Evaluation

The applicant's original FMA was docketed in a letter from Niagara Mohawk Power Corporation (NMPC)[1] to NRC's Region I Office dated August 1, 1980. The FMA was based on the evaluation of dynamic loading on a limiting 0.215 inch flaw in the BSW. The applicant calculated that the dynamic stress intensity factor (K_I) was 33.2 ksi(in)$^{0.5}$ for the limiting flaw. The staff reviewed the applicant's FMA and concluded that the applicant had conservatively demonstrated that K_I was less than the dynamic fracture toughness criterion (K_{ID}) of 48.8 ksi(in)$^{0.5}$, as based on a Charpy-V (C_v) impact energy of 20 ft-lb for the structural steel. Thus, the staff concurs with the applicant that the original FMA demonstrated that the limiting flaw in the BSW was structurally stable for the remainder of the current operating term.

However, since the K_{ID} value was based on a C_v impact energy of 20 ft-lb and since C_v impact energies may decrease with increasing neutron fluence exposure, the applicant concluded that the effects of increasing neutron fluence in the BSW over a 60-year licensed life (i.e., through 54 EFPY) must be assessed for its impact relative to the original FMA. Thus, the staff concludes that the applicant made a conservative conclusion in identifying that the fracture mechanics evaluation for the BSW was a TLAA for NMP2 as stated in the ALRA. Neutron irradiation embrittlement can reduce the fracture toughness of ferritic steels (i.e., carbon steel or low alloy steel materials). Typically, the staff assesses neutron irradiation embrittlement in ferritic steel materials based on the accumulated fluence exposure of the materials to high energy neutrons (E > 1.0 MeV). The staff has established, in 10 CFR Part 50, Appendix H, a neutron fluence value of 1×10^{17} n/cm^2 (E > 1.0 MeV) as its threshold for considering neutron irradiation embrittlement in ferritic steel materials.

The applicant estimated that the neutron fluence of the BSW inside cylinder surface will be 2.54×10^{17} n/cm^2 (E > 1.0 MeV) at 54 EFPY. This value is greater than the staff's threshold for considering neutron irradiation embrittlement in ferritic steel materials. Therefore, the applicant used an alternate approach to demonstrate that a neutron fluence exposure of 2.54×10^{17} n/cm^2 (E > 1.0 MeV) would not invalidate the original FMA. The applicant stated that more recent low-temperature irradiation data for the structural carbon steels from the Shippingport neutron shield (SNS) tank and high flux isotope reactor (HFIR) vessel provide a more accurate estimation of embrittlement for the BSW (Refer to SANDIA Report SAND 92-2420, "Accelerated 54 °C Irradiated Test of Shippingport Neutron Shield Tank and HFIR Vessel Materials," dated January 1993). The SANDIA report provides the 30 ft-lb Cv impact test results for ferritic steel test specimens taken from the SNS tank and HFIR vessel. The test specimens were irradiated to a neutron fluence exposure of 5.07×10^{17} n/cm^2 (E > 1.0 MeV) at a controlled test temperature of 130°F prior to Cv impact testing.

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1. The owner of Nine Mile Point Nuclear Station prior to its acquisition by Constellation Energy.

The SANDIA results projected a maximum shift (increase) of 35 °F in the 30 ft-lb reference transition temperature for the test specimens and a reduction of approximately 6 ft-lb in the upper shelf energy (USE) value. The applicant concluded that, since the projected fluence for the NMP2 BSW is less than the value used in the SANDIA Report, it would be justified to use the SANDIA results as a basis for re-estimating the projected neutron fluence exposure on the BSW through 54 EFPY.

The staff determined that the methodology in SANDIA Report is not an NRC-approved methodology. Therefore the staff issued aRAI 4.7.1B-1, dated December 23, 2005, and requested that the applicant provide an updated neutron fluence calculation for the BSW, using NRC-approved neutron fluence methodology, to ensure that conclusions of the original FMA remain valid for the period of extended operation. As an alternative, the staff stated that the applicant could place a commitment in the NMP2 ALRA to submit an updated neutron fluence calculation for the BSW for the staff's review and approval at least two years prior to entering the period of extended operation.

In its response, to aRAI 4.7.1B-1, by letter dated January 11, 2006, the applicant stated:

> NMPNS will perform a fluence analysis for the period of extended operation (PEO) using plant specific methodology that is consistent with Reg. Guide 1.190. This methodology has been approved by the NRC as part of the NMP1 and NMP2 Pressure-Temperature Curve analysis review. The fluence analysis will establish whether or not the maximum fluence at the Biological Shield Wall or the fluence at the shield wall flaws, on which the ALRA Section 4.7.1 is based, is below the threshold value above which neutron embrittlement is considered to be an issue (10^{17} n/cm^2). NMPNS will submit the summary of this analysis to the NRC for review and approval not later than two years prior to entry into the PEO. Based on the results of this analysis, the submittal will also include revised ALRA Sections 4.7.1 and A.2.2.5.1, and any other supporting analysis, as applicable.

The applicant's original fluence value for the BSW was based on calculations carried out using the two-dimensional discrete ordinates transport (DOT) code that had been approved for the Nine Mile Point, Units 1 and 2 (NMP1/2). However, the staff concluded that the DOT code was qualified only for neutron fluences up to and inclusive of fluences of the NMP1/2 reactor vessels (RVs), and that application of the DOT code to the BSW is outside the range of the code's qualification. In a conference call held with the applicant dated January 23, 2006, the staff informed the applicant of this conclusion on the DOT code and reiterated its request that a supplemental neutron fluence calculation be submitted for the BSW. This was designated as Open Item 4.7B.1-1 in the staff SER with Open Items which was issued on March 3, 2006.

In the applicant's supplemental letter of March 23, 2006, the applicant stated that it had performed an updated neutron fluence calculation for the BSW and that the revised neutron fluence value for the BSW was 6.2 x 10^{16} n/cm^2 (E > 1.0 MeV) at 54 EFPY. This fluence is less than the NRC's threshold value for considering neutron-irradiation embrittlement in ferritic steel materials.

The applicant further stated in the letter that: (1) neutron irradiation embrittlement is not an issue for the BSW at NMP2, and (2) the dynamic FMA for the BSW does not need to be treated as a TLAA for the NMP2 LRA. Based on the result of their new calculation, the applicant proposed, in the March 23, 2006 letter, to delete TLAA Section 4.7.1, "RPV Biological Shield (NMP2 Only)," and its USAR Supplement summary description A.2.2.5.1 from the NMP2 LRA.

In a later communication email dated March 29, 2006, the applicant provided supplemental information on its neutron fluence methodology to support the updated neutron fluence value of 6.2 x 10^{16} n/cm^2 (E > 1.0 MeV) for the BWS, as assessed through 54 EFPY. Taken together, the supplementary information clarified that there is significant neutron leakage in the axial as well in the azimuthal directions. The azimuthal leakage reduces the peak neutron fluences and the axial leakage reduces the total number of neutrons. Consequently, the total number of neutron reaching the BSW was determined to be smaller than the number of neutrons leaving the outside surface of the NMP2 RV. The applicant indicated that the azimuthal leakage diminishes the neutron fluence reaching the inside surface of the BSW (as measured relative to those emerging from the RV outside surface) as an inverse function of the square of the distance from the outside RV wall. The azimuthal leakage also reduces the difference between the maximum and minimum fluences reaching the inside surface of the BSW. This is caused by the presence of a void between the outside surface of the RV and the inside surface of the BSW. A neutron scattering away from the radial direction would have a very low chance of reaching the BSW if a scattering and absorbing medium was present between the RV and BSW wall surfaces. However, since a void exists between the wall surfaces, more neutrons would reach the inside surface of the BSW, thus flattening out the energy distribution of neutrons reaching and absorbed by the inside BSW wall. Therefore, the neutron fluence for the BSW has a more uniform distribution and lower average value (6.2 x 10^{16} n/cm^2 [E > 1.0 MeV]) when compared to the neutron fluence distribution and average neutron fluence value (1.02 x 10^{17} n/cm^2 [E > 1.0 MeV]) for the outside RV wall surface.

Based on this assessment, the staff concludes that the applicant's revised neutron fluence value of 6.2 x 10^{16} n/cm^2 (E > 1.0 MeV) for the BSW at 54 EFPY is acceptable. The staff further concludes that the revised neutron fluence value supports the conclusion that neutron irradiation embrittlement of the BSW will not be an issue for the component during the period of extended operation because the value is less than the staff's threshold of 1.0 x 10^{17} n/cm^2 (E > 1.0 MeV). Therefore, based on this assessment, the staff concludes that the dynamic FMA for the BSW does not need to be treated as a TLAA for the NMP2 LRA, and that Sections 4.7.1 and A.2.2.5.1 may be deleted from the NMP2 LRA. Therefore, Open Item 4.7B.1-1 identified in the staff Safety Evaluation Report with Open Items, issued on March 3, 2006, is resolved and closed.

4.7.1.3 USAR Supplement

The applicant's USAR supplement summary description of TLAA 4.7.1, "RPV Biological Shield (NMP2 Only)" was provided in NMP2 ALRA Section A.2.2.5.1 and described the applicant's methodology for re-evaluating the fracture toughness of the NMP2 BSW.

In the applicant's supplement responses to aRAI 4.7.1B-1 dated March 23 and 29, 2006, the applicant provided supplemental information to support the conclusion that ALRA Sections 4.7.1and A2.2.5.1 could be deleted from the NMP2 ALRA. In SER Section 4.7.1.2, the staff concluded that the applicant's supplemental responses to the staff request aRAI 4.7.1B-1, dated March 23 and 29, 2006, provided an acceptable basis for the staff to conclude that (1) the neutron fluence value for the BSW at 54 EFPY was less than the staff's threshold value (as provided in 10 CFR Part 50, Appendix H) for considering neutron irradiation embrittlement in ferritic steel materials, (2) the dynamic FMA for the biological shield did not need to be treated as a TLAA for the NMP2 LRA, and (3) ALRA Sections 4.7.1 and A2.2.5.1, could be deleted from the NMP2 ALRA. Based on the staff's assessment in SER Section 4.7.1, the staff concludes that the applicant has provided an acceptable basis for deleting ALRA Section A.2.2.5.1.

4.7.1.4 Conclusion

On the basis of its review, the staff found that the applicant has provided an acceptable basis for concluding that the dynamic FMA for the BSW does not need to be treated as a TLAA for the NMP2 ALRA and that ALRA Sections 4.7.1 and A.2.2.5.1 may be deleted from the scope of the NMP2 ALRA.

4.7.2 Main Steam Isolation Valve Corrosion Allowance (NMP2 Only)

This TLAA applies only to NMP2. The NMP1 licensing basis did not specify a corrosion allowance for the NMP1 main steam isolation valves (MSIVs). Therefore NMPNS did not evaluate the NMP1 MSIV corrosion allowance as a TLAA. However, the NMP1 MSIVs are evaluated under the NMP Flow-Accelerated Corrosion (FAC) Program and a manufacturer-specified corrosion allowance has been applied to the NMP1 MSIVs to create assurance that unacceptable wall thinning will either not occur or be detected and corrected in a timely manner.

4.7.2.1 Summary of Technical Information in the Amended Application

The MSIV bodies were fabricated from low-alloy steel. During normal plant operation the MSIVs are exposed to a dry steam environment; however, during refueling outages, they are exposed to treated water and air. To support a 40-year service life in the environments described above, a corrosion allowance of 0.120 inches was imposed in addition to the minimum MSIV wall thickness required by applicable codes. The calculation used to determine this corrosion allowance is a TLAA.

Summing the predicted values for corrosion of the MSIVs in the treated water environment, the air environment, and the steam environment results in a total loss in wall thickness of 0.0256 inches over 60 years.

4.7.2.2 Staff Evaluation

The predicted reduction in MSIV wall thickness is calculated based on the projected exposure of the valve bodies to water, air, and dry steam environments for the period of extended operation. Under normal plant operating conditions the MSIVs are exposed to a dry steam environment. During RPV flood-up at the start of a refueling outage, the MSIVs are flooded with treated water. For the remainder of the refueling outage the valves are exposed to an air environment. In order to build conservatism into the corrosion calculation, the exposure times of MSIVs to the water and air environments are doubled from the typical exposure times during a refueling outage. The reduction of MSIV wall thickness caused by exposure to each environment is calculated based on exposure time and the appropriate corrosion rate. The applicant's calculation used the following corrosion rates and exposure times: 0.0033 inches per year for 4.6 years of exposure to air, 0.0050 inches per year for 0.66 years of exposure to treated water; and, 0.00013 inches per year for 54.7 years due to FAC.

In letters dated, January 14, 2005 and July 14, 2005, the applicant responded to staff RAIs 4.7.2-1 and 4.7.2-2 regarding the flow accelerated corrosion calculations performed for the dry steam environment. These RAIs requested clarifying information about the applicant's predictive model for FAC. The applicant's response indicated that the 0.00013 inches per year corrosion rate is based on piping upstream of the MSIVs, as modeled by the FAC Program predictive computer model (CHECWORKS). The upstream piping measurements are used for the MSIVs because non-parallel inner and outer surfaces throughout the MSIV body, and surface irregularities due to casting, make accurate and repeatable measurements of MSIV wall thickness difficult. The NMP FAC Program is consistent with industry practice in that representative components are periodically measured and trended to predict wear in the main steam system. Thickness measurements of the main steam system piping components for NMP1 and NMP2 were taken during the most recent refueling outage and did not identify any significant wall thinning.

The amount of wall thinning based on maximum expected corrosion rates of MSIV bodies remains bounded by the corrosion allowance assumed in the valve design. Based on the applicant's conservative analysis of the predicted loss of material, the staff concludes that the corrosion allowance identified, in conjunction with monitoring performed under the FAC Program, will ensure MSIVs are capable of performing their intended function for 60 years of operation.

4.7.2.3 USAR Supplement

The applicant provided a USAR supplement summary description of its TLAA evaluation of the MSIV corrosion allowance in ALRA Section A2.2.5.2. On the basis of its review of the USAR supplement, the staff concludes that the summary description of the applicant's actions to address the MSIV corrosion allowance is adequate.

4.7.2.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding the MSIV corrosion allowance TLAA, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the USAR supplement contains an appropriate summary description of the MSIV corrosion allowance TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.7.3 Stress Relaxation of Core Plate Hold-Down Bolts (NMP2 Only)

4.7.3.1 Summary of Technical Information in the Amended Application

In the original LRA Section 4.7.3, the applicant summarized the evaluation of stress relaxation of core plate hold-down bolts for the period of extended operation. Hold-down bolts located around the rim of the core plate are subcomponents of the core plate assembly that ensure the core plate safety function. Preload in these bolts could be reduced over time by the effects of intergranular stress corrosion cracking (IGSCC) and fluence; therefore, the staff's SE dated December 7, 2000, determined that loss of preload should be evaluated as a potential TLAA. In BWR/2 through BWR/5 RPV designs without core plate wedges installed, these bolts are required to provide lateral restraint of the core plate in the event of a worst-case weld failure. For plants with this configuration, BWRVIP-25 recommends visual or ultrasonic examination of 50 percent of the hold-down bolts. NMP1 has core plate wedges installed; therefore, examination of the core plate hold-down bolts is not required. However, an analysis to justify deferral of the recommended examination until refueling outage 10 (RFO10) for NMP2 satisfies the criteria of 10 CFR 54.3(a); therefore, this analysis is a TLAA.

