U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Safety Evaluation Report

Related to the Subsequent License Renewal of Dresden Nuclear Power Station, Units 2 and 3

Docket No 50-237 and 50-249

Constellation Energy Generation LLC

Issued: September 2025

ABSTRACT

This safety evaluation (SE) documents the safety review by the U.S. Nuclear Regulatory Commission (NRC) staff of the Dresden Nuclear Power Station, Units 2 and 3, (DNPS) subsequent license renewal application (SLRA).

DNPS is located in Morris, Illinois, which is approximately 23 miles southwest of Joliet, Illinois. Both units are General Electric Type-3 boiling-water reactors. Constellation Energy Generation, LLC (CEG) operates DNPS at a licensed power output of 2,957 megawatts thermal. The NRC issued the initial Unit 2 operating license (Renewed Facility Operating License No. DPR-19), on February 20, 1991, and renewed the operating license on October 28, 2004. The NRC issued the initial Unit 3 operating license (Renewed Facility Operating License No. DPR-25), on January 12, 1971, and renewed the operating license on October 28, 2004.

By letter dated April 17, 2024 (Agencywide Documents Access and Management System [ADAMS] Package Accession No. ML24108A007), as supplemented, CEG submitted an application for a subsequent license renewal for DNPS. CEG requested renewal for a period of 20 years beyond the current expiration at midnight on December 22, 2029, and January 12, 2031, for Units 2 and 3, respectively.

In performing its review, the NRC staff used the SLRA; SLRA supplements; NUREG-2191, Revision 0, *Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report*, issued July 2017 (ML17187A031 and ML17187A204); NUREG-2192, Revision 0, *Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants*" issued July 2017 (ML17188A158); and CEG's responses to requests for additional information. As part of its SLRA review, the NRC staff conducted a regulatory audit from June 17, 2024, through March 14, 2025, in accordance with the audit plan dated June 18, 2024, (ML24138A181) and as detailed in the Audit Report dated June 12, 2025 (ML25126A252).

This SE documents the NRC staff's safety review of the information submitted by CEG through May 8, 2025. Based on its review of the SLRA, the NRC staff determined that CEG has met the requirements of Title 10 of the *Code of Federal Regulations* Section 54.29(a), which states that a renewed license may be issued if the Commission finds that aging effects are or will be managed during the period of extended operation, and that time-limited aging analyses have been addressed.

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ABBREVIATIONS AND ACRONYMS

ACI	American Concrete Institute
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act of 1954 as amended
AEER	auxiliary electric equipment room
AMP	aging management program
AMR	aging management review
ANSI	American National Standards Institute
ART	adjusted reference temperature
ASME	American Society of Mechanical Engineers
ATWS	anticipated transient without scram
BSW	biological shield wall
BTP	Branch Technical Position
BWR	boiling-water reactor
CASS	Cast Austenitic Stainless Steel
CEG	Constellation Energy Generation, LLC
CF	chemistry factor
CFR	*Code of Federal Regulations*
CLB	current licensing basis
CUF	cumulative usage factor
DBE	design-basis event
DNPS	Dresden Nuclear Power Station, Units 2 and 3
DORT	Discrete Ordinate Transfer
EAF	environmentally assisted fatigue
EFPY	effective full power years
EMA	equivalent margin analysis
EOI	Expression of Interest
EPRI	Electric Power Research Institute
EPU	Extended Power Uprate
EQ	environmental qualification
ESF	Engineered Safety Features
FPS	fire protection system
FR	*Federal Register*
FSAR	final safety analysis report
GALL	Generic Aging Lessons Learned
GEH	General Electric Hitachi
HELB	high-energy line breaks
HS	high-strength
I&C	instrumentation and control

ID	inside diameter
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
ISG	interim staff guidance
ISP	Integrated Surveillance Program
LR	license renewal
LR GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants
LRA	license renewal application
MIC	microbiologically influenced corrosion
MWt	megawatts thermal
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
OE	operating experience
P-T	pressure-temperature
PTLR	pressure temperature limit report
QA	quality assurance
RAI	requests for additional information
RCI	requests for confirmation of information
RG	Regulatory Guide
RPV	reactor pressure vessel
RT	reference temperature
RV	reactor vessel
SBO	station blackout
SC	structures and component
SE	safety evaluation
SLR	subsequent license renewal
SLRA	subsequent license renewal application
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
SSC	systems, structures, and components
SSE	safe-shutdown earthquake
TLAA	time limited aging analyses
USE	upper-shelf energy

SECTION 1 INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This safety evaluation (SE) documents the U.S. Nuclear Regulatory Commission (NRC) staff's safety review of the subsequent license renewal application (SLRA) for Dresden Nuclear Power Station, Units 2 and 3, (DNPS). Constellation Energy Generation, LLC (CEG) filed the SLRA by letter dated April 17, 2024 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML24108A007), as supplemented by letters dated February 20, 2025 (ML25051A253), March 13, 2025 (ML25072A153), April 10, 2025 (ML25100A132), April 28, 2025 (ML25118A278), and May 8, 2025 (ML25128A184).

In its application, CEG seeks to renew Dresden, Units 2 (Renewed Facility Operating License No. DPR-19) and 3 (Renewed Facility Operating License No. DPR-25), for an additional 20 year each, beyond the current expiration of their renewed license at midnight on December 22, 2029, and January 12, 2031, respectively. The NRC staff performed a safety review of CEG's application in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants" (10 CFR Part 54). The NRC project manager for the SLRA review is Mr. Mark Yoo, who can be contacted by email at Mark.Yoo@nrc.gov.

DNPS is located in Morris, Illinois, which is approximately 23 miles southwest of Joliet, Illinois. Both units are General Electric Type-3 boiling-water reactors. CEG operates DNPS at a licensed power output of 2,957 megawatts thermal (MWt). The NRC issued the initial Dresden Unit 2 operating license (Renewed Facility Operating License No. DPR-19), on February 20, 1991, and renewed the operating license on October 28, 2004. The NRC issued the initial Dresden Unit 3 operating license (Renewed Facility Operating License No. DPR-25), on January 12, 1971, and renewed the operating license on October 28, 2004. The DNPS updated final safety analysis report (UFSAR) describes the plant and the site (ML23180A022).

Section 54.29, "Standards for issuance of a renewed license" of 10 CFR sets forth the license renewal (LR) standards. Based on these standards, a renewed license may be issued if the Commission finds that aging effects are or will be managed during the period of extended operation, and that time-limited aging analyses have been addressed. In addition, the NRC's requirements in 10 CFR Part 51 concerning environmental review must be satisfied, and, when applicable, matters raised concerning consideration of Commission rules and regulations in adjudicatory proceedings must be addressed for the issuance of a renewed license. Accordingly, the NRC LR process consists of (1) a safety review and (2) an environmental review. Regulations in 10 CFR Part 54, "Requirements for renewal of operating licenses for nuclear power plants," and 10 CFR Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions," set forth requirements for safety reviews and environmental reviews, respectively. The safety review for the DNPS subsequent license renewal (SLR) is based on CEG's SLRA, as well as the NRC staff's audits, responses to the NRC staff's requests for additional information (RAIs), and responses to the NRC staff's requests for confirmation of information (RCIs). CEG supplemented its application and provided clarifications through its responses to the staff's questions in RAIs, RCIs, audits, meetings, and docketed correspondence. The NRC staff reviewed and considered the information submitted through May 8, 2025.

The public may view the SLRA and material related to the subsequent license renewal (SLR) review on the NRC's website at http://www.nrc.gov.

This SE summarizes the results of the NRC staff's safety review of the SLRA. It describes technical details the staff considered in evaluating the safety aspects of the proposed operation of Units 2 and 3, for an additional 20 years each, beyond the term of the current renewed operating license. The staff reviewed the SLRA in accordance with NRC regulations and the guidance in NUREG-2192, Revision 0, "*Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants*" (SRP-SLR), dated July 2017 (ML17188A158).

Sections 2 through 4 of this SE address the NRC staff's evaluation of SLR issues considered during its review of the application. Section 5 contains the staff's conclusions. The SE contains four appendices, which provide the following additional information:

- Appendix A: "License Renewal Commitments," contains a table showing CEG's commitments for subsequent renewal of the operating license.
- Appendix B: "Chronology," contains a chronology of the principal correspondence between the NRC staff and CEG, as well as other relevant correspondence regarding the SLRA review.
- Appendix C: "Principal Contributors," contains a list of principal contributors to the SE.
- Appendix D: "References," contains a bibliography of the references that support the NRC staff's review.

1.2 License Renewal Background

Under the Atomic Energy Act (AEA) of 1954, as amended, and NRC regulations, the NRC staff issues initial operating licenses for commercial power reactors for 40 years. This 40-year license term was selected based on economic and antitrust considerations rather than on technical limitations; however, some individual plant and equipment designs may have been engineered for an expected 40-year service life. NRC regulations permit license renewals that extend the initial 40-year license for up to 20 additional years of operation per renewal. The staff issues renewed licenses only after it determines that a nuclear facility can operate safely to the end of the period of extended operation. There are no limitations in the AEA or NRC regulations on the number of times a license may be renewed.

As described in 10 CFR Part 54, the focus of the NRC staff's SLR safety review is to verify that the applicant has identified aging effects that could impair the ability of structures and components within the scope of SLR to perform their intended functions, and to demonstrate that these effects will be adequately managed during a period of extended operation. The regulations of 10 CFR Part 54 establish the regulatory requirements for both initial LR and SLR.

1.2.1 Safety Review

LR requirements for power reactors (applicable to both initial and SLR) are based on two key principles:

(1) The regulatory process is adequate to ensure that the licensing bases of all currently operating plants maintain an acceptable level of safety with the possible exception of the

detrimental aging effects on the functions of certain systems, structures, and components (SSCs) and a few other safety-related issues during the period of extended operation.

(2) The plant-specific licensing basis must be maintained during the renewal term in the same manner, and to the same extent, as during the original licensing term.

In implementing these two principles, 10 CFR 54.4, “Scope,” paragraph (a) defines the scope of LR as including the following SSCs:

(1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions:

   i. The integrity of the reactor coolant pressure boundary;

   ii. The capability to shut down the reactor and maintain it in a safe shutdown condition; or

   iii. The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of [10 CFR Chapter I], as applicable.

(1) All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of [§ 54.4].

(2) All systems, structures, and components s relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without SCRAM (10 CFR 50.62), and station blackout (10 CFR 50.63).

As required by 10 CFR 54.21(a), an LR applicant must review all SSCs within the scope of 10 CFR Part 54 to identify structures and components (SCs) subject to an aging management review (AMR). SCs subject to an AMR are those that perform an intended function without moving parts, or without a change in configuration or properties, and are not subject to replacement based on a qualified life or specified time period. In accordance with 10 CFR 54.21(a)(3), a license renewal applicant must demonstrate that the effects of aging will be adequately managed so that the intended function(s) of those SCs will be maintained consistent with the current licensing basis (CLB) for the period of extended operation.

In contrast, active equipment is adequately monitored and maintained by existing programs and is not subject to an AMR. In other words, detrimental aging effects that may affect active equipment can be readily identified and corrected through existing surveillance, performance monitoring, and maintenance programs. Surveillance and maintenance programs for active equipment, as well as other maintenance aspects of plant design and licensing basis, are required under 10 CFR Part 50, “Domestic licensing of production and utilization facilities,” regulations throughout the period of extended operation.

As required by 10 CFR 54.21(d), a license renewal application must include a UFSAR supplement with a summary description of the applicant’s programs and activities for managing the effects of aging, as well as an evaluation of time-limited aging analyses (TLAAs) for the period of extended operation.

LR regulations also require TLAA identification and updating. Section 54.3, "Definitions," of 10 CFR specifies criteria that determine which licensee calculations and analyses are to be considered TLAAs for the purposes of LR. As required by 10 CFR 54.21(c)(1), the applicant must demonstrate that these analyses will remain valid for the period of extended operation, or that the analyses have been projected to the end of the period of extended operation, or that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

In the DNPS SLRA, CEG stated that it used the process defined in the NUREG-2191, Revision 0, *Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report*, dated July 2017 (ML17187A031 and ML17187A204), which summarizes NRC staff-approved aging management programs (AMPs) for many SCs subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources for SLRA review can be greatly reduced, thereby improving the efficiency and effectiveness of the SLR review process. The GALL-SLR Report summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used throughout the nuclear power plant industry. The report is also a quick reference for both applicant and staff reviewers on AMPs and activities that can manage aging adequately during the subsequent period of extended operation.

1.2.2 Environmental Review

10 CFR Part 51 contains the NRC's regulations for implementing the requirements of the National Environmental Policy Act of 1969, as amended. The NRC staff's environmental review is ongoing. The staff will publish its environmental review findings separately from this report.

1.3 Principal Review Matters

10 CFR Part 54 describes the requirements for renewal of operating licenses for nuclear power plants. The NRC staff's safety review of the SLRA was performed in accordance with NRC guidance and 10 CFR Part 54 requirements. This SE describes the results of the staff's safety review in accordance with 10 CFR Part 54 requirements.

As required by 10 CFR 54.19(a), a license renewal applicant must submit general information as specified in 10 CFR 50.33(a) through (e), (h), and (i). CEG provided this information in SLRA Section 1, or incorporated by reference other documents that contained the information. The NRC staff reviewed SLRA Section 1 and finds that CEG submitted the required information.

Section 54.19(b) of 10 CFR requires that the SLRA include "conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." On this issue, CEG stated in SLRA Section 1.1.10:

> 10 CFR 54.19(b) requires that "each application must include conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The current indemnity agreement (No. B-10) for DNPS states, in Article VII, that the agreement "shall terminate at the time of expiration of that license specified in Item 3 of the Attachment." As updated in Amendment 12 and Amendment 14, Item 3 of the Attachment to the indemnity agreement respectively lists license number DPR-19 (for DNPS, Unit 2) and DPR-25 (for DNPS, Unit 3). Applicant requests that any necessary conforming changes be made to Article VII and Item 3 of the Attachment, and any other sections of the indemnity

agreement as appropriate to ensure that the indemnity agreement continues to apply during both the term of the current licenses and the term of the renewed licenses. Applicant understands that no changes may be necessary for this purpose if the current license numbers for DNPS, Unit 2 and Unit 3 are retained. Note that current Amendment 27 updated Item 1 of the Attachment to identify Constellation Energy Generation, LLC as the licensee.

Section 54.21 of 10 CFR, “Contents of application—technical information,” requires that the SLRA contain all of the following information:

- an integrated plant assessment
- a description of any CLB changes during the NRC staff’s review of the SLRA
- an evaluation of TLAAs
- a FSAR supplement

SLRA Sections 3 and 4, as well as Appendix B, address the LR requirements of 10 CFR 54.21(a), (b), and (c). The NRC staff also finds that SLRA Appendix A addresses the LR requirements of 10 CFR 54.21(d).

Section 54.21(b) of 10 CFR requires that each year following submittal of the SLRA, and at least three months before the scheduled completion of the NRC staff’s review, the applicant must submit an SLRA amendment identifying any CLB changes that materially affect the contents of the SLRA, including the UFSAR supplement. By letter dated April 3, 2025, CEG submitted an SLRA update that summarizes the CLB changes that have occurred during the staff’s review of the SLRA (ML25093A082). The NRC staff finds that this submission satisfies the 10 CFR 54.21(b) requirements.

Section 54.22 of 10 CFR, “Contents of application—technical specifications,” requires that the SLRA include any changes or additions to the technical specifications that are necessary to manage aging effects during the period of extended operation. In SLRA Appendix D, CEG states that no changes to technical specifications are necessary for issuance of a subsequent renewed operating license. The NRC staff finds that this statement adequately addresses the 10 CFR 54.22 requirements.

The NRC staff also evaluated the technical information required by 10 CFR 54.21 and 10 CFR 54.22 in accordance with NRC regulations and SRP-SLR guidance. Sections 2, 3, and 4 of the SE details the staff’s evaluations of the SLRA technical information.

The staff did not identify any novel or noteworthy issues in its review of the SLRA that would benefit from an Advisory Committee on Reactor Safeguards review.

1.4 Interim Staff Guidance

LR is a living program. The NRC staff, industry, and other interested stakeholders gain experience and develop lessons-learned with each renewed license. The lessons-learned contribute to the staff’s performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence. The staff identifies lessons-learned in interim staff guidance (ISG) for the staff, industry, and other interested stakeholders to use until the NRC incorporates the information into LR guidance documents such as the SRP-SLR and GALL-SLR Report.