In its ALRA, the applicant provides the following analysis:

> NMP2 has implemented all relevant BWRVIP-required inspections as augmented inservice inspections in accordance with applicable ASME Code requirements. The existing analysis of loss of preload in the NMP2 hold-down bolts determined that sufficient preload remains to justify deferral of the recommended examination until RFO10.
>
> Disposition: 10 CFR 54.21(c)(1)(iii) - The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.
>
> The subject analysis considered loss of preload caused by both IGSCC and fluence. A review of the associated calculations and the design basis loads indicates the following:
>
> The predicted amount of stress relaxation due to IGSCC is insignificant through the end of the period of extended operation.
>
> When the effect of fluence through the period of extended operation is considered, the remaining preload is sufficient to withstand all normal and upset condition loadings, but insufficient to withstand the faulted condition loading. Even with no loss of preload

due to fluence, the calculation showed very little margin between the initial preload and the required preload under faulted conditions. The conclusion to the calculation indicates that reconciliation is necessary in determining why so little margin exists between required and applied preload.

Due to the difficulty encountered by the industry in performing the recommended inspections, the BWRVIP is also pursuing an analytical solution to the issue of stress relaxation of core plate hold-down bolts that may demonstrate sufficient remaining preload to withstand all design loadings until the end of extended life.

The potential for cracking of components comprising the reactor vessel internals due to IGSCC is managed by the BWR Vessel Internals Program at NMP2, which incorporates comprehensive inspection and evaluation guidelines issued by the BWRVIP and approved by the NRC. Prior to the end of the current license period, NMP2 will either:

(1) install core plate wedges (as part of a proposed core shroud tie-rod repair) to eliminate the need for the enhanced inspections of the core plate hold-down bolts as recommended by BWRVIP-25; or

(2) perform an analysis (incorporating detailed flux/fluence analyses and improved stress relaxation correlations) to demonstrate that the core plate hold-down bolts can withstand all normal, emergency, and faulted loads considering the effects of stress relaxation, until the end of the period of extended operation.

The applicant indicated further that these activities would provide assurance that any stress relaxation of the NMP2 core plate hold-down bolts will be adequately managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.7.3.2 Staff Evaluation

Per 10 CFR 54.21(c)(1), applicants for license renewal must demonstrate that TLAAs for license renewal have been projected through the end of the period of extended operation for their facilities, remain valid for the period of extended operation, or demonstrate that the effects of aging that are applicable to the components evaluated by the TLAAs will be managed during the period of extended operation.

The staff's review of the original LRA Section 4.7.3 identified an area in which additional information was necessary to complete the review of the stress relaxation of core plate hold-down bolts.

In an RAI regarding "Part II - Core Plant Hold-Down Bolts (Unit 2)," dated November 22, 2005, the staff requested additional information from the applicant as relevant to its commitment for submitting the analysis on the core plate hold-down bolts to the staff for review and approval. In its response, by letter dated December 5, 2005, the applicant included in its commitment that the analysis would be submitted for staff review and approval two years prior to entering the license renewal period.

The applicant's commitment regarding the core plate hold-down bolts, as stated in Appendix A of the ALRA and supplemented by letter dated December 5, 2005, is that NMPNS will either: (1) install core plate wedges (as part of a proposed core shroud tie-rod repair) to eliminate the need for the enhanced inspections of the core plate hold-down bolts recommended by BWRVIP-25; or (2) two years prior to entering the period of extended operation, submit an analysis that incorporates detailed flux/fluence analyses and improved stress relaxation correlations, in accordance with BWRVIP-25, to demonstrate that the core plate hold-down bolts and the core plate can withstand all normal, emergency, and faulted loads and effects of stress relaxation for the period of extended operation. This is Commitment No. 12 in the NMP2 ALRA, as amended in the December 5, 2005, letter from the applicant.

Therefore, based on the review of the ALRA and the applicant's response to the above RAI Part II, the staff found that the applicant's commitment would provide assurance that any stress relaxation of the NMP2 core plate hold-down bolts would be adequately managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). Therefore, the staff's concern described in RAI Part II is resolved.

4.7.3.3 USAR Supplement

The applicant provided a USAR supplement summary description of its TLAA evaluation of stress relaxation of core plate hold-down bolts in ALRA Section A2.2.5.3 and it was supplemented by letter dated December 5, 2005. On the basis of its review of the USAR supplement, and as supplemented by letter dated December 5, 2005, the staff concludes that the summary description of the applicant's actions to address stress relaxation of core plate hold-down bolts is adequate.

In addition, by letter dated December 5, 2005, the applicant provided a revised Commitment No. 12 in Table A2.4 of the NMP2 ALRA, which is identified below:

> NMPNS will either: (1) install core plate wedges (as part of a proposed core shroud tie-rod repair) to eliminate the need for the enhanced inspections of the core plate hold-down bolts recommended by BWRVIP-25; or (2) perform an analysis (incorporating detailed flux/fluence analyses and improved stress relaxation correlations) in accordance to BWRVIP-25 to demonstrate that the core plate hold-down bolts and the core plate can withstand all normal, emergency, and faulted loads and effects of stress relaxation for the period of extended operation, and submit it for staff review and approval 2 years prior to entering the period of extended operation.

The staff finds that the applicant has adequately included its commitment regarding the core plate hold-down bolts in Table A2.4 of the NMP2 ALRA and, therefore concludes that the USAR supplement contains an appropriate summary description of Commitment No. 12 for NMP2.

4.7.3.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), regarding stress relaxation of the core plate hold-down bolts TLAA, that the effects of aging on the intended function(s) would be adequately managed for the period of extended operation. The staff also concludes that the USAR supplement contains an appropriate summary description of the core plate hold-down bolts TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.7.4 Reactor Vessel and Reactor Vessel Closure Head Weld Flaw Evaluations (NMP1 Only)

4.7.4.1 Summary of Technical Information in the Amended Application

In ALRA Section 4.7.4, the applicant summarized the evaluation of the reactor vessel and reactor vessel closure head weld flaw evaluations for the period of extended operation. During RFO15, augmented examinations identified unacceptable flaw indications in two RPV shell welds, as indicated in NMPC's letter dated September 14, 1999. During RFO17, UT examinations identified an unacceptable flaw indication in a closure head meridional weld, as stated in NMPC's letter dated September 19, 2003. Structural evaluations for these flaws (performed in accordance with ASME Section XI, Subsection IWB-3600) indicated that the flaw characteristics are within the pre-determined acceptability criteria to justify continued operation without repair of the flaw. Since the acceptability criteria were applicable only through the original 40-year license term, the subject evaluations satisfy the criteria of 10 CFR 54.3(a). As such, these analyses are TLAAs.

In its ALRA, the applicant provides the following analysis:

> Unacceptable indications in the RPV shell are located in axial weld RVWD-140 and shell-to-flange circumferential weld RVWD-099. The detected flaws are subsurface planar flaws located parallel to the centerline of the weld (i.e., the indications in RVWD-140 were axially-oriented and the indications in RVWD-099 were circumferentially-oriented). The flaw evaluations considered fatigue crack growth and irradiation embrittlement (only applicable for the beltline weld, RVWD-140) to 28 EFPY, as indicated in NMPC's letter dated September 14, 1999. The NRC reviewed the original evaluations and concurred that continued operation with these flaws is acceptable through 28 EFPY, the end of the current license term, as stated in the NRC SE dated May 5, 2000. In 2002, these evaluations were reconciled to the pressure test conditions associated with the updated P-T limit curves; the previously detected flaws remain acceptable when compared to the updated (lower) allowable flaw sizes at 28 EFPY.
>
> The unacceptable indication in the closure head is located in weld RVWD-005 and characterized as a subsurface planar flaw. The flaw evaluation, as described in NMPC's letter dated September 19, 2003, considered fatigue crack growth due to 240 startup/shutdown cycles (the number of design startup/shutdown cycles for the original 40-year operating term) and determined the flaw to be acceptable for continued service.
>
> Disposition:
>
> The number of cycles from the time of inspection to the end of the evaluation period is used to determine crack growth as discussed in NMPC's September 19, 2003. With the addition of the period of extended operation (20 years), the NMP1 RPV can be expected to accumulate fatigue usage for no more than 25 additional years. During

this interval, it is unlikely that 240 startup/shutdown cycles will occur. Therefore, the RPV closure head weld flaw evaluation remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

Evaluation, re-examination, and repairs associated with identified flaw indications are controlled under the NMP1 ASME Inservice Inspection (Subsections IWB, IWC, IWD) Program, which manages aging of all Class 1, 2, and 3 pressure-retaining components and their integral attachments. Prior to the period of extended operation, the RPV weld flaw calculations will be revised to consider additional fatigue crack growth and the effects of additional irradiation embrittlement for beltline materials associated with operation for an additional 20 years (i.e., out to at least 46 EFPY). If the revised calculation shows the identified flaws cannot meet the applicable acceptance criteria, the indications will be re-examined in accordance with ASME Section XI requirements. These activities provide assurance that the potential growth of identified flaws in the RPV welds will be adequately managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.7.4.2 Staff Evaluation

The applicant's original flaw evaluation for the flaw located in one of the RPV closure head meridional welds was provided in NMPC letter (NMP 1L-1776), dated September 19, 2003, and was approved in the NRC safety evaluation to NMPC dated December 21, 2004. The original flaw evaluation considered fatigue crack growth due to 240 startup/shutdown cycles (the number of design startup/shutdown cycles for the 40-year operating term) and determined the flaw to be acceptable for continued service.

In ALRA Section 4.7.4, the applicant stated that the number of cycles from the time of inspection to the end of the evaluation period is used to determine crack growth. In addition, the applicant indicated that with the addition of the period of extended operation (20 years), the NMP1 RPV can be expected to accumulate fatigue usage for no more than 25 additional years.

The staff's review of ALRA Section 4.7.4 identified an area in which additional information was necessary to complete the review of the reactor vessel and reactor vessel closure head weld flaw evaluations.

In RAI 4.7.4-1, dated November 22, 2005, the staff requested that the applicant provide a commitment to state that the analysis is to be submitted for staff review and approval no later than two years prior to the period of extended operation.

In its response, by letter dated December 5, 2005, the applicant clarified that from the date of the inspection (March 2003) through the end of the period of extended operation, it is unlikely that the number of startup/shutdown cycles that occur will exceed the 240 additional startup/shutdown cycles that were the bases for the evaluation. Therefore, the staff agreed with the applicant that the RPV closure head weld flaw evaluation remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

The applicant's original flaw evaluation for the two flaws located in the RPV shell welds was provided in Niagara Mohawk Power Corporation (NMPC) Letter NMP 1L-1467, dated September 14, 1999, and approved in the NRC safety evaluation to NMPC dated May 5, 2000.

The flaw evaluations considered fatigue crack growth and irradiation embrittlement to 28 EFPY, and the staff concurred that continued operation with these flaws was acceptable only through 28 EFPY, the end of the current license term. Therefore, to address the impact of license renewal on these flaw evaluations, the applicant, in ALRA Section A1.4 and as supplemented by its letter dated December 5, 2005, revised Commitment No. 12 for NMP1 regarding the RPV shell weld flaws:

> The RPV weld flaw evaluation will be revised to consider additional fatigue crack growth and the effects of additional irradiation embrittlement (for beltline materials) associated with operation for an additional 20 years (i.e., out to at least 46 EFPY) and submitted for NRC review and approval no later than 2 years prior to the period of extended operation. If the revised calculation shows the identified flaws cannot meet the applicable acceptance criteria, the indications will be reexamined in accordance with ASME Section XI requirements.

The applicant's commitment requires the applicant to submit the renewed flaw evaluations for the flaws in the RPV shell welds to the NRC for staff review and approval at least two years prior to entering the period of extended operation. The applicant's commitment will ensure that the staff will have sufficient time to assess the renewed flaw evaluations for acceptability. Based on this evaluation and the applicant's revision of Commitment 12, the staff concludes that the applicant will adequately address that the structural integrity of the NMP-1 RPV shell will be maintained during the period of extended operation. Therefore, the staff's concern described in RAI 4.7.4-1 is resolved.

4.7.4.3 UFSAR Supplement

The applicant provided a UFSAR supplement summary description of its TLAA evaluation of the reactor vessel and reactor vessel closure head weld flaw evaluations in ALRA Section A1.2.5.1, which was supplemented by letter dated December 5, 2005. On the basis of its review of the UFSAR supplement, the staff concludes that the summary description of the applicant's actions to address the reactor vessel and reactor vessel closure head weld flaw evaluations is adequate.

In addition, by letter dated December 5, 2005, the applicant provided a revised Commitment No. 12, as stated above.

The staff found that the applicant had adequately included its commitment regarding the RPV weld flaw evaluations in Table A1.4 of the NMP1 ALRA, and therefore concludes that the UFSAR supplement contains an appropriate summary description of Commitment No. 12 for NMP1.

4.7.4.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant had demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), regarding the RPV closure head weld flaw evaluation, that the analyses remain valid for the period of extended operation. The applicant has also provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), regarding potential growth of identified flaws in the RPV welds, that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the reactor vessel and reactor vessel closure head weld flaw evaluations TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.7.5 Reactor Water Cleanup System Weld Overlay Fatigue Flaw Growth Evaluations (NMP1 Only)

4.7.5.1 Summary of Technical Information in the Amended Application

Section 54.21(b) of 10 CFR, in part, requires applicants to submit an annual update of their LRAs. On December 20, 2005, the applicant submitted its annual update for the NMP Units 1 and 2 ALRA. The applicant included a supplemental TLAA Section 4.7.5, "Reactor Water Cleanup System Weld Overlay Fatigue Flaw Growth Evaluations (NMP-1 Only)" (henceforth the RWCU Overlay TLAA) within the scope of annual update for the ALRA.

The applicant identified that the design of the reactor water cleanup (RWCU) system includes two welds (RWCU welds 33-FW-22 and 33 FW-23A) that had experienced IGSCC and subsequently had been repaired with autstenitic stainless steel weld overlays. The applicant stated that the majority of the deposited weld metal in the overlays is resistant to IGSCC because the deposited weld metal is made from an austenitic stainless steel filler metal. However, the applicant stated that the 0.625 inch of the deposited weld overlay material is considered to be susceptible to IGSCC due to weld dilution, a phenomena that causes alloy mixing when the first pass of weld metal is deposited onto the austenitic stainless steel base metal of the pipe requiring the overlay repair.

The applicant stated that it performed a fatigue flaw growth evaluation of the assumed flaw in overlays (0.625 inch in depth) based on the methodologies in the following ASME Code Cases: (1) ASME Code Case N-504 for RWCU weld 33-FW-22, and (2) ASME Code Case N-504-2 for RWCU weld 33-FW-23A. The applicant identified that the fatigue flaw growth analyses for the RWCU weld overlays are TLAA that conform to the definition in 10 CFR 54.3.

4.7.5.2 Staff Evaluation

The RWCU system is designed to improve the water quality of the NMP1 reactor coolant by means of a series of high efficiency resin-bed filtration demineralizers. The RWCU system also includes regenerative and non-regenerative heat exchangers that are used to ensure that the reactor coolant passing through the RWCU system will re-enter the reactor vessel at the proper temperature (~ 530 °F). The ASME Code Class 1 portions of the RWCU system include piping, pump, valve and fitting components that are located inside the containment structure and extend out of the containment structure inclusive of the second outboard containment isolation valves for the system. The ASME Code Class 1 portions of the RWCU system serve a reactor coolant pressure boundary function in addition to the water purification function and heat exchanger function.

On January 23, 2006, the staff held a teleconference with the applicant to discuss the basis for approving the RWCU Overlay TLAA. During the teleconference, the staff informed the applicant that an alternative basis for approving the RWCU Overlay TLAA would be to credit an acceptable inspection-based AMP for managing cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays. The staff's basis for taking this position was that the applicant had already indicated that it was implementing UT examinations of these weld overlays and that this would be permissible in accordance with 10 CFR 54.21(c)(1)(iii). The applicant also informed the staff that the UT examinations of these weld overlays are currently being performed in accordance with the applicant's BWR Stress Corrosion Cracking Program discussed in SER Section 3.0.3.2.5.