Table 1.4-1 identifies the current set of SLR ISG topics, as well as the corresponding sections in this SE that address each topic.

Table 1.4-1. Current Subsequent License Renewal Interim Staff Guidance

License Renewal ISG Topic (Approved SLR-ISG Number)	Title	SE Section
SLR-ISG-2021-01-PWRVI (ML20217L203)	Updated Aging Management Criteria for Reactor Vessel Internal Components for Pressurized-Water Reactors	Not applicable
SLR-ISG-2021-02-MECHANICAL (ML20181A434)	Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance	SE Sections 3.0.3.1.5, 3.0.3.1.13, 3.0.3.1.20, 3.0.3.2.1, and 3.0.3.2.7
SLR-ISG-2021-03-STRUCTURES (ML20181A381)	Updated Aging Management Criteria for Structures Portions of Subsequent License Renewal Guidance	SE Sections 3.0.3.1.16, 3.0.3.2.18, and 3.5.2.2
SLR-ISG-2021-04-ELECTRICAL (ML20181A395)	Updated Aging Management Criteria for Electrical Portions of Subsequent License Renewal Guidance	SE Sections 3.0.3.1.18, 3.0.3.2.21, and 3.0.3.2.22

1.5 Summary of Open Items

An item is considered to be open if, in the NRC staff's judgment, the staff has not determined that the item meets all applicable regulatory requirements at the time of the issuance of this SE. After reviewing the SLRA, including additional information CEG submitted through May 8, 2025, the staff identified no open items.

1.6 Summary of Confirmatory Items

An item is considered confirmatory if, in the NRC staff's judgment, the staff and the applicant have reached an acceptable resolution that meets all applicable regulatory requirements but, at the time of the issuance of this SE, the staff had not received the necessary documentation to confirm the resolution. After reviewing the SLRA, including additional information CEG submitted through May 8, 2025, the staff finds that no confirmatory items exist that require a formal response from CEG.

1.7 Summary of Proposed License Conditions

After reviewing the SLRA, including additional information CEG submitted through May 8, 2025, the NRC staff deemed two license conditions appropriate and necessary:

(1) The first license condition requires CEG, following the staff's issuance of the subsequent renewed license, to include the UFSAR supplement (containing a summary of programs and activities for managing the effects of aging and an evaluation of TLAAs for the subsequent period of extended operation (as required by 10 CFR 54.21(d))) in its next periodic FSAR update required by 10 CFR 50.71(e). The regulations at 10 CFR 50.71(e) require nuclear power reactors licensees to periodically update their plant's final safety analysis report "to assure that the information included in the report contains the latest information developed." CEG may make changes to the programs and activities described

in the UFSAR update and supplement provided it evaluates such changes under the criteria set forth in 10 CFR 50.59, “Changes, tests and experiments,” and otherwise complies with the requirements in that section.

(2) The second license condition requires CEG to complete future activities described in the UFSAR supplement before the beginning of the subsequent period of extended operation. CEG must complete these activities no later than 6 months before the beginning of the subsequent period of extended operation and must also notify the NRC in writing when it has completed those activities. Unless modified in accordance with 10 CFR 50.59, the programs and commitments described in the UFSAR supplement remain in effect during the subsequent period of extended operation.

SECTION 2 STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

2.1 Scoping and Screening Methodology

2.1.1 Introduction

Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21, “Contents of Application – Technical Information,” requires, in part, that a subsequent license renewal application (SLRA) contains an integrated plant assessment (IPA) of the systems, structures, and components (SSCs) within the scope of subsequent license renewal (SLR), as delineated in 10 CFR 54.4, “Scope.” The IPA must identify and list those structures and components (SCs) included in the SSCs within the scope of SLR that are subject to an aging management review (AMR). Furthermore, 10 CFR 54.21 requires that an SLRA describe and justify the methods used to identify the SSCs within the scope of SLR and the SCs therein subject to an AMR.

2.1.2 Summary of Technical Information in the Application

Dresden Nuclear Power Station (DNPS), Units 2 and 3, SLRA Section 2.0, “Scoping and Screening Methodology for Identifying Structures and Components Subject to Aging Management Review and Implementation Results,” provides the technical information required by 10 CFR 54.21. SLRA Section 2.0 states, in part, that CEG considered the following in developing the scoping and screening methodology described in SLRA Section 2.0:

- 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants” (the Rule)
- Nuclear Energy Institute (NEI) 17-01, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 for Subsequent License Renewal,” issued December 2017 ((ML17339A599), endorsed by U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.188, Revision 2, “Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses,” issued April 2020 (ML20017A265)

SLRA Section 2.1, “Scoping and Screening Methodology,” describes the methodology DNPS used to identify the SSCs within the scope of SLR (scoping) and the SCs therein subject to an AMR (screening).

2.1.3 Scoping and Screening Program Review

The NRC staff evaluated CEG’s scoping and screening methodology in accordance with the guidance in Section 2.1, “Scoping and Screening Methodology,” of NUREG-2192, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants” (SRP-SLR), issued July 2017 (ML1788A158). The following regulations provide the basis for the acceptance criteria the NRC staff used to assess the adequacy of CEG’s SLRA scoping and screening methodology:

- 10 CFR 54.4(a), as it relates to the identification of SSCs within the scope of the Rule
- 10 CFR 54.4(b), as it relates to the identification of the intended functions of SSCs within the scope of the Rule

- 10 CFR 54.21(a), as it relates to the methods used by CEG to identify SCs subject to an AMR

The NRC staff reviewed the information in SLRA Section 2.1 to confirm that CEG described a process (methodology) for identifying SSCs that are within the scope of SLR in accordance with the requirements of 10 CFR 54.4(a) and SCs that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a).

2.1.3.1 Documentation Sources for Scoping and Screening

2.1.3.1.1 Summary of Technical Information in the Application

SLRA Section 2.1.2, “Information Sources Used for Scoping and Screening,” discusses the information sources that were used for the SLR scoping and screening processes.

2.1.3.1.2 Staff Evaluation

The CLB is defined in 10 CFR 54.3,“Definitions,” as the set of NRC requirements applicable to a specific plant and an applicant’s written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 52, 54, 55, 70, 72, 73, and 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications. It also includes the plant-specific design-basis information specified in 10 CFR 50.2, “Definitions,” as documented in the most recent updated UFSAR as required by 10 CFR 50.71, “Maintenance of records, making of reports.” Lastly, it includes the applicant’s commitments remaining in effect that were made in docketed licensing correspondence, such as applicant responses to NRC bulletins, generic letters, and enforcement actions, as well as applicant commitments documented in NRC safety evaluations (SEs) or applicant event reports.

The NRC staff considered the scope and depth of CEG’s CLB review to verify that the methodology is sufficiently comprehensive to identify SSCs within the scope of SLR and SCs subject to an AMR. The NRC staff determined the documentation sources provided sufficient information to ensure that CEG identified SSCs to be included within the scope of SLR consistent with the plant’s CLB.

2.1.3.1.3 Conclusion

Based on its review of the SLRA, the NRC staff finds that CEG’s consideration of document sources, including CLB information, is consistent with the Rule, the SRP-SLR, and the guidance in NEI 17-01 and is, therefore, acceptable.

2.1.4 Plant Systems, Structures, and Components Scoping Methodology

SLRA Section 2.1.5, “Scoping Procedure,” states, in part, the following:

> The scoping process is the systematic approach used to identify the DNPS SSCs within the scope of SLR. The scoping process is initially performed at the system and structure level, in accordance with the scoping criteria identified in 10 CFR 54.4(a). System and structure functions and intended functions are identified from a review of the source CLB documents.

2.1.4.1 Application of the Scoping Criteria in 10 CFR 54.4(a)(1)

2.1.4.1.1 Summary of Technical Information in the Application

CEG addressed the methods used to identify SSCs within the scope of SLR, in accordance with the requirements of 10 CFR 54.4(a)(1), in SLRA Section 2.1.5.1, “Safety-Related—10 CFR 54.4(a)(1),” which addresses the three 10 CFR 54.4(a)(1) criteria.

2.1.4.1.2 Staff Evaluation

In accordance with 10 CFR 54.4(a)(1), the applicant must consider all safety-related SSCs relied on to remain functional during and following a design-basis event (DBE) (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions: (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe-shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, “Determination of exclusion area, low population zone, and population center distance,” as applicable.

The NRC staff reviewed the identification of DBEs against the criteria in SRP-SLR Section 2.1.3, “Review Procedures.”

The NRC staff reviewed CEG’s basis documents that (1) describe design-basis conditions in the CLB and (2) address DBEs as defined in 10 CFR 50.49(b)(1). The UFSAR and basis documents discuss events such as internal and external flooding, tornadoes, and missiles. The NRC staff determined CEG’s evaluation of DBEs is consistent with the SRP-SLR. The NRC staff reviewed SLRA Section 2.1.4.1, CEG’s evaluation of the Rule, and CLB definitions pertaining to 10 CFR 54.4(a)(1) and determined CEG’s CLB definition of “safety related” met the definition of “safety related” specified in the Rule.

2.1.4.1.3 Conclusion

Based on its review of the SLRA and the UFSAR, the NRC staff finds CEG’s methodology for identifying safety-related SSCs relied upon to remain functional during and following DBEs and for including those SSCs within the scope of SLR is in accordance with the requirements of 10 CFR 54.4(a)(1) and is, therefore, acceptable.

2.1.4.2 Application of the Scoping Criteria in 10 CFR 54.4(a)(2)

2.1.4.2.1 Summary of Technical Information in the Application

CEG addressed the methods used to identify SSCs included within the scope of SLR, in accordance with the requirements of 10 CFR 54.4(a)(2), in SLRA Section 2.1.5.2, “Nonsafety-Related Affecting Safety-Related—10 CFR 54.4(a)(2).” SLRA Section 2.1.5.2 organizes CEG’s assessment of nonsafety-related SSCs with respect the following application or configuration categories:

- Functional support for safety-related SSC 10 CFR 54.4(a)(1) functions
- Connected to and provide structural support for safety-related SSCs
- Potential for spatial interactions with safety-related SSCs

In addition, SLRA Section 2.0 states CEG's methodology is consistent with the guidance contained in NEI 17-01. NEI 17-01 (which also refers to NEI 95-10, Revision 6, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54—The License Renewal Rule," issued June 2005, endorsed by the NRC in Regulatory Guide 1.188) discusses the implementation of the 10 CFR 54.4(a)(2) scoping criteria to include nonsafety-related SSCs whose failure can prevent the satisfactory accomplishment of safety functions.

2.1.4.2.2 Staff Evaluation

The NRC staff reviewed SLRA Section 2.1.5.2, in which CEG described the scoping methodology for nonsafety-related SSCs in accordance with 10 CFR 54.4(a)(2). During the review, the NRC staff followed the guidance contained in SRP-SLR Section 2.1.3.1.2, "Nonsafety-Related," which states that CEG should not consider hypothetical failures that are not part of the CLB and that have not previously been experienced but rather should base its evaluation on the plant's CLB, engineering judgment and analyses, and relevant operating experience.

<u>Functional support for safety-related SSC 10 CFR 54.4(a)(1) functions</u>

The NRC staff reviewed SLRA Section 2.1.5.2 subheading "Functional Support for Safety-Related SSC 10 CFR 54.4(a)(1) Functions," which describes nonsafety-related SSCs that are required to function in support of a safety-related SSC intended function and were included within the scope of SLR in accordance with 10 CFR 54.4(a)(2). The NRC staff confirmed that CEG reviewed the UFSAR, controlled plant component database, maintenance rule database, engineering drawings and calculations, and CLB documentation, to identify the nonsafety-related support SSCs whose failure could prevent the performance of a safety-related intended function. The NRC staff determined that CEG identified the nonsafety-related SSCs that perform or support a safety function and included those SSCs within the scope of SLR in accordance with 10 CFR 54.4(a)(2).

The NRC staff determined that CEG's methodology for identifying nonsafety-related SSCs that perform or support a safety function for inclusion within the scope of SLR is in accordance with the guidance of the SRP-SLR and the requirements of 10 CFR 54.4(a)(2).

<u>Connected to and provide structural support for safety-related SSCs</u>

The NRC staff reviewed SLRA Section 2.1.5.2 subheading "Connected to and Provide Structural Support for Safety-Related SSCs," which describes the method used to identify nonsafety-related SSCs directly connected to safety-related SSCs to be included within the scope of SLR in accordance with 10 CFR 54.4(a)(2).

The NRC staff determined that CEG used a combination of the following to identify the bounding portion of nonsafety-related piping systems to include within the scope of SLR: seismic anchors, equivalent anchors as defined in the CLB, equivalent anchors as defined in NEI 17-01, and the bounding conditions identified in NEI 17-01 (which refers to NEI 95-10).

The NRC staff determined that CEG's methodology for identifying and including nonsafety-related SSCs directly connected to safety-related SSCs within the scope of SLR is in accordance with the guidance of the SRP-SLR and the requirements of 10 CFR 54.4(a)(2).

Potential for spatial interactions with safety-related SSCs

The NRC staff reviewed SLRA Section 2.1.5.2 subheading “Potential for Spatial Interactions with Safety-Related SSCs,” which describes the methods used to identify nonsafety-related SSCs with the potential for spatial interaction with safety-related SSCs to be included within the scope of SLR in accordance with 10 CFR 54.4(a)(2).

The NRC staff determined that CEG had used a preventive approach (i.e., spaces approach) to identify and evaluate the portions of nonsafety-related systems with the potential for spatial interaction with safety-related SSCs. The approach focused on the interaction between nonsafety-related and safety-related SSCs that are located in the same space, which was described as a structure that contains safety-related SSCs. The NRC staff determined that CEG included the nonsafety-related SSCs located within the same space as safety-related SSCs within the scope of SLR in accordance with 10 CFR 54.4(a)(2).

The NRC staff determined that CEG’s methodology for identifying and including nonsafety-related SSCs with the potential for spatial interaction with safety-related SSCs within the scope of SLR is in accordance with the guidance of the SRP-SLR and the requirements of 10 CFR 54.4(a)(2).

2.1.4.2.3 Conclusion

Based on its review of the SLRA, the NRC staff finds that CEG’s methodology for identifying, evaluating, and including nonsafety-related SSCs, whose failure could prevent satisfactory accomplishment of the intended functions of safety-related SSCs, within the scope of SLR is in accordance with the requirements of 10 CFR 54.4(a)(2) and is, therefore, acceptable.

2.1.4.3 Application of the Scoping Criteria in 10 CFR 54.4(a)(3)

2.1.4.3.1 Summary of Technical Information in the Application

SLRA Section 2.1.5.3, “Regulated Events—10 CFR 54.4(a)(3),” describes the methods used to identify SSCs included within the scope of SLR in accordance with the requirements of 10 CFR 54.4(a)(3).

2.1.4.3.2 Staff Evaluation

The NRC staff reviewed SLRA Section 2.1.5.3, which describes the method used to identify and include within the scope of SLR those SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the agency’s regulations for fire protection (10 CFR 50.48, “Fire protection”), EQ (10 CFR 50.49, “Environmental qualification of electric equipment important to safety for nuclear power plants”), anticipated transients without scram (ATWS) (10 CFR 50.62, “Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light water cooled nuclear power plants”), and station blackout (SBO) (10 CFR 50.63, “Loss of all alternating current power”).

The NRC staff determined that CEG’s scoping process considered information sources used for scoping and screening to verify that the appropriate SSCs were included within the scope of SLR, evaluated CLB information to identify SSCs that perform functions addressed in 10 CFR 54.4(a)(3), and included those SSCs within the scope of SLR. Based on its review of information contained in the SLRA and the CLB documents reviewed, the NRC staff determined that CEG's methodology is sufficient for identifying and including SSCs credited in performing functions within the scope of SLR in accordance with the requirements of 10 CFR 54.4(a)(3).

2.1.4.3.3 Conclusion

Based on its review of the SLRA, the NRC staff finds that CEG's methodology for identifying and including SSCs that are relied on to remain functional during regulated events is consistent with the requirements of 10 CFR 54.4(a)(3) and is, therefore, acceptable.

2.1.4.4 Scoping of Systems and Structures

2.1.4.4.1 Summary of Technical Information in the Application

SLRA Section 2.0 states, in part, the following:

> The scoping and screening methodology is consistent with the guidelines presented in Nuclear Energy Institute (NEI) 17-01, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 for Subsequent License Renewal" (Reference 1.7.3).