In RAI 4.7.5A-1, dated April 19, 2006, the staff requested confirmation that the applicant would use the BWR Stress Corrosion Cracking Program and the UT examinations that are performed in accordance with the AMP as the basis for: (1) managing IGSCC in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays, and (2) accepting the RWCU Overlay TLAA in accordance with 10 CFR 54.21(c)(1)(iii). With respect to NMP1, the staff also requested the applicant to: (1) update the ALRA to include RWCU welds 33-FW-22 and 33-W-23A and their repair overlays within the scope of the BWR Stress Corrosion Cracking Program, (2) update the USAR Supplement summary description to be consistent with the position that 10 CFR 54.21(c)(1)(iii) will be used as the basis for accepting the RWCU Overlay TLAA, and (3) include a discussion in the USAR Supplement that specifies that the applicant's BWR Stress Corrosion Cracking Program will be used as the basis for managing cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays.

In its response, by letter dated April 21, 2006, the applicant clarified that, pursuant to 10 CFR 54.21(c)(1)(iii), it will use the BWR Stress Corrosion Cracking Program as the basis for managing cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays. The applicant clarified that the BWR Stress Corrosion Cracking Program is normally used to manage IGSCC of ASME Code Class 1 austenitic steel weld components. In addition, the applicant also stated that: (1) the BWR Stress Corrosion Cracking Program proposes to use UT examinations as the inspection technique for examining austenitic stainless steel weld components that are within the scope of the AMP (including those that have been repaired with austenitic stainless steel weld overlays), and (2) the UT technique proposed by the BWR Stress Corrosion Cracking Program for these components is consistent with the guidelines in NRC-approved Topical Report BWRVIP-75A, "WR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75) [October 1999]," and is capable of detecting and sizing any cracks in the subject welds and overlays, including those that grow by fatigue. The staff approved Topical Report BWRVIP-75A in a safety evaluation dated March 14, 2002. The applicant further stated that the BWRVIP-75A program recommends that the UT examinations be performed on 25 percent of the susceptible welds every 10 years, with 50 percent of the UT examinations to be completed within the first six years in the 10-year ISI interval. The applicant also confirmed that the last UT examination of RWCU weld 33-FW-22 was performed in 2003 and that no cracking was detected in the deposited overlay weld metal; and that the RWCU weld 33-FW-23A is scheduled to be reinspected during the 2007 refueling outage.

In GL 88-01, the staff established the following position with respect to performing inspections of austenitic stainless steel welds that experienced IGSCC and were repaired with austenitic stainless steel weld overlays:

(1) The weld overlays needed to be conducted in accordance with Subarticle IWB-3600 of the ASME Boiler and Pressure Vessel Code.

(2) The welds and their overlays needed to be examined by UT inspectors and UT procedures qualified to inspect weld overlays in conformance with the staff's position on inspection methods and personnel.

The "parameters monitored/inspected" program element in GALL AMP XI.M7, "BWR Stress Corrosion Cracking," states, in part, that the program is used to detect and size cracks by using those examination and inspection guidelines delineated in NUREG-0313, Revision 2, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," January 1988, and GL 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping," January 25, 1988, or, alternatively, in guidelines of Topical Report BWRVIP-75A.

The "parameters monitored/inspected" program element for GALL AMP XI.M7 does not distinguish whether the cracking has been initiated by SCC or by fatigue. The applicant has indicated that it will use the UT examinations of its BWR Stress Corrosion Cracking Program as the basis for managing cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays.

The staff found this as an acceptable approach since it conforms to: (1) the "parameters monitored/inspected" program element in GALL AMP XI.M7, (2) the staff's position in GL 88-01 for performing UT inspections of austenitic stainless weld overlays repair designs, and (3) with the changes to GL 88-01 UT inspection schedules that were proposed in Topical Report BWRVIP-75A.

In addition, the applicant made the following amendments to the ALRA to address the inquiries in RAI 4.7.5A-1 and the changes to the RWCU Overlay TLAA.

(1) ALRA Table 3.3.2.A-17 was amended to include an AMR entry indicating that cracking of the wrought austenitic stainless piping to the RWCU heat exchangers under exposure to the "treated water or steam, temperature ≥ 212°F, but < 482°F" environment will be managed by a TLAA, evaluated in accordance with 10 CFR 54.21(c).

(2) ALRA Section 4.7.5 was amended to be consistent with the change in applicant's position for accepting this TLAA under 10 CFR 54.21(c)(1)(iii).

(3) ALRA USAR supplement Section A1.2.5.2 was amended to be consistent with the applicant's position for accepting the RWCU Overlay TLAA under 10 CFR 54.21(c)(1)(iii).

The staff founds these changes to be acceptable because the applicant has made the appropriate update of its AMR tables and ALRA Sections 4.7.5 and A1.2.5.2 to account for: (1) the change in applicant's position for accepting the RWCU Overlay TLAA in accordance with 10 CFR 54.21(c)(1)(iii), and (2) the basis for using the UT examinations of the BWR Stress Corrosion Cracking program to manage cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays. The staff evaluated the amended version of ALRA Section A1.2.5.2 in SER Section 4.7A.5.3.

Based on this assessment, the staff concludes that the applicant has provided: (1) an acceptable basis for approving the RWCU Overlay TLAA in accordance with 10 CFR 54.21(c)(1)(iii), (2) an acceptable AMP to manage cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays, and (3) appropriate changes to the ALRA to account for its amended position for accepting this TLAA. Therefore, the staff's concerns described in RAI 4.7.5A-1 are resolved.

4.7.5.3 USAR Supplement

ALRA Section A.1.2.5.2 summarizes the applicant's USAR Supplement description for the RWCU Overlay TLAA. In its response to RAI 4.7.5A-1, the applicant provided the following amended USAR supplement:

> A1.2.5.2 Reactor Water Cleanup System Weld Overlay Fatigue Flaw Growth Evaluations
>
> Fatigue crack growth analyses have been performed for two weld overlays in the reactor water cleanup system. The repaired welds are located at the inlet nozzle of the regenerative heat exchanger and the transition pipe between the upper and lower shells of the regenerative heat exchanger, respectively. The weld overlays consist of IGSCC-resistant austenitic stainless steel material and, thus, are not susceptible to continued IGSCC crack propagation. However, the first 1/16" thick layer of weld metal deposited is not assumed to be IGSCC-resistant due to weld dilution; thus, it is assumed to be cracked. A fatigue crack growth analysis for each weld overlay was performed in accordance with ASME Section XI, Appendix C, with the crack propagating into the overlay from the hypothetical 1/16" deep crack. The results of those analyses showed that the welds were acceptable per the code criteria through the end of the period of extended operation. Additionally, however, the overlaid welds are UT examined periodically under the BWR Stress Corrosion Cracking Program, thus ensuring there is no fatigue crack propagation into the overlays. The maximum interval between inspections is defined by the requirements of BWRVIP-75A. Therefore, the aging of the RWCU weld overlays will be adequately managed through the balance of the initial 40 year licensing term and the period of extended operation.

The applicant's amended USAR supplement for the RWCU Overlay TLAA appropriately summarizes how the applicant will apply the BWR Stress Corrosion Cracking Program to manage cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays. The applicant's revised USAR supplement summary description is consistent with the basis in the applicant's response to RAI 4.7.5A-1, which indicated that, pursuant to 10 CFR 54.21(c)(1)(iii), the applicant will use its BWR Stress Corrosion Cracking Program to manage cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays.

In SER Section 4.7.5.2, the staff provided its basis for accepting the RWCU overlay TLAA in accordance with 10 CFR 54.21(c)(1)(iii) and for accepting the applicant's BWR Stress Corrosion Cracking Program as the basis for managing cracking in RWCU welds 33-FW-22 and 33-FW-23A and their repair overlays. Since the amended USAR supplement is consistent with the applicant's basis for accepting the applicant's RWCU Overlay TLAA under 10 CFR 54.21(c)(1)(iii) and the staff's evaluation for accepting this TLAA, the staff concludes that the USAR supplement summary description for the RWCU overlay TLAA is acceptable.

4.7.5.4 Conclusion

On the basis of its review, as discussed above, the staff concludes that there is reasonable assurance that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii) that, for the RWCU Overlay TLAA, the effects of aging on the intended functions for the RWCU will be adequately managed for the period of extended operation. The staff also concludes that the revised NMP1 USAR supplement contains an appropriate summary description of the RWCU Overlay TLAA for the period of extended operation, as required pursuant to 10 CFR 54.21(d).

4.8 Conclusion for Time-Limited Aging Analyses

The staff reviewed the information in ALRA Section 4, "Time-Limited Aging Analyses." On the basis of its review, the staff concludes that the applicant has provided an adequate list of TLAAs, as defined in 10 CFR 54.3. Further, the staff concluded that the applicant demonstrated that: (1) the TLAAs will remain valid for the period of extended operation, as required by 10 CFR 54.21(c)(1)(i); (2) the TLAAs have been projected to the end of the period of extended operation, as required by 10 CFR 54.21(c)(1)(ii); or (3) that the aging effects will be adequately managed for the period of extended operation, as required by 10 CFR 54.21(c)(1)(iii). The staff also reviewed the UFSAR and USAR supplements for the TLAAs and found that the supplements contain descriptions of the TLAAs sufficient to satisfy the requirements of 10 CFR 54.21(d). In addition, the staff concluded that no plant-specific exemptions are in effect that are based on TLAAs, as required by 10 CFR 54.21(a)(2).

With regard to these matters, the staff concludes that there is reasonable assurance that the activities authorized by the renewed licenses will continue to be conducted in accordance with the CLB, and that any changes made to the CLB, in order to comply with 10 CFR 54.29(a), are in accordance with the Atomic Energy Act of 1954 and the NRC's regulations.

SECTION 5

REVIEW BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The NRC staff issued its safety evaluation report (SER) related to the renewal of operating licenses for Nine Mile Point Nuclear Station, Units 1 and 2 on March 3, 2006. On April 5, 2006 the applicant presented its license renewal application, and the staff presented its review findings to the ACRS Plant License Renewal Subcommittee. The staff reviewed the applicant's comments on the SER and completed its review of the license renewal application. The staff's evaluation is documented in a final SER that was issued by letter dated June 1, 2006.

During the 534[nd] meeting of the ACRS, July 12, 2006, the ACRS completed its review of the NMPNS license renewal application and the NRC staff's SER. The ACRS documented its findings in a letter to the Commission dated August 2, 2006. A copy of this letter is provided on the following pages of this SER Section.

ACRSR-2204

August 2, 2006

The Honorable Dale E. Klein
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE LICENSE RENEWAL APPLICATION FOR THE NINE MILE POINT NUCLEAR STATION, UNITS 1 AND 2

Dear Chairman Klein:

During the 534th meeting of the Advisory Committee on Reactor Safeguards, July 12–13, 2006, we completed our review of the license renewal application for the Nine Mile Point Nuclear Station (NMPNS), Units 1 and 2, and the final Safety Evaluation Report (SER) prepared by the NRC staff. Our Plant License Renewal Subcommittee also reviewed this matter during a meeting on April 5, 2006. During these reviews, we had the benefit of discussions with representatives of the staff and the applicant, Constellation Energy Group, LLC (CEG). We also had the benefit of the documents referenced. This report fulfills the requirement of 10 CFR 54.25, which requires that the ACRS review and report on all license renewal applications.

CONCLUSION AND RECOMMENDATION

1. The programs committed to and established by the applicant to manage age-related degradation provide reasonable assurance that NMPNS, Units 1 and 2, can be operated in accordance with their current licensing basis for the period of extended operation without undue risk to the health and safety of the public.

2. CEG's application for renewal of the operating licenses for NMPNS, Units 1 and 2, should be approved.

BACKGROUND AND DISCUSSION

NMPNS consists of two General Electric (GE) boiling water reactor (BWR) Units on a site six miles northeast of Oswego, NY. The current operating licenses will expire on August 22, 2009 for Unit 1 and October 31, 2026 for Unit 2. The applicant has requested renewal of these licenses for an additional 20 years.

Unit 1 uses a Mark 1 containment design consisting of a drywell, a suppression chamber in the shape of a torus, and a vent system that connects the drywell to the torus. Unit 2 uses a Mark 2 containment structure of reinforced concrete with an inner liner of carbon steel. Unit 1 is authorized to operate at 1,850 MWt, and Unit 2 at 3,467 MWt. The Unit 1 main condenser is

cooled by a once-through circulating water system using cooling water from Lake Ontario. Unit 2 has a closed cooling system that uses a natural draft cooling tower.
In the final SER, the staff documented its review of the license renewal application and other information submitted by the applicant or obtained during the staff's audit and inspection at the plant site. The staff reviewed the completeness of the applicant's identification of structures, systems, and components (SSCs) that are within the scope of license renewal; the integrated plant assessment process; the applicant's identification of plausible aging mechanisms associated with passive, long-lived structures and components; the adequacy of the applicant's Aging Management Programs (AMPs); and the identification and assessment of time-limited aging analyses (TLAAs).

The application demonstrates consistency with, or justifies deviations from, the approaches specified in the Generic Aging Lessons Learned (GALL) Report. The applicant has correctly identified those SSCs from both Units that fall within the scope of license renewal. The applicant performed an aging management review of SSCs within the license renewal scope. Based on the results of this review, the applicant will apply 43 AMPs. Of these, 9 are fully consistent with the GALL Report, 27 are consistent with the GALL Report with exceptions or enhancements, and 7 are plant specific. The staff determined that the AMPs described by the applicant are appropriate and sufficient to manage aging of long-lived passive components that are within the scope of license renewal. We concur.

The staff conducted an inspection and an audit for the license renewal application. The inspection was performed to verify that the scoping and screening methodologies are consistent with the regulations and are adequately reflected in the application. The audit verified the appropriateness of the AMPs and the aging management reviews. Based on the inspection and audit, the staff concluded that these programs are consistent with the descriptions contained in the CEG license renewal application. The staff also concluded that the existing programs, to be credited as AMPs for license renewal, are generally functioning well and that an implementation plan had been established in the applicant's commitment tracking system to ensure timely completion of the license renewal commitments.

Analyses of neutron embrittlement of the reactor vessels for both units were performed by the applicant and independently verified by the staff. These analyses demonstrate that the limiting reactor vessel beltline welds and plate materials will satisfy acceptance criteria for the periods of extended operation. Both the applicant and the staff chose to use a lifetime capacity factor of 90 percent for determining neutron fluence.

The staff identified no open items or confirmatory items in the final SER. CEG has made 56 license renewal commitments for NMPNS. Of these commitments, 26 are common to both Units with 16 commitments applying only to Unit 1 and 14 commitments applying only to Unit 2. The staff has included appropriate license conditions in the final SER to satisfy the remaining documentation issues and action items. No changes in the technical specifications are required for either Unit.

The applicant's initial license renewal application was not of adequate quality. In reviewing the application, the staff generated 323 Requests for Additional Information (RAIs) and 385 audit questions. The large number of RAIs prompted the applicant to request a delay to prepare an amended license renewal application. The amended license renewal application was more complete and of higher quality.

The staff's evaluation was comprehensive and well documented in the final SER. The inspection and audit performed by the staff were effective in evaluating the applicant's proposed and existing programs and TLAAs.

No issues related to the matters described in 10 CFR 54.29(a)(1) and (a)(2) preclude renewal of the operating licenses for NMPNS, Units 1 and 2. The programs committed to and established by the applicant provide reasonable assurance that NMPNS, Units 1 and 2, can be operated in accordance with their current licensing basis for the period of extended operation without undue risk to the health and safety of the public. The application for renewal of the operating licenses for NMPNS, Units 1 and 2, should be approved.