SLRA Section 2.1.1, "Introduction," states that CEG defined the plant in terms of systems and structures, and an evaluation was completed for all systems and structures on site to ensure that the entire plant was assessed. SLRA Sections 2.3 through 2.5 include a description of the system or structure; a list of functions it performs; and identification of intended functions, the 10 CFR 54.4(a) scoping criteria met by the system or structure, scoping boundaries, system intended functions, UFSAR references, and component types subject to an AMR.

2.1.4.4.2 Staff Evaluation

The NRC staff reviewed SLRA Sections 2.0 and 2.1.1 and the associated subsections, which describe CEG's methodology for identifying SSCs within the scope of SLR, to verify that they meet the requirements of 10 CFR 54.4(a).

The NRC staff determined that CEG identified the SSCs within the scope of SLR and documented the results of the scoping process in SLRA Section 2.3, "Scoping and Screening Results: Mechanical;" SLRA Section 2.4, "Scoping and Screening Results: Structures;" and SLRA Section 2.5, "Scoping and Screening Results: Electrical."

2.1.4.4.3 Conclusion

Based on its review of the SLRA, the NRC staff finds that CEG's scoping methodology in Sections 2.0 and 2.1 through 2.5 is consistent with the guidance contained in the SRP-SLR and identified those SSCs that are (1) safety-related, (2) nonsafety-related whose failure could affect safety-related intended functions, and (3) necessary to demonstrate compliance with the NRC staff's regulations for fire protection, EQ, ATWS, and SBO. The NRC staff finds that CEG's methodology is consistent with the requirements of 10 CFR 54.4(a) and is therefore acceptable.

2.1.5 Screening Methodology

2.1.5.1 Summary of Technical Information in the Application

SLRA Section 2.1.6, “Screening Procedure,” discusses the screening process, during which CEG’s staff evaluated the component types and commodity groups included within the scope of SLR to determine which ones are passive and long-lived and therefore subject to an AMR, as specified by 10 CFR 54.21(a)(1).

2.1.5.2 Staff Evaluation

In accordance with 10 CFR 54.21, each SLRA must contain an IPA that identifies SCs that are within the scope of SLR and that are subject to an AMR. The IPA must identify components that perform an intended function without moving parts or a change in configuration or properties (passive), as well as components that are not subject to periodic replacement based on a qualified life or specified time period (long-lived). In addition, the IPA must include a description and justification of the methodology used to identify passive, long-lived SCs and a demonstration that the effects of aging on those SCs will be adequately managed so that the intended function(s) will be maintained under all design conditions imposed by the plant specific CLB for the subsequent period of extended operation.

The NRC staff reviewed SLRA Sections 2.1.1 and 2.1.6, which describe the methodology CEG used to identify the mechanical, structural, and electrical SCs within the scope of SLR that are subject to an AMR. CEG implemented a process for determining which SCs are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.1.5.2.1 Mechanical and Structural

The NRC staff reviewed CEG’s methodology used for mechanical and structural component screening as described in SLRA Section 2.1.1 “Introduction,” and Section 2.1.6 “Screening Procedure.” The NRC staff determined that CEG used the screening process described in these sections, along with the information contained in NEI 17-01 and the SRP-SLR, to identify the mechanical and structural SCs subject to an AMR. The NRC staff determined that CEG identified the SCs that meet the passive criteria in accordance with the guidance contained in NEI 17-01 and, among those SCs, those that are not subject to replacement based on a qualified life or specified time period (long-lived). CEG determined that the remaining passive, long-lived components are subject to an AMR.

2.1.5.2.2 Electrical

The NRC staff reviewed CEG’s methodology used for electrical component screening as described in SLRA Sections 2.1.1 and 2.1.6. The NRC staff confirmed that CEG used the screening process described in the SLRA, along with the information contained in NEI 17-01 and the SRP-SLR, to identify the electrical SSCs subject to an AMR. The NRC staff determined that CEG identified electrical commodity groups that meet the passive criteria in accordance with NEI 17-01 and, among those passive SCs, those SCs that are not subject to replacement based on a qualified life or specified time period (long-lived). CEG determined that the remaining passive, long-lived components are subject to an AMR.

2.1.5.3 Conclusion

Based on its review of the SLRA, the NRC staff finds that CEG's screening methodology is (1) consistent with the guidance contained in the SRP-SLR and (2) identified the passive, long-lived components within the scope of SLR that are subject to an AMR. The NRC staff concludes that CEG's methodology is consistent with the requirements of 10 CFR 54.21(a)(1) and is, therefore, acceptable.

2.1.6 Summary of Evaluation Findings

Based on its review of the SLRA, the NRC staff finds that CEG's description and justification of the methodology for identifying SSCs within the scope of SLR and SCs subject to an AMR are consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1) and are, therefore, acceptable.

2.2 Plant Level Scoping Results

2.2.1 Introduction

In SLRA Section 2.1, CEG described the methodology for identifying SSCs within the scope of SLR and subject to an AMR. In SLRA Section 2.2, "Plant Level Scoping Results," CEG provides the results of the implementation of the scoping methodology that determined which systems and structures must be included within the scope of SLR.

The NRC staff reviewed the plant-level scoping results to determine whether CEG properly identified SSCs within the scope of SLR and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a).

2.2.2 Summary of Technical Information in the Application

SLRA Section 2.2, Table 2.2-1, "Plant Level Scoping Results," lists the plant mechanical, structural, electrical, and instrumentation and control (I&C) systems and indicates those systems that are within the scope of SLR.

2.2.3 Staff Evaluation

Section 2.1 of this SE contains the NRC staff's review and evaluation of CEG's scoping and screening methodology. To verify that CEG properly implemented its methodology, the NRC staff's review focused on the implementation results shown in SLRA Table 2.2-1.

The NRC staff determined that CEG properly identified the systems and structures within the scope of SLR in accordance with 10 CFR 54.4. The NRC staff reviewed selected systems and structures that had not been identified as within the scope of SLR to verify whether these systems and structures have any intended functions requiring their inclusion within the scope of SLR. The NRC staff conducted the review of the scoping implementation in accordance with SRP-SLR Section 2.2, "Plant-Level Scoping Results."

The NRC staff sampled the contents of the UFSAR based on the systems and structures listed in SLRA Table 2.2-1. The NRC staff sought to determine whether any systems or structures may have intended functions within the scope of SLR (as defined by 10 CFR 54.4) that had been omitted from the scope of SLR. The NRC staff did not identify any omissions.

2.2.4 Conclusion

Based on its review of the SLRA, the NRC staff finds that the SLRA adequately identifies the systems and structures within the scope of SLR in accordance with 10 CFR 54.4 and is, therefore, acceptable.

2.3 Scoping and Screening Results: Mechanical Systems

This section documents the NRC staff's review of CEG's scoping and screening results for mechanical systems. Specifically, this section discusses the following items:

- reactor coolant system
- engineered safety features
- auxiliary systems
- steam and power conversion systems

To verify CEG properly implemented its methodology, the NRC staff focused its review on the implementation results. This focus allowed the NRC staff to verify that CEG identified the mechanical system SCs that met the scoping criteria and that were subject to an AMR, thus confirming that there were no omissions.

The NRC staff performed its evaluation of mechanical systems using the methodology described in SRP-SLR Section 2.3, "Scoping and Screening Results: Mechanical Systems," and considered the system function(s) as described in the FSAR. The objective was to determine whether CEG, in accordance with 10 CFR 54.4, identified components and supporting structures for mechanical systems that met the scoping criteria for SLR. Similarly, the NRC staff evaluated CEG's screening results to verify that all passive, long-lived components are subject to an AMR, as required by 10 CFR 54.21(a)(1).

In the scoping evaluation, the NRC staff reviewed the SLRA, applicable sections of the UFSARs, license renewal boundary drawings, and other licensing basis documents, as appropriate, for each mechanical system within the scope of SLR. The NRC staff reviewed relevant licensing basis documents for each mechanical system to confirm that the SLRA specifies all intended functions defined by 10 CFR 54.4(a). The review then focused on identifying any components with intended functions defined by 10 CFR 54.4(a) that CEG may have omitted from the scoping results.

After reviewing the scoping results, the NRC staff evaluated CEGs screening results. For those SCs with intended functions included under 10 CFR 54.4(a), the NRC staff verified that CEG properly screened out either (1) SCs that have functions performed with moving parts or that have a change in configuration or properties or (2) SCs subject to replacement after a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). The NRC staff confirmed that CEG included in the AMR those SCs that do not meet either of these criteria, as required by 10 CFR 54.21(a)(1).