Sincerely,

/RA/

Graham B. Wallis
Chairman

References:

1. Safety Evaluation Report-Final Related to the License Renewal of Nine Mile Point Nuclear Station, Units 1 and 2, dated May 30, 2006.

2. Nine Mile Point Nuclear Station, Units 1 and 2 — Application for Renewed Operating Licenses, dated May 26, 2004.

3. Audit and Review Report for Plant Aging Management Programs (AMPs) and Aging Management Reviews (AMRs) — Nine Mile Point Nuclear Station, dated January 5, 2006.

4. Nine Mile Point Nuclear Station Inspection Report 05000220/20050011 and 05000410/20050011, dated March 2, 2006.

5. Safety Evaluation Report with Open Items Related to the License Renewal of the Nine Mile Point Nuclear Station, Units 1 and 2, dated March 3, 2006.

SECTION 6

CONCLUSION

The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) reviewed the license renewal application (LRA) and its amended license renewal application (ALRA) for the Nine Mile Point Nuclear Station (NMPNS), Units 1 and 2, in accordance with the NRC regulations and NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. Title 10, Section 54.29, of the *Code of Federal Regulations* (10 CFR 54.29) provides the standards for issuance of a renewed license.

On the basis of its evaluation of the LRA and ALRA, the staff concludes that there is reasonable assurance that the requirements of 10 CFR 54.29(a) have been met and that all open items have been resolved.

The staff would like to note that any requirements of Subpart A of 10 CFR Part 51 are to be documented in the Final Supplement 24 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Nine Mile Point Nuclear Station (NMPNS), Units 1 and 2, Final Report," which is scheduled to be issued on May 29, 2006. The staff further notes that the Draft Supplement 24 to NUREG-1437 was issued for public comments on September 29, 2005.

APPENDIX A

COMMITMENTS FOR LICENSE RENEWAL OF NMPNS UNITS 1 AND 2

During the review of the Nine Mile Point Nuclear Station, Units 1 and 2, original license renewal application (LRA) and amended license renewal application (ALRA) by the staff of the U.S. Nuclear Regulatory Commission, the applicant made commitments related to aging management programs to manage aging effects of structures and components prior to the period of extended operation. The following table lists these commitments, along with the implementation schedules and the sources of the commitment.

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
3	Apply for relief from reactor vessel circumferential weld inspections for the period of extended operation. Supporting analyses, procedural controls, and operator training will be completed prior to the period of extended operation to support and confirm that the RPV circumferential weld failure probability remains acceptable for the period of extended operation.	A1.2.1.3	Prior to Period of Extended Operation	ALRA Section 4.2.3
8	Develop a baseline Cumulative Usage Factor (CUF) for the specified portions of the following systems: (1) Feedwater / High Pressure Coolant Injection (2) Core Spray (3) Reactor Water Cleanup (piping inside the Reactor Coolant Pressure Boundary) and (4) Reactor Recirculation (and associated Shutdown Cooling Systems Lines). If the baseline CUF for a specified portion of a system exceeds 0.4, the limiting locations may require additional monitoring to demonstrate compliance over the period of extended operation.	A1.2.2.3	Prior to Period of Extended Operation	ALRA Section 4.3.7
10	The Fatigue Monitoring Program will track transients specific to the Emergency Cooling System with additional usage added to the baseline Cumulative Usage Factor for the emergency condensers as described in Section 4.3 of the LRA.	A1.2.2.6	Prior to Period of Extended Operation	ALRA Section 4.3.7
11	Enhance the Fatigue Monitoring Program to (1) ensure that fatigue usage of the torus attached piping and other torus locations does not exceed the design limits, add ERV lifts as a transient to be counted by the Fatigue Monitoring Program and (2) add the two highest usage torus attached piping locations, the 12-inch core spray suction line for Core Spray Pump 111 that enters the torus at penetration XS-337 and the 3-inch containment spray line that enters the torus at penetration XS-326 as fatigue monitoring locations.	A1.2.4.2	Prior to Period of Extended Operation	ALRA Section 4.6.2 and Appendix B3.2

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
12	The RPV weld flaw evaluations will be revised to consider additional fatigue crack growth and the effects of additional irradiation embrittlement (for beltline materials) associated with operation for an additional 20 years (i.e., out to at least 46 EFPY) and submitted for NRC review and approval no later than 2 years prior to the period of extended operation. If the revised calculation shows the identified flaws cannot meet the applicable acceptance criteria, the indications will be reexamined in accordance with ASME Section XI requirements.	A1.2.5.1	Completed	ALRA Section 4.7.4 As supplemented By NMP1L 2007 Dated 12/5/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS - UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
13	Enhance the BWR VIP to address the following: (1) BWRVIP-18 open item regarding the inspection of inaccessible welds for core spray system. As such, NMPNS will implement the resolution of this open item as documented in the BWRVIP response and reviewed and accepted by the NRC; (2) The inspection and evaluation guidelines for steam dryers are currently under development by the BWRVIP committee. Once these guidelines are documented, and reviewed and accepted by the NRC, the actions will be implemented in accordance with the BWRVIP program; (3) The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the appropriate program and implementing documents; and (4) The reinspection scope and frequency for the grid beam going forward will be based on BWRVIP-26A guidance for plant specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least 2 locations with accessible indications within the initial 6 years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions.	A1.1.12	Prior to Period of Extended Operation	ALRA Appendix B2.1.8 As supplemented By NMP1L 2005 Dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
15	Enhance the Closed Cycle Cooling Water System (CCCWS) Program to (1) Expand periodic chemistry checks of the systems consistent with the guidelines of EPRI TR-107396;(2) Implement a program to use corrosion inhibitors in the Reactor Building Closed Loop (RBCL) Cooling Systems and Control Room HVAC System in accordance with the guidelines given in EPRI TR-107396; (3) Direct periodic inspections to monitor for loss of material in the piping of the CCCWS; (4) Implement a corrosion monitoring program for larger bore CCCW piping not subject to inspection under another program; (5) Establish the frequencies to inspect for degradation of components in CCCWS, including heat exchanger tube wall thinning; (6) Perform a heat removal capability test for the Control Room HVAC System at least every 5 years; (7) Establish periodic monitoring, trending, and evaluation of performance parameters for the RBCL cooling and Control Room HVAC; (8) Provide the controls and sampling necessary to maintain water chemistry parameters in CCCWS within the guidelines of EPRI Report TR 107396; and (9) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.	A1.1.13	Prior to the Period of Extended Operation	ALRA Appendix B2.1.11
16	The Boraflex Monitoring Program will be enhanced to (1) Require periodic neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of test coupons to those of Boraflex racks that remain in use during the period of extended operation; and (2) Establish monitoring and trending instructions for in-situ test results, silica levels, and coupon results.	A1.1.5	Prior to Period of Extended Operation	ALRA Appendix B2.1.12 As supplemented By NMP1L 1996 Dated 11/17/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
18	Enhance the Compressed Air Monitoring Program to (1) Develop new activities to manage the loss of material, stress corrosion cracking, and perform periodic system leak checks;(2) Expand the scope, periodicity, and inspection techniques to ensure that the aging of certain sub-components of the dryers and compressors (e.g., valves, heat exchangers) are managed; (3) Develop and implement activities to address the failure mechanism of stress corrosion cracking in unannealed red brass piping; (4) Establish activities that manage the aging of the internal surfaces of carbon steel piping and that require system leak checks to detect deterioration of the pressure boundaries; and (5) Expand the acceptance criteria to ensure that the aging of certain sub-components of the dryers and compressors (e.g., valves, heat exchangers) are managed.	A1.1.14	Prior to Period of Extended Operation	ALRA Appendix B2.1.14
21	Enhance the Fuel Oil Chemistry Program to (1) Establish specifications to perform quarterly trending of water and sediment; (2) Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and/or fuel stabilizers to maintain fuel oil quality; (3) Add specifications to periodically inspect the interior surfaces of the emergency diesel fuel oil storage tanks for evidence of significant degradation, including a specific requirement that the tank bottom thickness be determined by UT or other industry recognized methods; (4) Add specifications for quarterly trending of particulate contamination analysis results; (5) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation; (6) Establish specifications for periodic opening of the diesel fire pump fuel oil day tank drain; and (7) Establish specifications to remove water, if found.	A1.1.20	Prior to Period of Extended Operation	ALRA Appendix B2.1.16 As supplemented By NMP1L 1996 Dated 11/17/05 and NMP1L 2005 Dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
26	Enhance the Structures Monitoring Program to (1) Expand the program to include the following activities or components in the scope of License Renewal but not within the current scope of 10 CFR 50.65: (a) the steel electrical transmission towers required for the SBO and recovery paths; (2) Expand the parameters monitored during structural inspections to include those relevant to aging effects identified for structural bolting; and (3) Implement regularly scheduled ground water monitoring to ensure that a benign environment is maintained.	A1.1.34	Prior to Period of Extended Operation	ALRA Appendix B2.1.28

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
36	As acknowledged by the NRC in the referenced RAI, the ASME Code Committee is evaluating the acceptability of roll/expansion techniques as a permanent repair for CRD stub tubes via Code Case N-730. NMP will continue to follow the status of the proposed ASME code case and will implement the final code case, as conditioned by the NRC, once it has been approved. If the code case is not approved by the ASME, NMP1 will seek NRC approval of the 10/19/05 code case draft on a plant specific basis as conditioned by the NRC. During the period of extended operation, should a CRD stub tube rolled in accordance with the provisions of the code case resume leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected: 1. A welded repair consistent with BWRVIP-58-A, "BWRVIP Internal Access Weld Repair" and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147. 2. A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1. 3. A future developed mechanical/welded repair method subject to the approval of the NRC.	A1.1.12	August 22, 2009	ALRA Appendix B2.1.8 As supplemented By NMP1L 2004 Dated 11/30/05
38	An EVT-1 examination of the NMP1 feedwater sparger end bracket welds will be added to the BWR Vessel Internals Program. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds.	A1.1.12	Prior to NMP1 Period of Extended Operation	NMP1L 2005 Dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 1				
NMP1 (ALRA Table A 1.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
39	The Masonry Wall Program (as managed by the Structures Monitoring Program) will be enhanced to provide guidance for inspecting NMP1 non-reinforced masonry walls that do not have bracing and are within scope of license renewal more frequently than the reinforced masonry walls.	A1.1.23 A1.1.34	Prior to NMP1 Period of Extended Operation	NMP1L 2005 Dated 12/1/05
40	NMP1 will perform an EVT-1 inspection of the thermal shield to flow shield weld starting in 2007 and proceeding at a 10 year frequency thereafter consistent with the ISI inspection interval.	A1.1.12	Prior to NMP1 Period of Extended Operation	NMP1L 2005 Dated 12/1/05
42	NMPNS will perform volumetric examinations on the NMP1 drywell shell during the 2007 refueling outage and an engineering evaluation will be performed to determine the actions necessary for NMP1 operation through the period of extended operation, in accordance with the NMP1 Drywell Supplemental Inspection Program.	A1.1.42	Prior to NMP1 Period of Extended Operation	NMP1L 2037 Dated 4/4/06

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 2				
NMP2 (ALRA Table A2 .4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
6	For the bounding locations for ASME Class 1 systems, transients contributing to fatigue usage will be tracked by the Fatigue Monitoring Program (FMP) with additional usage added to the baseline Cumulative Usage Factor (CUF) using the design Cycle Based Fatigue (CBF) method described in Section 4.3 of the LRA. If a bounding location with a current CUF value less than or equal to 0.1 could have its CUF value exceed 0.1 before the end of the period of extended operation, then the impact on the original break postulation calculations will be assessed.	A2.2.2.2	Prior to Period of Extended Operation	ALRA Section 4.3.2
8	If fatigue monitoring of ASME Class 1 piping (described in LRA Section 4.3.2) indicates higher fatigue usage than expected, non-ASME Class 1 piping will be evaluated for possible fatigue concerns.	A2.2.2.4	Prior to Period of Extended Operation	ALRA Section 4.3.4
9	Revise or evaluate the Cumulative Usage Factor evaluations for the shroud, core support plate and studs, and jet pumps to remove conservatism and/or encompass the period of extended operation (e.g., a more extensive fatigue analysis of the jet pumps will be performed).	A2.2.2.5	Prior to Period of Extended Operation	ALRA Section 4.3.5
11	For penetrations listed in Table 4.6-4 of the LRA, transients contributing to fatigue usage will be tracked by the NMPNS FMP with additional usage added to the baseline Cumulative Usage Factor using the design Cycle Based Fatigue method described in Section 4.3 of the LRA.	A2.1.16	Prior to Period of Extended Operation	ALRA Section 4.6.5

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 2				
NMP2 (ALRA Table A2 .4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
12	NMPNS will either:(1) Install core plate wedges (as part of a proposed core shroud tie-rod repair) to eliminate the need for the enhanced inspections of the core plate hold-down bolts recommended by BWRVIP-25; or (2) Perform an analysis (incorporating detailed flux/fluence analyses and improved stress relaxation correlations) in accordance with BWRVIP-25 to demonstrate that the core plate hold-down bolts can withstand all normal, emergency, and faulted loads considering the effects of stress relaxation, until the end of the period of extended operation and submit it for staff review and approval 2 years prior to entering the period of extended operation.	A2.2.5.3	October 31, 2024	ALRA Section 4.7.3 As supplemented By NMP1L 2007 Dated 12/5/05 And NMP1L 2008 Dated 12/13/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 2				
NMP2 (ALRA Table A2 .4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
13	Enhance the BWR VIP to address (1) BWRVIP-18, 41 and 42 open items regarding the inspection of inaccessible welds for core spray, jet pump and low pressure coolant injection components, respectively. As such, NMPNS will implement the resolution of these open items as documented in the BWRVIP response and reviewed and accepted by the NRC; (2) The inspection and evaluation guidelines for steam dryers and access hole covers are currently under development by the BWRVIP committee. Once these guidelines are documented, and reviewed and accepted by the NRC, the actions will be implemented in accordance with the BWRVIP program; (3) The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the appropriate program and implementing documents; and (4) NMPNS will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the NMP BWRVIP program will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline."	A2.1.13	Prior to Period of Extended Operation	ALRA Appendix B2.1.8 As supplemented By NMP1L 2005 Dated 12/1/05 And NMP1L 2008 Dated 12/13/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 2				
NMP2 (ALRA Table A2 .4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
15	Enhance the Closed Cycle Cooling Water System (CCCWS) Program to (1) Expand periodic chemistry checks of the system consistent with the guidelines of EPRI TR-107396; (2) Implement a program to use corrosion inhibitors in the Reactor Building Closed Loop Systems (RBCL) and Control Building Ventilation Chilled Water System (CBVCWS) in accordance with the guidelines given in EPRI TR-107396; (3) Direct periodic inspections to monitor for loss of material in the piping of the CCCW systems; (4) Establish the frequencies to inspect for degradation of components in CCCWS, including heat exchanger tube wall thinning; (5) Establish periodic monitoring, trending, and evaluation of performance parameters for the RBCL Cooling and CBVCWS; (6) Specify chemistry sampling frequency for the CBVCWS; (7) Provide the controls and sampling necessary to maintain water chemistry parameters in CCCWS within the guidelines of EPRI Report TR 107396; and (8) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.	A2.1.14	Prior to the Period of Extended Operation	ALRA Appendix B2.1.11