2.3.1 Summary of Technical Information in the Application

SLRA Section 2.3.1, “Reactor Vessel, Internals, and Reactor Coolant System,” Section 2.3.2, “Engineering Safety Features,” Section 2.3.3, “Auxiliary Systems,” and Section 2.3.4, “Steam and Power Conversion System,” identify the mechanical SCs and supporting SCs subject to an AMR for SLR.

2.3.2 Staff Evaluation

The NRC staff evaluated the system functions described in the SLRA and UFSARs to verify that CEG included within the scope of SLR all components with intended functions delineated under 10 CFR 54.4(a). The NRC staff then reviewed those components that CEG identified as within the scope of SLR to verify that CEG included all passive and long-lived components subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

Using the evaluation methodology described in SLRA Section 2.1 and the guidance in SRP-SLR, Section 2.3, “Scoping and Screening Results: Mechanical Systems,” the NRC staff reviewed DNPS license renewal boundary drawings, the UFSAR, and additional documents. The documents that the NRC staff reviewed to verify CEG’s results are described in the following table.

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
SLRA Section	SLRA Section Title	Documents Reviewed by Staff		
		SLRA Tables	UFSAR	SLRA Drawings
SLRA Section 2.3.1, "Reactor Vessel, Internals, and Reactor Coolant System"				
2.3.1.1	Reactor Coolant Pressure Boundary System	Table 2.3.1-1, Reactor Coolant Pressure Boundary System Components Subject to Aging Management Review Table 3.1.2-1, Reactor Coolant Pressure Boundary System Summary of Aging Management Evaluation	Sections 5.1, 5.2, 6.2.4	SLR-DRE-M-12; Sheets 1 and 2 SLR-DRE-M-14 SLR-DRE-M-20 SLR-DRE-M-26; Sheets 1, 2, and 3 SLR-DRE-M-27 SLR-DRE-M-28 SLR-DRE-M-29; Sheets 1 and 2 SLR-DRE-M-30 SLR-DRE-M-32 SLR-DRE-M-33 SLR-DRE-M-51 SLR-DRE-M-345; Sheets 1 and 2 SLR-DRE-M-347 SLR-DRE-M-353 SLR-DRE-M-357; Sheets 1, 2, and 3 SLR-DRE-M-358 SLR-DRE-M-359 SLR-DRE-M-360, Sheet 1 SLR-DRE-M-361 SLR-DRE-M-363 SLR-DRE-M-364 SLR-DRE-M-374 SLR-DRE-M-1234, Sheet 1

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.1.2	Reactor Vessel	Table 2.3.1-2, Reactor Vessel Components Subject to Aging Management Review Table 3.1.2-2, Reactor Vessel Summary of Aging Management Evaluation	Sections 3.9.3.1.1, 5.1, 5.3	SLR-DRE-M-12, Sheet 1 SLR-DRE-M-14 SLR-DRE-M-26; Sheets 1 and 2 SLR-DRE-M-27 SLR-DRE-M-28 SLR-DRE-M-51 SLR-DRE-M-345, Sheet 1 SLR-DRE-M-347 SLR-DRE-M-357; Sheets 1 and 2 SLR-DRE-M-358 SLR-DRE-M-359 SLR-DRE-M-374
2.3.1.3	Reactor Vessel Internals	Table 2.3.1-3, Reactor Vessel Internals Components Subject to Aging Management Review Table 3.1.2-2, Reactor Vessel Internals Summary of Aging Management Evaluation	Sections 1.2.1, 1.2.2.3, 3.9.5, 4.6, 7.2.2.2, 7.6.1	None
SLRA Section 2.3.2, "Engineered Safety Features"				
2.3.2.1	Containment Atmospheric Control System	Table 2.3.2-1, Containment Atmospheric Control System Components Subject to Aging Management Review Table 3.2.2-1, Containment Atmospheric Control System Summary of Aging Management Evaluation	Sections 6.0.8, 6.2.5, 9.3.1.4, 9.3.1.5	SLR-DRE-M-12, Sheet 1 SLR-DRE-M-25 SLR-DRE-M-25, Sheet 1 SLR-DRE-M-37, Sheet 2 SLR-DRE-M-345, Sheet 1 SLR-DRE-M-356 SLR-DRE-M-356, Sheet 1 SLR-DRE-M-367, Sheet 2 SLR-DRE-M-706; Sheets 1 and 2 SLR-DRE-M-707; Sheets 1 and 2 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1239, Sheet 1

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.2.2	Core Spray System	Table 2.3.2-2, Core Spray System Components Subject to Aging Management Review Table 3.2.2-2, Core Spray System Summary of Aging Management Evaluation	Sections 6.3, 7.3.1.1	SLR-DRE-M-27, Sheet 1 SLR-DRE-M-358 SLR-DRE-M-26, Sheet 1 SLR-DRE-M-29, Sheet 1 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-51 SLR-DRE-M-357, Sheet 1 SLR-DRE-M-360, Sheet 1 SLR-DRE-M-366 SLR-DRE-M-374
2.3.2.3	High Pressure Coolant Injection System	Table 2.3.2-3, High Pressure Coolant Injection System Components Subject to Aging Management Review Table 3.2.2-3, High Pressure Coolant Injection System Summary of Aging Management Evaluation	Sections 1.2.2.5, 6.3, 7.3.1.3	SLR-DRE-M-14 SLR-DRE-M-29, Sheet 1 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-40, Sheet 1 SLR-DRE-M-49, Sheet 1 SLR-DRE-M-51, Sheet 1 SLR-DRE-M-51A, Sheet 1 SLR-DRE-M-347 SLR-DRE-M-360, Sheet 1 SLR-DRE-M-370, Sheet 1 SLR-DRE-M-374, Sheet 1 SLR-DRE-M-374A, Sheet 1
2.3.2.4	Isolation Condenser System	Table 2.3.2-4, Isolation Condenser System Components Subject to Aging Management Review Table 3.2.2-4, Isolation Condenser System Summary of Aging Management Evaluation	Sections 1.2.2.5, 3.4.1.1, 5.4.6	SLR-DRE-M-12, Sheet 2 SLR-DRE-M-28 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-39 SLR-DRE-M-41, Sheet 2 SLR-DRE-M-345, Sheet 2 SLR-DRE-M-359 SLR-DRE-M-366 SLR-DRE-M-369 SLR-DRE-M-4203 SLR-DRE-M-4204
2.3.2.5	Low Pressure Coolant Injection System	Table 2.3.2-5, Low Pressure Coolant Injection System Components Subject to Aging Management Review Table 3.2.2-5, Low Pressure Coolant Injection System Summary of Aging Management Evaluation	Sections 1.2.2.5, 6.2.2, 6.3.2,	SLR-DRE-M-15, Sheet 1 SLR-DRE-M-29, Sheet 1 SLR-DRE-M-39 SLR-DRE-M-51 SLR-DRE-M-348, Sheet 1

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
			7.3.1.2, 7.4.1	SLR-DRE-M-360, Sheet 1 SLR-DRE-M-369 SLR-DRE-M-374 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1239, Sheet 1
2.3.2.6	Primary Containment Isolation System	Table 2.3.2-6, Primary Containment Isolation System Components Subject to Aging Management Review Table 3.2.2-6, Primary Containment Isolation System Summary of Aging Management Evaluation	Sections 6.2.4, 6.2.5, 7.3.2 Table 6.2-9	SLR-DRE-M-25 SLR-DRE-M-37, Sheet 2 SLR-DRE-M-51 SLR-DRE-M-356 SLR-DRE-M-367, Sheet 2 SLR-DRE-M-374
2.3.2.7	Standby Gas Treatment System	Table 2.3.2-7, Standby Gas Treatment System Components Subject to Aging Management Review Table 3.2.2-7, Standby Gas Treatment System Summary of Aging Management Evaluation	Sections 6.0.1, 6.2.1.2.7, 6.2.5, 6.5.3	SLR-DRE-M-25 SLR-DRE-M-49 SLR-DRE-M-269, Sheet 1 SLR-DRE-M-356 SLR-DRE-M-529 SLR-DRE-M-707; Sheets 1 and 2 SLR-DRE-M-1235 SLR-DRE-M-1240

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
SLRA Section 2.3.3, "Auxiliary Systems"				
2.3.3.1	Closed Cycle Cooling Water System	Table 2.3.3-1, Closed Cycle Cooling Water System Components Subject to Aging Management Review Table 3.3.2-1, Closed Cycle Cooling Water System Summary of Aging Management Evaluation	Sections 9.2.3 9.2.7	SLR-DRE-M-20 SLR-DRE-M-21 SLR-DRE-M-22 SLR-DRE-M-37; Sheets 7 and 10 SLR-DRE-M-39 SLR-DRE-M-39A SLR-DRE-M-177; Sheets 1 and 4 SLR-DRE-M-177A, Sheet 2 SLR-DRE-M-178 SLR-DRE-M-353 SLR-DRE-M-354; Sheets 1 and 2 SLR-DRE-M-355 SLR-DRE-M-367; Sheets 4, 6, and 7 SLR-DRE-M-368A SLR-DRE-M-369 SLR-DRE-M-369A SLR-DRE-M-419; Sheets 1 and 4 SLR-DRE-M-419A, Sheet 2 SLR-DRE-M-421 SS-Mech-2 SLR-DRE-M-369 Rev.0 update SS-Mech-3 SLR-DRE-M-353 Rev.0 update
2.3.3.2	Compressed Air System	Table 2.3.3-2, Compressed Air System Components Subject to Aging Management Review Table 3.3.2-2, Compressed Air System Summary of Aging Management Evaluation	Sections 1.2.4.4.2 6.4.2 9.3.1.2 9.3.1.3 9.3.1.6	SLR-DRE-M-12, Sheet 2 SLR-DRE-M-21 SLR-DRE-M-37; Sheets 7, 8, 9, and 10 SLR-DRE-M-38; Sheets 1 and 2 SLR-DRE-M-48 SLR-DRE-M-50 SLR-DRE-M-345, Sheet 2 SLR-DRE-M-355 SLR-DRE-M-364 SLR-DRE-M-367; Sheets 1, 4, 5, 6, and 7 SLR-DRE-M-368 SLR-DRE-M-368A SLR-DRE-M-372 SLR-DRE-M-373 SLR-DRE-M-830

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
2.3.3.3	Control Rod Drive System	Table 2.3.3-3, Control Rod Drive System Components Subject to Aging Management Review Table 3.3.2-3, Control Rod Drive System Summary of Aging Management Evaluation	Sections 4.6.1 4.6.3 4.6.4 4.6.5	SLR-DRE-M-21 SLR-DRE-M-26; Sheets 1, 2, and 3 SLR-DRE-M-34; Sheets 1 and 2 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-40 SLR-DRE-M-354, Sheet 2 SLR-DRE-M-357; Sheets 1, 2, and 3 SLR-DRE-M-365; Sheets 1 and 2 SLR-DRE-M-366
2.3.3.4	Control Room Ventilation System	Table 2.3.3-4, Control Room Ventilation System Components Subject to Aging Management Review Table 3.3.2-4, Control Room Ventilation System Summary of Aging Management Evaluation	Sections 6.4.2 6.4.3 6.4.4 9.4.1	SLR-DRE-M-273; Sheets 1 and 2 SLR-DRE-M-3121
2.3.3.5	Cranes, Hoists, and Refueling Equipment System	Table 2.3.3-5, Cranes, Hoists, and Refueling Equipment System Components Subject to Aging Management Review Table 3.3.2-5, Cranes, Hoists, and Refueling Equipment System Summary of Aging Management Evaluation	Sections 9.1.4 9.6	None
2.3.3.6	Demineralized Water Makeup System	Table 2.3.3-6, Demineralized Water Makeup System Components Subject to Aging Management Review Table 3.3.2-6, Demineralized Water Makeup System Summary of Aging Management Evaluation	Section 9.2.4	SLR-DRE-M-15, Sheet 3 SLR-DRE-M-20 SLR-DRE-M-21 SLR-DRE-M-28 SLR-DRE-M-31 SLR-DRE-M-33 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-39 SLR-DRE-M-40 SLR-DRE-M-43, Sheet 1 SLR-DRE-M-177; Sheets 1 and 3 SLR-DRE-M-177A, Sheet 1 SLR-DRE-M-269, Sheet 3 SLR-DRE-M-270 SLR-DRE-M-353 SLR-DRE-M-354, Sheet 1 SLR-DRE-M-359 SLR-DRE-M-362 SLR-DRE-M-364

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
				SLR-DRE-M-366 SLR-DRE-M-369 SLR-DRE-M-370 SLR-DRE-M-371, Sheet 1 SLR-DRE-M-419; Sheets 1 and 3 SLR-DRE-M-419A, Sheet 1 SLR-DRE-M-530, Sheet 1 SLR-DRE-M-1234, Sheet 3 SLR-DRE-M-1239, Sheet 3 SLR-DRE-M-4457
2.3.3.7	Diesel Generator and Auxiliaries System	Table 2.3.3-7, Diesel Generator and Auxiliaries System Components Subject to Aging Management Review Table 3.3.2-7, Diesel Generator and Auxiliaries System Summary of Aging Management Evaluation	Sections 8.3.1.5 9.5.4 9.5.5 9.5.6 9.5.7 9.5.8	SLR-DRE-M-22 SLR-DRE-M-36 SLR-DRE-M-40 SLR-DRE-M-41, Sheet 2 SLR-DRE-M-173 SLR-DRE-M-355 SLR-DRE-M-478; Sheets 1, 2, and 3 SLR-DRE-M-517; Sheets 1, 2, and 3 SLR-DRE-M-518; Sheets 1, 2, and 3 SS-Mech-4 SLR-DRE-M-41 Sheet 2 Rev.0 update SS-Mech-5 SLR-DRE-M-478 Sheet 1 Rev.0 update
2.3.3.8	Fire Protection System	See Additional Discussion below		
2.3.3.9	Fuel Pool Cooling System	Table 2.3.3-9, Fuel Pool Cooling System Components Subject to Aging Management Review Table 3.3.2-9, Fuel Pool Cooling System Summary of Aging Management Evaluation	Sections 5.4.7 9.1.1 9.1.2 9.1.3	SLR-DRE-M-20 SLR-DRE-M-31 SLR-DRE-M-32 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-39 SLR-DRE-M-48 SLR-DRE-M-50 SLR-DRE-M-177A, Sheet 2 SLR-DRE-M-353 SLR-DRE-M-362 SLR-DRE-M-363 SLR-DRE-M-369 SLR-DRE-M-373 SLR-DRE-M-419A, Sheet 2

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
				SS-Mech-7 SLR-DRE-M-362 Rev.0 update
2.3.3.10	Nonsafety-Related Ventilation System	Table 2.3.3-10, Nonsafety-Related Ventilation System Components Subject to Aging Management Review Table 3.3.2-10, Nonsafety-Related Ventilation System Summary of Aging Management Evaluation	Sections 9.4.3 9.4.4 9.4.5 9.4.8	SLR-DRE-M-20 SLR-DRE-M-21 SLR-DRE-M-22 SLR-DRE-M-25 SLR-DRE-M-32 SLR-DRE-M-42 SLR-DRE-M-175; Sheets 2 and 3 SLR-DRE-M-176 SLR-DRE-M-269, Sheet 1 SLR-DRE-M-270 SLR-DRE-M-273; Sheets 1 and 5 SLR-DRE-M-353 SLR-DRE-M-355 SLR-DRE-M-363 SLR-DRE-M-472; Sheets 1 and 2 SLR-DRE-M-529, Sheet 1 SLR-DRE-M-530, Sheet 1 SLR-DRE-M-626 SLR-DRE-M-936 SLR-DRE-M-4457 SS-Mech-1 SLR-DRE-M-20 Rev.0 update
2.3.3.11	Off Gas System	Table 2.3.3-11, Off Gas System Components Subject to Aging Management Review Table 3.3.2-11, Off Gas System Summary of Aging Management Evaluation	Section 11.3.1	SLR-DRE-M-12, Sheet 2 SLR-DRE-M-40 SLR-DRE-M-43; Sheets 1, 2, and 5 SLR-DRE-M-178 SLR-DRE-M-345, Sheet 2 SLR-DRE-M-370 SLR-DRE-M-371; Sheets 1, 2, and 5 SLR-DRE-M-421