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS - UNIT 2				
NMP2 (ALRA Table A2 .4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
19	Enhance the Fuel Oil Chemistry Program to (1) Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and/or fuel stabilizers to maintain fuel oil quality; (2) Add specifications to sample the diesel fuel oil storage tanks for water and sediment at least quarterly per the ASTM standard; (3) Add specifications to periodically inspect the interior surfaces of the fuel oil storage tanks for evidence of significant degradation, including a specific requirement that the tank bottom thickness be determined by UT or other industry recognized methods; (4) Add specifications for quarterly trending of particulate contamination analysis results; (5) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation; (6) Establish specifications to perform quarterly trending of water and sediment; and (7) Establish specifications to remove water, if found.	A2.1.20	Prior to Period of Extended Operation	ALRA Appendix B2.1.18 As supplemented By NMP1L 1996 Dated 11/17/05 And NMP1L 2005 Dated 12/1/05
24	Enhance the Structures Monitoring Program to (1) Expand the program to include the following activities or components in the scope of License Renewal but not within the current scope of 10 CFR 50.65: (a) Fire Rated Assemblies & Watertight Penetration Visual Inspections (b) masonry walls in the Turbine Building and Service Water Tunnel serving a fire barrier function (c) the steel electrical transmission towers required for the SBO and recovery paths; (2) Expand the parameters monitored during structural inspections to include those relevant to aging effects identified for structural bolting; and (3) Implement regularly scheduled ground water monitoring to ensure that a benign environment is maintained.	A2.1.34	Prior to Period of Extended Operation	ALRA Appendix B2.1.27 and B2.1.28
34	Develop and implement a Wooden Power Pole Inspection Program.	A2.1.40	Prior to Period of Extended Operation	ALRA Appendix B2.1.40

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 2				
NMP2 (ALRA Table A2 .4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
36	The spent fuel rack design that currently utilizes Boraflex for reactivity control in the spent fuel pool will be replaced by a design that utilizes Boral for this function.	NA	Prior to NMP2 Period of Extended Operation	NMP1L 1996 Dated 11/17/05
37	An EVT-1 examination of the NMP2 feedwater sparger end bracket welds will be added to the BWR Vessel Internals Program as a program enhancement. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP2 feedwater thermal sleeve concludes that the thermal sleeve hidden welds are not IGSCC susceptible, the NMP2 inspections will be discontinued.	A2.1.13	Prior to NMP2 Period of Extended Operation	NMP1L 2005 Dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – UNIT 2				
NMP2 (ALRA Table A2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
38	Enhance the Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program as follows: (1) Expand the scope of the existing procedures to provide for manhole inspections and water removal, (2) Develop a new testing procedure specific to those cables requiring aging management under this Program. The specific type of test performed will be a proven test for detecting deterioration of the insulation system due to wetting as described in EPRI TR-103834-P1-2, such as power factor, partial discharge, or other testing that is both state-of-the-art and consistent with the latest industry guidance at the time the test is performed. (3) establish requirement to test cables subject to aging management prior to, and every 10 years during, the period of extended operation, and (4) establish maintenance requirement to inspect and remove water, as necessary, from manholes serving cables subject to aging management. The inspection frequency will be based upon actual plant experience with water accumulation in the manhole, but in any event, will be at least once every two years. The first inspection will be completed prior to the period or extended operation.	A2.1.39	Prior to NMP2 Period of Extended Operation	NMP1L 2005 Dated 12/1/05
39	No later than two years prior to entry into the PEO, NMP will submit, for NRC review and approval, the summary of the Reg. Guide 1.190 based analysis that determines the maximum neutron fluence at the NMP2 Biological Shield Wall or at the shield wall flaw locations that are the basis for the ALRA Section 4.7.1 TLAA. The submittal will include revised ALRA Sections 4.7.1 and A2.2.5.1, and any other supporting analysis, as applicable.	A2.2.5.1	October 31, 2024	NMP1L 2015 Dated 1/11/06

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
1	1	Incorporate Appendix A1 into the NMP1 UFSAR and Appendix A2 into the NMP2 USAR.	A0 A0	Following the issuance of the renewed Operating License	ALRA Section A0
2	2	In accordance with 10 CFR 54.21(b), during NRC review of this application, provide an annual update to the application to reflect any change to the current licensing basis that materially affects the contents of the License Renewal Application (LRA).	NA	Completed	ALRA Section 1.2.1 NMP1L 2009 Dated 12/20/05 And NMP1L 2028 Dated 3/23/06
4	3	Supporting analyses will be completed prior to the period of extended operation to confirm that the failure probabilities for the limiting RPV axial welds remain bounded for the period of extended operation.	A1.2.1.4 A2.2.1.3	Prior to Period of Extended Operation	ALRA Section 4.2.4
5	4	For those locations where additional fatigue analysis is required to take advantage of the implicit margin, and to more accurately determine cumulative usage factor (CUFs), the EPRI FatiguePro fatigue monitoring software will be implemented prior to the period of extended operation.	A1.2.2 A2.2.2	Prior to Period of Extended Operation	ALRA Section 4.3 and Appendix B3.2
6	5	For the critical reactor vessel component locations, shown in Tables 4.3-3 and 4.3-4 of the LRA, additional usage will be added to the baseline Cumulative Usage Factor using one of the methods described in Section 4.3 of the LRA.	A1.2.2.1 A2.2.2.1	Prior to Period of Extended Operation	ALRA Section 4.3.1
7	7	Transients contributing to fatigue usage of the FWS nozzles will be tracked by the Fatigue Monitoring Program (FMP) with additional usage added to the baseline Cumulative Usage Factor using the Stress Based fatigue method described in Section 4.3 of the LRA.	A1.2.2.2 A2.2.2.3	Prior to Period of Extended Operation	ALRA Section 4.3.3

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
9	10	Assess the impact of the reactor coolant environment on a sample of critical component locations, including locations equivalent to those identified in NUREG/CR-6260, as part of the Fatigue Monitoring Program. These locations will be evaluated by applying environmental correction factors (F_{en}) to existing and future fatigue analyses.	A1.2.2.5 A2.2.2.6	Prior to Period of Extended Operation	ALRA Section 4.3.6 and Appendix B3.2
14	14	Enhance the Open Cycle Cooling Water System (OCCWS) Program to (1) Ensure that the applicable commitments made for GL 89-13, and the requirements in NUREG-1801, Section XI.M20 are captured in the implementing documents for GL 89-13; (2) Incorporate into the OCCWS program, the requirements of the NUREG-1801, Section XI.M20 that are more conservative than the GL 89-13 commitments; and (3) Revise the preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies.	A1.1.29 A2.1.29	Prior to Period of Extended Operation	ALRA Appendix B2.1.10
17	16	Revise applicable procedures related to the Crane Inspection Program to add specific direction for performance of corrosion inspections, with acceptance criteria, for certain hoist lifting assembly components.	A1.1.22 A2.1.22	Prior to Period of Extended Operation	ALRA Appendix B2.1.13 As supplemented By NMP1L 1996 dated 11/17/05 and NMP1L 2005 dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
19	17	Enhance the Fire Protection Program to (1) Incorporate periodic visual inspections of piping and fittings located in a non-water environment such as Halon and Carbon Dioxide fire suppression systems components, to detect evidence of corrosion and any system mechanical damage that could affect its intended function; (2) Expand the scope of periodic functional tests of the diesel-driven fire pump to include inspection of engine exhaust system components to verify that loss of material is managed; (3) Perform an engineering evaluation to determine the plant specific inspection periodicity of fire doors; and (4) Revise Halon and Carbon Dioxide functional test frequencies to semi-annual.	A1.1.17 A2.1.17	Prior to Period of Extended Operation	ALRA Appendix B2.1.16 As supplemented By NMP1L 1996 Dated 11/17/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
20	18	Enhance the Fire Water System Program by revising applicable existing procedures to (1) incorporate inspections to detect and manage loss of material due to corrosion into existing periodic test procedures; (2) specify periodic component inspections to verify that loss of material is being managed; (3) add procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling; (4) add requirements to periodically check the water-based fire protection systems for microbiological contamination; (5) measure fire protection system piping wall thickness using non-intrusive techniques (e.g., volumetric testing) to detect loss of material due to corrosion; (6) establish an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testing; (7) define acceptance criteria for visual inspections and volumetric testing; and (8) Develop new procedures and PM tasks to implement sprinkler head replacements and/or inspections to meet National Fire Protection Association (NFPA) 25, "Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," Section 5.3.1 (2003 Edition) requirements.	A1.1.18 A2.1.18	Prior to Period of Extended Operation	ALRA Appendix B2.1.17 As supplemented By NMP1L1996 dated 11/17/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
22	20	Enhance the Reactor Vessel Surveillance program to (1) Incorporate the requirements and elements of the Integrated Surveillance Program (ISP), as documented in BWRVIP-116 and approved by NRC, or an NRC approved plant-specific program into the Reactor Vessel Surveillance Program, and include a requirement that if NMPNS surveillance capsules are tested, the tested specimens will be stored in lieu of optional disposal. When the NRC issues a final safety evaluation report (SER) for BWRVIP-116, NMPNS will address any open items and complete the SER Action Items. Should BWRVIP-116 not be approved by the NRC, a plant specific reactor vessel surveillance program will be submitted to the NRC two years prior to commencement of the period of extended operation and (2) Project analyses of upper shelf energy and pressure temperature limits to 60 years using methods prescribed by Regulatory Guide 1.99, Revision 2, and include the applicable bounds of the data, such as operating temperature and neutron fluence.	A1.1.32 A2.1.32	U1 - August 22, 2007 U2 - October 31, 2024	ALRA Appendix B2.1.19
23	21	Develop and implement a One-Time Inspection Program, which also includes the attributes for a Selective Leaching of Materials Program.	A1.1.28, A1.1.33 A2.1.28, A2.1.33	Prior to Period of Extended Operation	ALRA Appendices B2.1.20 and B2.1.21
24	22	Develop and implement a Buried Piping and Tank Inspection Program which includes a requirement that before entry into the period of extended operation, if an opportunistic inspection has not occurred, NMPNS will excavate NMP1 and NMP2 degradation susceptible areas to perform focused inspections.	A1.1.6 A2.1.7	Prior to Period of Extended Operation	ALRA Appendix B2.1.22, as supplemented By NMP1L 2005 Dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
25	23	An augmented VT-1 visual examination of the containment penetration bellows will be performed using enhanced techniques qualified for detecting SCC, per NUREG-1611, Table 2, Item 12.	A1.1.2 A2.1.2	Prior to Period of Extended Operation	ALRA Appendix B2.1.23
27	25	Develop and implement a Non-EQ Electrical Cables and Connection Program.	A1.1.24 A2.1.24	Prior to Period of Extended Operation	ALRA Appendix B2.1.29
28	26	Enhance the Non-EQ Electrical Cable and Connections Used in Instrumentation Circuit Program to (1) Implement reviews of calibration or surveillance data for indications of aging degradation affecting instrument circuit performance. The first reviews will be completed prior to the period of extended operation and every ten years thereafter; and (2) In cases where a calibration or surveillance program does not include the cabling system in the testing circuit, or as an alternative to the review of calibration results described above, provide requirements and procedures to perform cable testing to detect deterioration of the insulation system, such as insulation resistance tests or other testing judged to be effective in determining cable insulation condition. The first test will be completed prior to the period of extended operation. The test frequency of these cables shall be determined based on engineering evaluation, but the test frequency shall be at least once every ten years.	A1.1.25 A2.1.25	Prior to Period of Extended Operation	ALRA Appendix B2.1.30 as supplemented By NMP1L 2005 Dated 12/1/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	**NMP2 (ALRA Table A 2.4 Items)**	**COMMITMENT**	**UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION**	**IMPLEMENTATION SCHEDULE**	**SOURCE**
29	27	Enhance the Preventive Maintenance Program to (1) Expand the PM Program to encompass activities for certain additional components, identified as requiring Aging Management. Explicitly define the aging management attributes, including the systems and the component types/commodities included in the program; (2) specifically list those activities credited for aging management; (3) specifically list parameters monitored (4) specifically list the aging effects detected; (5) establish a requirement that inspection data be monitored and trended; and (6) establish detailed parameter-specific acceptance criteria.	A1.1.30 A2.1.30	Prior to Period of Extended Operation	ALRA Appendix B2.1.32
30	28	Enhance the System Walkdown Program to (1) Train all personnel performing inspections in the Systems Walk-down Program to ensure that age related degradation is properly identified and incorporate this training into the site training program; and (2) Specify acceptance criteria for visual inspections to ensure aging related degradation is properly identified and corrected.	A1.1.35 A2.1.35	Prior to Period of Extended Operation	ALRA Appendix B2.1.33
31	29	Enhance the Non-Segregated Bus Inspection Program to (1) expand visual inspections of the bus ducts, their supports and insulation systems; (2) Create new provisions to perform as an alternative to either thermography or periodic low range resistance checks of a statistical sample of the bus ducts accessible bolted connections, a visual inspection for the connections that are covered with heat shrink tape, sleeving, insulating boots, etc; and (3) Define acceptance criteria for inspection of the bus ducts, their support and insulation systems, and the low range ohmic checks of connections.	A1.1.27 A2.1.27	Prior to Period of Extended Operation	ALRA Appendix B2.1.34 as supplemented By NMP1L 1996 dated 11/17/05 NMP1L 2005 dated 12/1/05 NMP1L 2007 dated 12/5/05

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
32	30	Develop and implement a Fuse Holder Inspection Program.	A1.1.21 A2.1.21	Prior to Period of Extended Operation	ALRA Appendix B2.1.35
33	31	Enhance the Bolting Integrity Program to (1) The Structures Monitoring, Preventive Maintenance and Systems Walk-down Programs will be enhanced to include requirements to inspect bolting for indication of loss of preload, cracking, and loss of material, as applicable; (2) Include in NMP administrative and implementing program documents references to the Bolting Integrity Program and Industry guidance; and (3) Establish an augmented inspection program for high-strength (actual yield strength $\geq$ 150 ksi) bolts. This augmented program will prescribe the examination requirements of Tables IWB-2500-1 and IWC-2500-1 of ASME Section SI for high-strength bolts in the Class 1 and Class 2 component supports, respectively.	A1.1.38 A2.1.37	Prior to Period of Extended Operation	ALRA Appendix B2.1.36

APPENDIX A - NINE MILE POINT NUCLEAR STATION LICENSE RENEWAL COMMITMENTS – COMMON FOR NMP1 and NMP2					
NMP1 (ALRA Table A 1.4 Items)	NMP2 (ALRA Table A 2.4 Items)	COMMITMENT	UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SUPPLEMENT LOCATION	IMPLEMENTATION SCHEDULE	SOURCE
34	32	Enhance the Protective Coating Monitoring and Maintenance Program to (1) specify the visual examination of coated surfaces for any visible defects includes blistering, cracking, flaking, peeling, and physical or mechanical damage; (2) perform periodic inspection of coatings every refueling outage versus every 24 months; (3) set minimum qualifications for inspection personnel, the inspection coordinator, and the inspection results evaluator; (4) perform thorough visual inspections in areas noted as deficient concurrently with the general visual inspection; (5) specify the types of instruments and equipment that may be used for the inspection; (6) pre-inspection reviews of the previous two monitoring reports before performing the condition assessment; (7) establishment of guidelines for prioritization of repair areas and monitoring these areas until they are repaired; and (8) to require that the inspection results evaluator determine which areas are unacceptable and initiate corrective action.	A1.1.40 A2.1.38	Prior to Period of Extended Operation	ALRA Appendix B2.1.38
35	33	Develop and implement a Non-EQ Electrical Cable Metallic Connections Inspection Program.	A1.1.41 A2.1.39	Prior to Period of Extended Operation	ALRA Appendix B2.1.39
37	35	Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary, to ensure that intended functions are not impacted by the aging effect.	A1.1.12 A2.1.13	Prior to Period of Extended Operation	ALRA Appendix B2.1.8 as supplemented By NMP1L 1996 Dated 11/17/05
41	40	The NRC review of BWRVIP-76 is not yet complete. When the NRC review of BWRVIP-76 is complete, NMPNS will evaluate the NRC SER and complete SER Action Item, as appropriate.	A1.1.12 A2.1.13	Prior to Period of Extended Operation	ALRA Appendix B2.1.8

APPENDIX B: CHRONOLOGY

This appendix contains a chronological listing of routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and Constellation Energy Group, LLC (CEG). This appendix also contains other correspondence regarding the NRC staff's review of the Nine Mile Point Nuclear Sation, Units 1 and 2 (under Docket Nos. 50-220 and 50-410).

May 26, 2004	In a letter (signed by James A. Spina), CEG submitted its application to renew the operating license of the Nine Mile Point Nuclear Station (NMPNS), Units 1 and 2. In its submittal, CEG provided an original signed hard copy of the application, with additional electronic copies of the application on CDs. Cover Page Through Chapter 4 (ADAMS Accession No. ML041490223), Appendix A (ADAMS Accession No. ML041490224), Appendix B (ADAMS Accession No. ML041490225), Appendix C (ADAMS Accession No. ML041490227), Appendix D (ADAMS Accession No. ML041490229), LR Boundary Drawings (ADAMS Accession No. ML041540072)
May 28, 2004	NRC Press Release-04-065: NRC Announces Availability of LRA For NMPNS, Units 1 and 2 (ADAMS Accession No. ML041490358)
June 1, 2004	In a letter (signed by P. T. Kuo), the NRC acknowledged receipt and availability of the License Renewal Application (LRA) for NMPNS, Units 1 and 2 (ADAMS Accession No. ML041540092)
June 2, 2004	Notice of June 16, 2004 Meeting (signed by R. Auluck) With CEG Regarding License Renewal For The NMPNS, Units 1 and 2 (ADAMS Accession No. ML041540386)
June 16, 2004	Slides of June 16, 2004 Meeting Presentation on NMPNS, Units 1 and 2 - LRA (ADAMS Accession No. ML041900140)
June 25, 2004	Notice of July 08, 2004 Meeting (signed by R. Auluck) With CEG Regarding License Renewal For The NMPNS, Units 1 and 2 to inform the public of the Forthcoming Public Information Session For The U.S. NRC Staff To Describe Its License Renewal Process (ADAMS Accession No. ML041770243)
July 2, 2004	Summary of June 16, 2004 Meeting Between the U.S. NRC Staff and CEG, Inc Representatives to Discuss the NMPNS, Units 1 & 2 LRA (ADAMS Accession No. ML041840412)
July 8, 2004	Summary of Public Information Session for the U.S. NRC Staff to Describe Its License Renewal Process (Enclosure 3 - Slides for NMPNS) (ADAMS Accession No. ML042240058)
July 15, 2004	In the *Federal Register*, a "Notice of Acceptance for Docketing of the Application and Notice of Opportunity for Hearing Regarding Renewal of Facility Operating License Nos. DPR-63 and DPR-69 for an Additional 20 Year Period" is published, concerning the NMPNS LRA (ADAMS Accession No. ML041980375)

July 21, 2004	NRC Press Release-04-088: NRC Announces Opportunity For Hearing On Application To Renew NMP Operating Licenses (ADAMS Accession No. ML042030444)
July 28, 2004	Notice of Acceptance for Docketing of the Application and Notice of Opportunity for Hearing Regarding Renewal of Facility Operating License Nos. DPR-63 and NPF-69 - Correction (ADAMS Accession No. ML042240564)
July 29, 2004	In a letter (signed by P. T. Kuo) to Mr. Jim Spina of CEG, the NRC provided Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process under the provisions of 10 CFR Part 51, to implement the National Environmental Policy Act of 1969 (NEPA) for License Renewal for NMPNS, Units 1 and 2 (ADAMS Accession No. ML042160074)
August 2, 2004	In a letter (signed by P. T. Kuo), the NRC notified CEG that the staff has prepared a notice of intent advising the public that the NRC intends to gather information necessary to prepare a plant-specific supplement to the Commission's "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," (NUREG-1437) in support of the review of the applications for the renewal of the NMP operating licenses. for License Renewal for NMPNS, Units 1 and 2 (ADAMS Accession No. ML042160153)
August 9, 2004	In a letter (signed by P. T. Kuo), the NRC provided a Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for License Renewal for NMPNS, Units 1 and 2 (ADAMS Accession No. ML042230182)
August 11, 2004	In a Meeting Summary (signed by N. Le), the NRC staff issued a summary of the Public Meeting conducted on July 8, 2004, to describe the NRC license renewal process to the public living near (ADAMS Accession No. ML042240038)
August 11, 2004	In the Federal Register, (Volume 69, Number 154, pages 48900-48901), a Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process in support of the review of the application for renewal of the NMPNS operating licenses for an additional 20 years (ADAMS Accession No.)
August 11, 2004	In a letter (signed by P. T. Kuo) to Ms. B. Castro, New York State Office of Parks, Recreation, and Historic Preservation, to notify a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, the NRC rules that implement the National Environmental Policy Act of 1969 (NEPA) regarding NMP Units 1 and 2 License Renewal Review (Project Review OPRHP No. 03PR0532) (ADAMS Accession No. ML042250207)

August 11, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Leo R. Henry, Tuscarora Nation, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042250372)
August 11, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Emerson Webster, Tonawanda Band of Senecas, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042250412)
August 11, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Ricky L. Armstrong, Seneca Nation of Indians, regarding the US NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042250437)
August 11, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Irving Powless, Jr., Onondaga Nation, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042260213)
August 11, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Clint Half Town, Cayuga Nation of New York, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042260230)
August 11, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Raymond Halbritter, Oneida Indian Nation of New York, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042260238)
August 12, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Jim Ransom, St. Regis Band of Mohawk Indians, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042260408)
August 12, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable M. Terrance, St. Regis Band Of Mohawk Indians, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042260460)
August 12, 2004	In a letter (signed by P. T. Kuo), NRC, to The Honorable Barbara Lazore, St. Regis Band Of Mohawk Indians, regarding the U.S. NRC Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042260489)
August 20, 2004	In a Meeting Notice (signed by Leslie Field), the NRC staff issued Notice of forth coming meeting to discuss Environmental Scoping Process for NMPNS LRA (ADAMS Accession No. ML042330412)
September 1, 2004	Revision of August 20, 2004, Notice Meeting to Discuss the Environmental Scoping Process for NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML042450141)

September 9, 2004	In an NRC Press release, the NRC announced seeking public input on Environmental Impact statement for NMPNS operating licenses (ADAMS Accession No.ML042530638)
September 13, 2004	Notice of Exit Meeting on October 1, 2004 with CEG to Discuss the Audit of the Methodology for the Scoping & Screening for the LRA for NMPNS Units 1 & 2 (ADAMS Accession No. ML042570112)
September 15, 2004	In a report (signed by Leslie field), the NRC provided a list of the references obtained during the site audit to support review of the LRA for NMPNS, Units 1 and 2 (ADAMS Accession No. ML050540665)
September 16, 2004	In a letter (signed by P. T. Kuo), NRC, to Ms. Natalie Roy, Oswego County Health Department, regarding the NMP, Units 1 and 2, License Renewal Review (ADAMS Accession No. ML042610263)
September 18, 2004	E-Mail from Farouk Baxter to NRC Regarding Comments on NMP License Renewal (ADAMS Accession No. ML050040016)
September 22, 2004	NMPNS Responses to U.S. NRC Requests for Additional Information from NRC Environmental Site Audit Conducted September 22, 2004 (ADAMS Accession No. ML043230144)
September 24, 2004	Letter (signed by L. Michael Treadwell), Executive Director, Operation Oswego County, to William L. Dam, NRC, Regarding NMPNS LRA (ADAMS Accession No. ML042860212)
October 4, 2004	In a letter (signed by State Senator Jim Wright, Chairman, the NY State Energy Committee) expressed strong support for the relicensing of NMPNS (ADAMS Accession No. ML0428901600)
October 5, 2004	In a Meeting Notice (signed by N. Le), the NRC staff issued Notice of forth coming meeting to dicuss results of NRC audit and review of AMPs and AMRs for NMPNS LRA (ADAMS Accession No. ML042800149), and revised October 25, 2004 (ADAMS Accession No. ML042990305) to change meeting date to November 5, 2004
October 11, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML052850264)
October 12, 2004	In a letter (signed by William A. Barclay), Assemblyman 12th District, NY, to NRC supporting renewal of the operating licenses of NMP Units 1 and 2 (ADAMS Accession No. ML050050455)
October 20, 2004	In a letter (signed by Leslie Fields), the NRC staff issued RAIs regarding Severe Accident Mitigation Alternative (SAMA) for the NRC's review of the NMPNS LRA (ADAMS Accession No. ML042940508)
October 21, 2004	Transmittal Note from Dennis Vandeputte, NMPNS, to NRC Forwarding Requested Materials from Site Audit (ADAMS Accession No. ML043100591)

October 25, 2004	Revised Notice (signed by N Le) of November 5, 2004 Meeting With CEG To Discuss The Aging Management Programs And Review For The LRA For NMPNS Units 1 & 2 (ADAMS Accession No. ML042990305)
October 26, 2004	Posted Revision 1 to "Audit and Review Plan for Plant Aging Management Reviews and Programs for the NMPNS, Units 1 and 2." (ADAMS Accession No. ML043000333)
October 29, 2004	In a letter (signed by James A. Spina), CEG submitted supplemental information, resulting from the NRC audits of Aging Management Programs, to its NMPNS LRA (ADAMS Accession No. ML043140293)
November 4, 2004	Summary of Meeting (signed by Leslie C. Fields) to provide the public information that was discussed in a Public Scoping Meetings to Support Review of NMPNS, Units 1 and 2, LRA held 09/21/2004 (ADAMS Accession No. ML043130425)
November 7, 2004	In a letter (signed by P T Kuo), NRC, to Mr. Michael Stoll, US Fish and Wildlife regarding LRA For NMPNS Units 1 & 2 (ADAMS Accession No. ML043140284)
November 9, 2004	In an Audit Trip Report (signed by Dale Thatcher), the NRC staff provide a summary of scoping audit and review of NMPNS LRA (ADAMS Accession No. ML043150211)
November 10, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043170655)
November 10, 2004	NMP Units 1 and 2, Response to NRC Request for Information Regarding the Offsite Power System (ADAMS Accession No. ML043280420)
November 11, 2004	In a Meeting Summary (signed by N. Le) the staff provided a summary of discussion between the NRC staff and Constellation applicant regarding reactor vessel fatigue analysis, containment liner plate, metal containment and penetration fatigue analysis (ADAMS Accession No. ML043270634)
November 15, 2004	Re-posted Audit And Review Plan For Plant Aging Management Reviews And Programs For The NMPNS, Units 1 And 2 (ADAMS Accession No. ML043210580)
November 15, 2004	Docketing of Responses to Requests for Additional Information Regarding the Environmental Site Audit Conducted in Support of the Environmental Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043340314)
November 15, 2004	Docketing of References Obtained During Site Audit Conducted in Support of Environmental Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050540665)

November 17, 2004	NRC Request for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043220665)
November 17, 2004	NRC Request for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043220678)
November 17, 2004	NRC Request for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043220679)
November 17, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043270617)
November 17, 2004	Summary of Meeting (signed by N Le) held on October 28, 2004, Between the U.S. NRC and CEG to further clarifying the intent of the staff's questions and the applicant's proposed responses, concerning the Review for the NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043270634)
November 18, 2004	Email from P. Tam, NRC, to Gregory Cwalina, regarding Consideration of Allegation (TAC MC5106, MC5107) (ADAMS Accession No. ML043240017)
November 19, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA.(ADAMS Accession No. ML043280670)
November 19, 2004	In a letter (signed by James A. Spina), CEG submitted supplemental information, resulting from the NRC audits and ongoing review of Aging Management Programs, to its NMPNS LRA (ADAMS Accession No. ML043600531)
November 22, 2004	NRC Requests for Additional Information for Review of NMPNS, Units 1 and 2, LRA (TAC MC3272 and MC3273) (ADAMS Accession No. ML043280683)
November 22, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML053290143)
December 3, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC Nos. MC3272 AND MC3273) (ADAMS Accession No. ML043420049)
December 6, 2004	In a letter (signed by James Spina), CEG submitted supplemental information resulting from the NRC Audit of Aging Management Reviews (ADAMS Accession No. ML043490370)
December 6, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information Regarding NMPNS LRA (ADAMS Accession No. ML043490360)
December 6, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information Regarding Time-Limited Aging Analyses (ADAMS Accession No. ML04327064)

December 6, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information Regarding NMPNS LRA (ADAMS Accession No. ML043490360)
December 7, 2004	In a letter (signed by P. T. Kuo), the NRC notified CEG that their support of the staff audits activities and CEG's response to the review of the draft requests for additional information (RAIs) has been less than timely and requested CEG to discuss plan to provide adequate resources to support the established review schedule for NMPNS LRA (ADAMS Accession No. ML043450440)
December 8, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC NOS. MC3272 AND MC3273) (ADAMS Accession No. ML043450450)
December 9, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC NOS. MC3272 AND MC3273) (ADAMS Accession No. ML043490666)
December 10, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC NO. MC3272 AND MC3273) (ADAMS Accession No. ML043500176)
December 17, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information Regarding Fire Detection and Protection Systems (TAC Nos. MC0691 and MC0692) (ADAMS Accession No. ML043630355)
December 17, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information from the Reactor Systems Branch Review (TACs MC0691 and MC0692) (ADAMS Accession No. ML043650311)
December 17, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Ad ADAMS ditional Information Regarding the Systems Walkdown Program (ADAMS Accession No. ML043650328)
December 21, 2004	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML043570368)
December 21, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information Regarding Sections 2.3.2, 2.3.4, and B2. 1.32.(ADAMS Accession No. ML050040315)
December 22, 2004	NRC Request for Additional Information for the Review of NMPNS, Units 1 and 2, LRA, (TAC Nos. MC3272 AND MC3273) (ADAMS Accession No. ML043650003)
December 22, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Request for Additional Information Regarding Scoping and Screening Methodology of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050040332)

December 22, 2004	In a letter (signed by James Spina), CEG, provided Responses to NRC Requests for Additional Information Regarding Sections 2.2, 2.3.3, and 2.3.4 of NMPNS, Units 1 and 2, LRA(TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050060182)
December 27, 2004	NRC Request for Additional Information for the Review of NMPNS, Units 1 and 2, LRA, (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML043650006)
December 29, 2004	Email from P. Tam, NRC, to Peter Farouk Baxter, regarding concerns with the NMP Offsite Power System (ADAMS Accession No. ML043650417)
December 30, 2004	Acknowledgment of receipt of letter for renewal of operating licenses for NMP, Units 1 and 2 addressed to J. Wright, NY State Senator (ADAMS Accession No. ML051680395)
January 3, 2005	In a letter (signed by James A. Spina), CEG provided its response to NRC Requests for Additional Information Regarding the Reactor Recirculation Systems of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050110235)
January 3, 2005	In a letter (signed by James A. Spina), CEG provided its response to the staff letter dated 12/7/2004 regarding the status of the NRC review schedule for NMPNS LRA (ADAMS Accession No. ML050120217)
January 5, 2005	In a letter (signed by N. Le), NRC, to J. Spina, NMP, regarding Revision of Schedule for the Conduct of Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050060421)
January 5, 2005	In a letter (signed by Leslie Fields), the NRC staff issued an Environmental Scoping Summary Report associated with the staff's review of the applications by CEG for renewal of the operating licensees for NMP Units 1 and 2 (ADAMS Accession No. ML050060373)
January 7, 2005	In a letter (signed by James A. Spina), CEG provided its response to NRC Request for Additional Information Regarding the NMP Unit 1 Containment System (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050190296)
January 10, 2005	In a letter (signed by James A. Spina), CEG provided its response to NRC Requests for Additional Information Regarding Aging Management of Electrical and Instrumentation and Control Systems (ADAMS Accession No. ML050190295)
January 10, 2005	NMP Units 1 and 2, LRA - Responses to NRC Requests for Additional Information Regarding Structures (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050190292)

January 12, 2005	In a Meeting Notice (signed by N. Le), the NRC staff issued Notice of forth coming meeting with CEG to discuss the milestone for the NRC review schedule of NMPNS LRA (ADAMS Accession No. ML0501300420)
January 13, 2005	In a Note to File (signed by N Le) the staff docketed additional information regarding the staff's follow-up questions after having reviewed CEG letters NMP1L 1899, 1 NMP1L 1900, dated December 17, 2004, and NMP1L 1905, dated 12, 22,2004 (ADAMS Accession No. ML050270496)
January 13, 2005	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, License Renewal Application (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050130283)
January 14, 2005	NMP Units 1 and 2 LRA - Responses to NRC Requests for Additional Information Regarding the Time-Limited Aging Analysis for Main Steam Isolation Valve Corrosion Allowance and the Closed-Cycle Cooling Water System (ADAMS Accession No. ML050250188)
January 20, 2005	NMP Units 1 and 2, LRA - Responses to NRC Requests for Additional Information Regarding Aging Management of Bolting (ADAMS Accession No. ML050330463)
January 26, 2005	NMP Units 1 and 2. LRA - Responses to NRC Requests for Additional Information Regarding Aging Management of Auxiliary Systems (ADAMS Accession No. ML050390370)
January 31 2005	NMP Units 1 and 2, LRA - Responses to NRC Requests for Additional Information Regarding Sections 2.2, 2.3.3, and 2.3.4, and Scoping and Screening Methodology (ADAMS Accession No. ML050460233)
January 31, 2005	In a letter (signed by James A. Spina), CEG submitted supplemental information to revise and supplement its response to the staff RAI on SAMA for NMPNS LRA (ADAMS Accession No. ML050460312)
January 31, 2005	NMP Units 1 and 2, LRA - Responses to NRC Requests for Additional Information Regarding RAI for Section 2.3.3 for NMPNS LRA (ADAMS Accession No. ML050460233)
February 2, 2005	A public meeting was held in Rockville, Maryland at the NRC Headquarters office between the NRC staff and CEG staff to discuss the review status and its impact on the NRC review schedule for the NMPNS LRA. This is documented in a Meeting Summary issued on March 3, 2005 (ADAMS Accession No. ML0506620124)
February 4, 2005	In a letter (signed by James A. Spina), CEG submitted supplemental information resulting from the NRC audit and review of AMRs for NMPNS LRA (ADAMS Accession No. ML050450485)

February 10, 2005	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050410428)
February 11, 2005	In a summary of a telephone conference conducted on February 11, 2005 (signed by N. Le), the NRC described the discussion between NRC staff and CEG staff concerning the staff RAIs for NMPNS (ADAMS Accession Number ML050420328)
February 11, 2005	Summary of January 27, 2005 Conference Call Between the U.S. NRC and CEG, Inc. Concerning the Review for the NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050420328)
February 11, 2005	Summary of the January 25, 2005 Conference Call Held with CEG Inc. Concerning the Review of the NMPNS, Units 1 and 2, License Renewal (ADAMS Accession No. ML050420387)
February 11, 2005	NMP Units 1 and 2, LRA - Submittal of Supplemental Information for Review of the LRA (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050560199)
February 14, 2005	In a summary of a telephone conference conducted on February 14, 2005 (signed by N. Le), the NRC described the discussion between NRC staff and CEG staff concerning the staff follow-up questions related to CEG supplemental information provided in CEG letter of 11/19/04 and 12/6/04 for NMPNS LRA (ADAMS Accession Number ML050460138)
February 14, 2005	NMP Units 1 and 2, LRA - Responses to NRC Requests for Additional Information Regarding the Reactor Vessel and Reactor Vessel Internal Components (ADAMS Accession No. ML050610059)
February 17, 2005	In a Meeting Notice (signed by R. Lorson), the NRC/ Region I staff issued Notice of forthcoming meeting with CEG to discuss NRC's team inspection covering the scoping and aging management portions of the NMPNS LRA (ADAMS Accession No. ML050480487)
February 22, 2005	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050540196)
February 23, 2005	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML050540263)
February 23, 2005	NRC Press Release-I-05-008: NRC, Company To Discuss License Renew Inspection Conducted At NMP Nuclear Power Plant (ADAMS Accession No. ML050540439)
February 28, 2005	In an NRC Press Release, the NRC announced the postponement of of the proposed March 3, 2005 public meeting to be held in Scriba, New York (ADAMS Accession No. ML050590308)

March 1, 2005	Revision - Notice of March 3, 2005 Meeting with Constellation Generation Group to Discuss NRC's Team Inspection Covering the Scoping and Aging Management Portions of NMPNS's Application for a Renewed License (ADAMS Accession No. ML050600423)
March 3, 2005	Summary of Meeting held on February 2, 2005, between the U.S. NRC Staff and NMPNS, LLC Representatives to discuss NMPNS, Units 1 and 2 (ADAMS Accession No. ML050620124)
March 3, 2005	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050620591)
March 3, 2005	In a letter (signed by T O'Connor), CEG requested a 90-day grace period to revcover the quality of the NMPNS LRA (ADAMS Accession No. ML050680270)
March 3, 2005	The staff posted audit data base resulting from the staff initial audit and review of the original NMLNS LRA (ADAMS Accession No. ML050660380)
March 7, 2005	In a letter (signed by P. Kuo), the NRC acknowledged CEG's March 3, 2005, request and its commitment to address quality issues, including those items the staff discussed on the telephone [and listed in the letter]. The NRC stopped its review in response to CEG's request. As a result of this delay, the staff will not meet the standard 22 month review schedule for NMPNS LRA (ADAMS Accession No. ML050660147)
March 7, 2005	The staff forwarded to CEG the remaining back-logged RAIs for CEG regarding NMPNS LRA Section 2.0 Tables - Scoping and Screening, LRA Section 2.3.4.A.5 - T-quenchers, LRA Section 3.1 Tables, LRA Tables 3.1.2.A-4 and 3.1.2.B-4, and LRA section 4.7.2 MSIV Corrosion Allowance (ADAMS Accession No. ML050680323)
March 8, 2005	NRC Press Release-05-045: NRC Extends Review Schedule For NMP Nuclear Power Plant License Renewal Request (ADAMS Accession No. ML050670508)
March 10, 2005	Summary of a Conference Call Held on February 28, 2005, Between the U.S. NRC and CEG Inc. Concerning the Review for the NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML050690308)
March 11, 2005	In a letter (signed by N. Le), the NRC staff revised the staff's review schedule for the NMPNS (ADAMS Accession No. ML05050700134)
March 18, 2005	In a letter (signed by N. Le) the staff issued a Meeting Notice to inform the public of a proposed meeting on March 30, 2005 to provide time for CEG to discuss with NRC Management their approach to the Recovery Plan for NMPNS LR activities (ADAMS Accession No. ML050770042)

March 25, 2005	Email from N. Le, NRC, to P. Mazzaferro, NMP, regarding Back-logged follow-up RAIs for the Aging Management of Auxiliary Systems for NMP1 and NMP2 LRA - Docket Nos. 50-220 and 50-410 (ADAMS Accession No. ML051010073)
April 19, 2005	Summary of Meeting Held on March 30, 2005, Between the NRC Staff and the CEG, Inc. Representatives to Discuss the Status of Their Recovery Effort for NMP, Units 1 and 2, LRA (ADAMS Accession No. ML051090540)
May 13, 2005	In a letter (signed by T. O'Connor), CEG provided a 60-day Notice and informed the NRC that CEG intended to complete the recovery tasks of the NMPNS LRA and will re-submit the information by July 15, 2005 (ADAMS Accession No. ML051440459)
May 20, 2005	Notice of June 9, 2005 Meeting with CEG Regarding the Recovery Plan of License Renewal for NMP Units 1 & 2 (ADAMS Accession No. ML051420002)
June 9, 2005	License Renewal IR 05000220-05-006 & 05000410-05-006, on 02/14-18/2005, 02/28/2005 - 03/04/2005 & 04/04/2005 - 04/08/2005, NMP Nuclear Power Station, Unit 1 & Unit 2; Interim report of inspection of the proposed aging management procedures and compliance (ADAMS Accession No. ML051610037)
June 9, 2005	Presentation Slides, NMP, Units 1 and 2, LRA Status Update (ADAMS Accession No. ML051650086)
June 16, 2005	Summary of Meeting held on June 9, 2005, between the U.S. NRC Staff and CEG, Inc. Representatives to discuss the status of their recovery effort, NMPNS, Units 1 and 2 (ADAMS Accession No. ML051670446)
June 16, 2005	Email from N. Le, NRC, to D. Dellario, regarding NMP backlogged follow-up RAIs for the Aging Management of Auxiliary Systems for NMP1 and NMP2 LRA (ADAMS Accession No. ML051730318)
June 17, 2005	Docketing of Additional Information pertaining to LRA of the NMPNS, Units 1 and 2 (ADAMS Accession No. ML051750247)
July 14, 2005	Letter from J. Spina, NMP, to NRC regarding Recovery of NMP LRA Quality (ADAMS Accession No. ML052000163)
July 14, 2005	In a letter, NMP1L 1962, (signed by James A. Spina), CEG provided an amended LRA (ALRA) which is an enhancement to the original NMPNS LRA which now has a more refined level of detail of information (ADAMS Accession No. ML051440459)
July 14, 2005	Amended LRA for NMPNS provided with CEG letter NMP1L 1962 (ADAMS Accession No. ML051440459)

July 14, 2005	Section 3.0 thru Appendix D, Amended LRA for NMPNS provided with CEG letter NMP1L 1962 (ADAMS Accession No. ML051440459)
July 14, 2005	In a letter, NMP1L 1963, (signed by James A. Spina), CEG provided amended LRA (ALRA) reference boundary drawings used in re-scoping and screening phase (ADAMS Accession No. ML052000143)
July 14, 2005	In a letter, NMP1L 1958, (signed by James A. Spina), CEG provided CEG's responses to the previously unanswered RAIs from NRC (ADAMS Accession No. ML052000147)
July 14, 2005	In a letter, NMP1L 1960, (signed by James A. Spina), CEG provided CEG's clarification to the previously answered RAIs from NRC (ADAMS Accession No. ML052000175)
July 14, 2005	NMP LRA - Clarification to Responses to Previously Answered NRC Requests for Additional Information (ADAMS Accession No. ML052000173)
July 14, 2005	NMP - Amended LRA, July 2005, Technical Information (ADAMS Accession No. ML052000186)
July 15, 2005	NRC Briefing for Delivery of the NMP Amended LRA (ADAMS Accession No. ML052080213)
July 26, 2005	Note to file, docketing of additional information pertaining to LRA of the NMPNS, Units 1 and 2 (ADAMS Accession No. ML052120003)
August 5, 2005	Letter from William Holston of NMPNS to Ms. Alyse Peterson regarding Application for Renewal of Operating Licenses (ADAMS Accession No. ML052310317)
August 12, 2005	Docketing of Additional Information Pertaining to LRA of the NMPNS, Units 1 and 2 (ADAMS Accession No. ML052240223)
August 12, 2005	Note to File: Docketing of Additional Information Pertaining to LRA of the NMPNS, Units 1 and 2 (ADAMS Accession No. ML052270151)
August 19, 2005	In a letter (signed by James A. Spina), CEG provided supplemental letter for reformatting Sections 3.1.2, 3.2.2, 3.3.2, 3.4.2, 3.5.2, 3.6.2 (ADAMS Accession No. ML0525005723)
September 12, 2005	The staff forwarded a copy of the NRC Audit and Review Plan for Plant Management Programs and Reviews for NMPNS ALRA. NRC Audit scheduled for weeks of September 19 and October 24, 2005 (ADAMS Accession No. ML052780304)
September 15, 2005	In a letter (signed by James A. Spina), CEG provided responses to staff RAIs and a table of clarification to its in a section by section (ADAMS Accession No. ML052700377), Subsequently this information was superceded by new information by letter dated Novemebr 17, 2005 (ADAMS Accession No. ML053320201)

September 30, 2005	In a letter (signed by P.T. Kuo), NRC issued the NRC's Draft NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 24, Regarding NMPNS, Units 1 and 2." (ADAMS Accession Number ML052720075)
October 7, 2005	Docketing of additional information (signed by N Le) for NMP ALRA Review (ADAMS Accession Number ML05052970005)
October 11, 2005	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML052850264)
October 13, 2005	In a letter (signed by N. Le) the staff issued a revised schedule for the staff review of the NMPNS ALRA and other audit & review activities (ADAMS Accession No. ML052870573)
October 13, 2005	In a letter (signed by N Le) the staff issued a Meeting Notice to inform the public of a proposed meeting on November 18, 2005 to discuss results of the NRC audits and reviews of AMPs and AMRs for NMPNS ALRA activities (ADAMS Accession No. ML052850010)
October 13, 2005	Docketing of additional information (signed by N Le) for NMP ALRA Review (ADAMS Accession Number ML052940233)
October 13, 2005	In a letter (signed by L. Fields) the staff issued a Meeting Notice to inform the public of a proposed meeting on November 17, 2005 to discuss the draft Supplemental Environmental Impact Statement for NMPNS ALRA activities (ADAMS Accession No. ML052900180)
October 15, 2005	NRC posted the data base for NMPNS LRA and ALRA NRC audits and reviews (ADAMS Accession No. ML050660384)
October 24, 2005	Docketing of additional information (signed by N Le) for NMP ALRA Review (ADAMS Accession Number ML05052970005)
October 28, 2005	NMP, Units 1 and 2, LRA - Responses to the NRC Requests for Additional Information Regarding LRA Sections 2.3 and 2.4 (ADAMS Accession No. ML053120311)
November 2, 2005	NRC Request for Additional Information for the review of NMPNS, Units 1 and 2, Amended LRA (ADAMS Accession No. ML053070131)
November 16, 2005	In a letter (signed by Marvin Sykes), the staff provided CEG with its inspection plan for the staff inspection of the NMPNS ALRA (ADAMS Accession No. ML05053200262)
November 17, 2005	In a letter (signed by T. O'Connor), CEG provided new information to supersede in its entirety the tabular clarification of information in CEG letter dated 9/15/2005 to the previously answered RAIs from NRC (ADAMS Accession No. ML053320201)
November 22, 2005	NRC Request for Additional Information for the Review of NMPNS, Units 1and 2, Amended LRA (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML053290143)

November 23, 2005	NRC Audit of Aging Management Programs and Aging Management Reviews for NMP Nuclear Power Station, Units 1 and 2 Database (ADAMS Accession No. ML053470313)
November 25, 2005	Comments (1) of Nancy Herter on Relicensing for NMPNS, Units 1 & 2 (ADAMS Accession No. ML053430114)
November 29, 2005	NRC Request for Additional Information for the Review of NMPNS, Units 1 & 2, Amended LRA (TAC Nos. MC3272 and MC3273) (ADAMS Accession No. ML053340117)
November 30, 2005	NMP Units 1 & 2, Amended LRA (ALRA) - Responses to NRC Requests for Additional Information Regarding ALRA Parts 1,2, & 3 (TAC Nos. MC3272 & MC3273) (ADAMS\Accession No. ML053480196)
December 1, 2005	In a letter (signed by James A. Spina), CEG provided resolutions to NRC audit items and a Table of resultant changes to the NMPNS ALRA (ADAMS Accession No. ML053460458)
December 5, 2005	In a letter (signed by James A. Spina), CEG provided three editorial changes and table replacement to the NMPNS ALRA (ADAMS Accession No. ML053480197)
December 8, 2005	Note to File - Docketing of Additional Information pertaining to LRA of the NMPNS, Units 1 and 2 (ADAMS Accession No. ML053420477)
December 8, 2005	Email comments from Tom Gurdziel on NUREG-1437, Supplement 24, Draft, pertaining to LRA of NMPNS, Units 1 and 2 (ADAMS Accession No. ML060310472)
December 13, 2005	In a letter (signed by James A. Spina), CEG provided three changes to previously submitted information in CEG letters dated December 1, 2005 and letter dated December 5, 2005 to the NMPNS ALRA (ADAMS Accession No. ML053630052)
December 15, 2005	In a letter (signed by James A. Spina), CEG provided comments on Draft Supplement 24 to the GEIS for License Renewal of NMPNS (ADAMS Accession No. ML053640304)
December 20 2005	In a letter (signed by Timothy O'Connor), CEG submitted its Annual Update information as required by 10 CFR54.21(b) for License Renewal of NMPNS (ADAMS Accession No. ML061080367)
December 21 2005	NMP, Units 1 and 2, LRA - Responses to the NRC Requests for Additional Information Regarding LRA Section 3.4 (ADAMS Accession No. ML050040315)

December 21 2005	In a meeting summary (signed by L. Field) the staff provided a summary of information that was discussed to provide the public with an opportunity to comment on the draft supplemental environmental impact statement (DSEIS), which was issued September 29, 2005. (ADAMS Accession No. ML053550507)
December 22, 2005	NRC Requests for Additional Information for Review of NMPNS, Units 1 and 2, LRA (TAC MC3272 and MC3273) (ADAMS Accession No. ML043650003)
December 23, 2005	NRC Request for Additional Information for the Review of NMPNS, Units 1 and 2, Amended LRA (ADAMS Accession No. ML053570337)
January 5, 2006	Audit and Review Report for Plant Aging Management Reviews and Programs, NMPNS, Units 1 and 2, Docket Nos: 50-220 and 50-410, January 5, 2006 (ADAMS Accession No. ML060110119)
January 11, 2006	NMP Units 1 and 2, Amended LRA - Responses to NRC Requests for Additional Information - Sections 3.4 and 4.7 (ADAMS Accession No. ML060130197)
January 11, 2006	In a meeting notice (signed by A Duncan White), the NRC provided notice to the public of a proposed meeting on January 26, 2006, with CEG, to dicuss results of the NRC regioanl inspection regarding the NMPNS ALRA (ADAMS Accession No. ML0060100142)
January 12, 2006	NRC Request for Additional Information [Re TLAA 4.7.5 RWCU weld overlaid fatigue flow calculation] for the Review of NMPNS, Units 1 and 2, Amended LRA (ADAMS Accession No. ML060210002)
January 13, 2006	NRC Requests for Additional Information for Review of NMPNS, Units 1 and 2, LRA (TAC MC3272 and MC3273) (ADAMS Accession No. ML050130283)
January 18, 2006	In a memorandum (signed by Kenneth Chang), the staff provided a resultant report of its audit and review activities in determinating whether the AMPs and AMRs for the NMPNS ALRA are in compliance with 10 CFR Part 54 (ADAMS Accession No. ML060180205)
January 18, 2006	In a meeting summary (signed by N Le) the staff provided a summary of information that was discussed, with the applicant, concerning the results of the staff audits and reviews of the AMPs and AMRs for the NMPNS, Units 1 and 2, ALRA (ADAMS Accession No. ML060220009)
January 19, 2006	NRC Press Release-I-06-003: NRC, Constellation To Discuss License Renewal Inspection Conducted At NMP Nuclear Power Plant (ADAMS Accession No. ML060190560)

March 3, 2006	Transmittal Letter (signed by PT Kuo) regarding Safety Evaluation Report with Open Items for the NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML060580756)
March 3, 2006	Safety Evaluation Report with Open Items for the NMPNS, Units 1 and 2, LRA (ADAMS Accession No. ML060580758)
March 8, 2006	Docketing of email communication between the NRC staff and Constellation Energy related to Environmental Review of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML060670503)
March 13, 2006	In a meeting notice (signed by N B Le), the NRC provided notice to the public of a proposed meeting on March 27, 2006, with CEG, to dicuss Open Item for NMP1 drywell liner regarding the SER for NMPNS ALRA (ADAMS Accession No. ML060720396)
March 16, 2006	NRC Requests for Additional Information for the Review of NMPNS, Units 1 and 2, ALRA (TAC MC3272 and MC3273) (ADAMS Accession No. ML060800739)
March 23, 2006	In a letter (signed by Timothy O'Connor), CEG submitted its second Update information per requirements of 10 CFR 54.21(b) for License Renewal of NMPN (ADAMS Accession No. ML060950410)
March 23, 2006	In a letter (signed by Timothy O'Connor), CEG submitted its response to Open Item 4.7B.1-1 for License Renewal of NMPN (ADAMS Accession No. ML060950413)
March 29, 2006	Docketing of a telephone conference between the NRC staff and Constellation Energy related to TLAA 4.7.1 and TLAA 4.7.5 of NMPNS, Units 1 and 2 LRA (ADAMS Accession No. ML060890579)
March 29, 2006	Docketing of an email communication between the NRC staff and Constellation Energy related to NMPNS, ALRA (ADAMS Accession No. ML060940622)
April 3, 2006	Docketting of an email communication between the NRC staff and Constellation Energy related to the bioshied letter dated April 4, 2006 for NMPNS, ALRA ADAMS Accession No. ML060940577)
April 3, 2006	In a letter (signed by Timothy O'Connor), CEG provided its comments to the NMPNS SER (ADAMS Accession No. ML061020166)
April 4, 2006	In a letter (signed by Timothy O'Connor), CEG submitted its response to Open Item 3.0.3.2.17-1 in NMPNS SER (ADAMS Accession No. ML061020154)
April 18, 2006	Docketing of an email communication between the NRC staff and Constellation Energy related to clarification of NMP2 Drywell Supplemental Inspection information (ADAMS Accession No. ML061090064)

April 18, 2006	Email communication between the NRC staff and Constellation Energy related to clarification of NMP2 Drywell Supplemental Inspection information (ADAMS Accession No. ML061090319)
April 19, 2006	NRC Requests for Additional Information for the Review of TLAA 4.7.5 of the NMPNS, Units 1 and 2, ALRA (TAC MC3272 and MC3273). (ADAMS Accession No. ML061090106)
April 21, 2006	In a letter (signed by Timothy O'Connor), CEG submitted its response to the staff RAI regarding TLAA 4.7.5 (ADAMS Accession No. ML061220595)
August 2, 2006	In a letter (signed by Graham B. Wallis), ACRS provided a Report on the Safety Aspect of the License Renewal Application for the Nine Mile Point Nuclear Station, Units 1 and 2. (ADAMS Accession No. ML061380269)

APPENDIX C: PRINCIPAL CONTRIBUTORS

NAME	RESPONSIBILITY
H. Ashar	Civil Engineering
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R. Dennig	Management Oversight
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R. Hsu	GALL Audit and Review
E. Imbro	Management Oversight
N. Igbal	Fire Protection
D. Jeng	Civil Engineering
R. Jenkins	Management Oversight
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N. Le	Lead Project Manager
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C. Li	Balance of Plant
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D. Matthews	Management Oversight
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CONTRACTOR	**TECHNICAL AREA**
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Information Systems Laboratories	Balance of Plant
Legin Group, Inc.	SER Support

APPENDIX D: REFERENCES

This appendix contains a listing of references used in the preparation of the Safety Evaluation Report prepared during the review of the license renewal application for Brunswick Steam Electric Plant, Units 1 and 2, Docket Numbers 50-325 and 50-324, respectively.

(1) NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," April 2001

(2) NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule, Revision 3," August 2001

(3) NUREG-1801, "Generic Aging Lessons Learned Report (GALL)," April 2001

(4) Letters From NRC to Mr. James A. Spina, "Request For Additional Information (RAI) Regarding The License Renewal Application For The Nine Mile Point Nuclear Station, Units 1 and 2"

(5) NMP Technical Report, LR_PBD-IWBCD, "AMSE Section XI Inservice Inspection, Sub Sections IWB IWC, and IWD (Units 1 and 2)," Revison 0, 9/9/2005

(6) NMP Technical Report, LR-PBD-WCHEM, "Water Chemistry (Units 1 and 2)," Revision 0, 9/14/2005

(7) NMP Technical Report, LR-PBD-HDSTUDS, "Reactor Head Closure Studs Program," Revision 1, 9/7/2005

(8) Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000, Subject: Nine Mile Point Nuclear Station, Unit No. 1 – Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129)

(9) NMP Technical Report, LR-PBD-VIDWELDS, "BWR Vessel ID Attachment Welds Program (Units 1 and 2)," Revision 0, 9/15/2005

(10) NUREG-1544, "Status Report: Intergranular SCC of BWR Core Shroud and Other Internal Components," March 1996

(11) NRC Regulatory Guide 1.65, "Materials and Inspections for Reactor Vessel Closure Studs," October 1973

(12) NMP Technical Report, LR-PBD-FWNZL, "BWR Feedwater Nozzle," Revision 0, 9/7/2005

(13) NMP Technical Report, LR-PBD-SCC, "BWR Stress Corrosion Cracking (Units 1 and 2)," Revision 0, 9/7/2005

(14) NMP1-RI-ISI-003, "Alternative Risk-Informed Inservice Inspection Plan and Schedule," Revision 01, 12/4/2003. NMP2-RI-ISI-006, "Alternative Risk-Informed Inservice Inspection Plan and Schedule," Revision 00, 12/5/2003

(15) NMP Technical Report, LR-PBD-VSSLPENS, "BWR Penetrations (Units 1 and 2)," Revision 0, 9/15/2005

(16) NMP Technical Report, LR-PBD-RVI, "BWR Vessel Internals (Units 1 and 2)," Revision 0, 9/15/2005

(17) ECPN-N1-HE-001, "NMP Unit 1 Erosion Corrosion Program Carbon Steel Piping Review Program High Energy Systems," Revision 5. ECPR-N2-HE-003, "NMP Unit 2 Carbon Steel and Low Alloy Piping Systems Erosion Corrosion (E/C) Review Program," Revision 0

(18) NMP Technical Report, LR-PBD-U1OCCW, "Open-Cycle Cooling Water System (Unit 1)," Revision 0, 9/14/2005. NMP Technical Report, LR-PBD-U1CCCW, "Closed-Cycle Cooling Water System (Unit 1)," Revision 0, 9/14/2005

(19) NMP Technical Report, LR-PBD-RVI, "BWR Vessel Internals (Units 1 and 2)," Revision 0, 9/15/2005

(20) NMP-AMP BFX01, Rev 0, "NMP1 Program Plan for Spent Fuel Rack Boraflex Degradation Monitoring Program"

(21) NMP Technical Report, LR-PBD-OHLOAD, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Units 1 and 2)," Revision 0, 9/12/2005

(22) NMP Technical Report, LR-PBD-COMPAIR, "Compressed Air Monitoring (Unit 1 only)," Revision 0, 9/13/2005

(23) NMP Unit 1 and 2 Reactor Water Cleanup System (GALL XI.M25) Program Attribute Assessment, Revision 1, 8/5/2004

(24) NMP Technical Report, LR-PBD-FIREPRO, "Fire Protection," Revision 0, 9/12/2005

(25) NMP Technical Report, LR-PBD-FIREWATER, "Fire Water," Revision 0, 9/12/2005

(26) N2-FSP-FPW-R001, "Electric/Diesel Fire Pump Functional Test," Revision 6, 10/23/2003. N1-PM-C3, "Electric and Diesel Fire Pump Performance Tests," Revision 5, 8/29/2003

(27) NMP Technical Report, LR-PBD-U1FOCHEM, "Fuel Oil Chemistry (Unit 1)," Revision 0, 9/14/2005

(28) NMP Technical Report, LR-PBD-OTINSP, "One-Time Inspection," Revision 0, 9/9/2005

(29) NMP Technical Report, LR-PBD-IWE, "ASME Section XI, Subsection IWE (Units 1 and 2)," Revision 2, 9/20/2005

(30) NMP Technical Report, LR-PBD-IWF, "ASME Section XI, Subsection IWF (Units 1 and 2)," Revision 1, 9/7/2005

(31) NMP Technical Report, LR-PBD-APPJ, "Program Attribute Assessment: Unit 1 10 CFR 50, Appendix J Program and Unit 2 10 CFR 50, Appendix J Program"

(32) NMP Technical Report, LR-PBD-STRUCMON, "Structures Monitoring Program (Units 1 and 2)," Revision 0, 9/12/2005

(33) NMP Technical Report, LR-PBP-ELECT1, "Aging Management Program for Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirement," Revision 0, 9/14/2005

(34) NMP Technical Report, LR-PBD-ELECT2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," Revision 2, 9/16/2005

(35) NMP Technical Report, LR-PBD-ELECT3, "Inaccessible Medium-Voltage Cable not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Unit 2 Only)," Revision 0, 10/10/2005

(36) NMP Technical Report, LR-PBD-ELECT4, "Aging Management Program for Bus Duct," Revision 0, 9/9/2005

(37) NMP Technical Report, LR-PBD-CRDRL, "BWR Control Rod Drive Return Line Nozzle (Units 1 and 2)," Revision 1, 9/7/2005

(38) NMP Technical Report, LR-PBD-ELECTPOLE, "Wooden Power Pole Inspection Program," Revision 0, 9/9/2005

(39) NIP-REL-06, Revision 02, "Fatigue Monitoring Program," 7/20/2004

(40) NER-1S-035, "Report on System Review and Recommendations for a Transient and Fatigue Monitoring System at the Nine Mile Point Nuclear Station," Revision 0, 2/10/2004

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8. PERFORMING ORGANIZATION - NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Same as above

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

This safety evaluation report (SER) documents the technical review of the Nine Mile Point Nuclear Station Units, 1 and 2 (NMPNS), license renewal application (LRA) by the staff of the U.S. Nuclear Regulatory Commission (NRC) (the staff). By letter dated May 26, 2004, Constellation Energy Group, LLC submitted the LRA for NMPNS in accordance with Title10, Part 54, of the Code of Federal Regulations (10CFRPart54). Due to concerns with the adequacy of support for and documentation of the license renewal activities in the initial submission, the applicant submitted an amended LRA (ALRA) on July14, 2005. Constellation Energy Group, LLC is requesting renewal of the operating licenses for NMPNS (Facility Operating License NumbersDPR-63 and NPF-69, respectively), for a period of 20 years beyond the current expiration dates of midnight August 22, 2009, for Unit 1 (NMP1) and midnight October 31, 2026, for Unit 2 (NMP2).

This SER presents the status of the staff's review of information submitted to the staff through April 21, 2006, the cutoff date for consideration in this SER. On March 3, 2006, the staff issued a draft SER which identified two open items that had to be resolved before the staff makes a final determination on the application. The two open items have now been resolved and SER Section1.5 summarizes these items and their resolutions. SER Section 6 provides the staff's final conclusion on the review of the NMPNS License Renewal Application dated May 26, 2004, as amended July 14, 2005, and all its subsequent supplemental letters as listed in SER Appendix B.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

license renewal, nuclear power

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