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
2.3.3.12	Open Cycle Cooling Water System	Table 2.3.3-12, Open Cycle Cooling Water System Components Subject to Aging Management Review Table 3.3.2-12, Open Cycle Cooling Water System Summary of Aging Management Evaluation	Sections 9.2.1 9.2.2 9.2.5 9.2.8 10.4.5	SLR-DRE-M-21 SLR-DRE-M-22 SLR-DRE-M-22, Sheet 1 SLR-DRE-M-23; Sheets 1, 2, and 5 SLR-DRE-M-29; Sheets 1 and 2 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-36 SLR-DRE-M-40 SLR-DRE-M-354, Sheet 2 SLR-DRE-M-355 SLR-DRE-M-360; Sheets 1 and 2 SLR-DRE-M-370 SLR-DRE-M-375, Sheet 3 SLR-DRE-M-626 SLR-DRE-M-3121 SLR-DRE-M-3486 SLR-DRE-M-3496
2.3.3.13	Plant Drainage System	Table 2.3.3-13, Plant Drainage System Components Subject to Aging Management Review Table 3.3.2-13, Plant Drainage System Summary of Aging Management Evaluation	Sections 9.3.3 11.2.2.1.1 11.2.2.1.2	SLR-DRE-M-15; Sheets 1 and 3 SLR-DRE-M-19 SLR-DRE-M-25 SLR-DRE-M-26; Sheets 1 and 2 SLR-DRE-M-27 SLR-DRE-M-28 SLR-DRE-M-29, Sheet 1 SLR-DRE-M-30 SLR-DRE-M-31 SLR-DRE-M-32 SLR-DRE-M-34; Sheets 1 and 2 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-37, Sheet 1 SLR-DRE-M-39 SLR-DRE-M-39A SLR-DRE-M-40 SLR-DRE-M-41, Sheet 2 SLR-DRE-M-43, Sheet 1 SLR-DRE-M-47, Sheet 1 SLR-DRE-M-50 SLR-DRE-M-177; Sheets 1, 3, and 4

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
				SLR-DRE-M-177A; Sheets 1 and 2 SLR-DRE-M-273, Sheet 5 SLR-DRE-M-348; Sheets 1 and 3 SLR-DRE-M-352 SLR-DRE-M-353 SLR-DRE-M-356 SLR-DRE-M-357, Sheet 1 SLR-DRE-M-358 SLR-DRE-M-359 SLR-DRE-M-360, Sheet 1 SLR-DRE-M-361 SLR-DRE-M-362 SLR-DRE-M-363 SLR-DRE-M-365; Sheets 1 and 2 SLR-DRE-M-367, Sheet 2 SLR-DRE-M-369 SLR-DRE-M-369A SLR-DRE-M-370 SLR-DRE-M-371, Sheet 1 SLR-DRE-M-373 SLR-DRE-M-374 SLR-DRE-M-419; Sheets 1, 3, and 4 SLR-DRE-M-419A; Sheets 1 and 2 SLR-DRE-M-529, Sheet 1 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1239, Sheet 1 SLR-DRE-M-4204

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.3.14	Process Sampling and Radiation Monitoring System	Table 2.3.3-14, Process Sampling and Radiation Monitoring System Components Subject to Aging Management Review Table 3.3.2-14, Process Sampling and Radiation Monitoring System Summary of Aging Management Evaluation	Sections 9.3.2 11.5	SLR-DRE-M-12, Sheet 2 SLR-DRE-M-15, Sheet 3 SLR-DRE-M-25 SLR-DRE-M-26, Sheet 2 SLR-DRE-M-30 SLR-DRE-M-34, Sheet 1 SLR-DRE-M-43, Sheet 1 SLR-DRE-M-177, Sheet 4 SLR-DRE-M-177A; Sheets 1 and 2 SLR-DRE-M-178 SLR-DRE-M-269, Sheet 1 SLR-DRE-M-345, Sheet 2 SLR-DRE-M-348, Sheet 3 SLR-DRE-M-356 SLR-DRE-M-357, Sheet 2 SLR-DRE-M-365, Sheet 1 SLR-DRE-M-419, Sheet 4 SLR-DRE-M-419A; Sheets 1 and 2 SLR-DRE-M-421 SLR-DRE-M-529, Sheet 1 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1235 SLR-DRE-M-1239, Sheet 1 SLR-DRE-M-1240 SLR-DRE-M-3486 SLR-DRE-M-3496

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.3.15	Radwaste System	Table 2.3.3-15, Radwaste System Components Subject to Aging Management Review Table 3.3.2-15, Radwaste System Summary of Aging Management Evaluation	Sections 1.2.2.12 11.2 11.4	SLR-DRE-M-20 SLR-DRE-M-26; Sheets 1 and 2 SLR-DRE-M-27 SLR-DRE-M-28 SLR-DRE-M-29; Sheets 1 and 2 SLR-DRE-M-30 SLR-DRE-M-31 SLR-DRE-M-32 SLR-DRE-M-39 SLR-DRE-M-40 SLR-DRE-M-44 SLR-DRE-M-47, Sheet 1 SLR-DRE-M-51 SLR-DRE-M-353 SLR-DRE-M-357; Sheets 1 and 2 SLR-DRE-M-358 SLR-DRE-M-359 SLR-DRE-M-362 SLR-DRE-M-363 SLR-DRE-M-365, Sheet 2 SLR-DRE-M-369 SLR-DRE-M-370 SLR-DRE-M-374 SLR-DRE-M-723 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1239, Sheet 1

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
2.3.3.16	Reactor Water Cleanup System	Table 2.3.3-16, Reactor Water Cleanup System Components Subject to Aging Management Review Table 3.3.2-16, Reactor Water Cleanup System Summary of Aging Management Evaluation	Sections 5.4.8 7.3.2.4	SLR-DRE-M-14 SLR-DRE-M-20 SLR-DRE-M-30 SLR-DRE-M-39 SLR-DRE-M-39A SLR-DRE-M-40 SLR-DRE-M-45, Sheet 1 SLR-DRE-M-46, Sheet 1 SLR-DRE-M-48 SLR-DRE-M-347 SLR-DRE-M-353 SLR-DRE-M-361 SLR-DRE-M-369 SLR-DRE-M-369A SLR-DRE-M-370 SLR-DRE-M-372 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1239, Sheet 1
2.3.3.17	SBO Diesel Generator Ventilation System	Table 2.3.3-17, SBO Diesel Generator Ventilation System Components Subject to Aging Management Review Table 3.3.2-17, SBO Diesel Generator Ventilation System Summary of Aging Management Evaluation	Sections 9.4.4.5 9.5.9	SLR-DRE-M-890 SLR-DRE-M-4356; Sheets 1, 2, 3, 4, and 5

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
2.3.3.18	Safety-Related Ventilation System	Table 2.3.3-18, Safety-Related Ventilation System Components Subject to Aging Management Review Table 3.3.2-18, Safety-Related Ventilation System Summary of Aging Management Evaluation	Sections 5.4.6 6.2.3 9.4.5 9.4.6 9.4.7	SLR-DRE-M-22 SLR DRE-M-29, Sheet 2 SLR-DRE-M-175, Sheet 2 SLR-DRE-M-269; Sheets 1, 2, and 3 SLR-DRE-M-270 SLR-DRE-M-355 SLR-DRE-M-360, Sheet 2 SLR-DRE-M-472, Sheet 1 SLR-DRE-M-529; Sheets 1, 2, and 3 SLR-DRE-M-530, Sheet 1 SLR-DRE-M-973 SLR-DRE-M-974 SLR-DRE-M-4204
2.3.3.19	Shutdown Cooling System	Table 2.3.3-19, Shutdown Cooling System Components Subject to Aging Management Review Table 3.3.2-19, Shutdown Cooling System Summary of Aging Management Evaluation	Sections 1.2.2.5 5.4.7	SLR-DRE-M-20 SLR-DRE-M-32 SLR-DRE-M-39 SLR-DRE-M-353 SLR-DRE-M-363 SLR-DRE-M-369 SLR-DRE-M-1234, Sheet 1 SLR-DRE-M-1239, Sheet 1
2.3.3.20	Standby Liquid Control System	Table 2.3.3-20, Standby Liquid Control System Components Subject to Aging Management Review	Sections 6.0.7 7.8 9.3.5 15.6.5.5	SLR-DRE-M-33 SLR-DRE-M-364

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.3.21	Station Blackout Diesel Generator System	Table 2.3.3-21, Station Blackout Diesel Generator System Components Subject to Aging Management Review Table 3.3.2-21, Station Blackout Diesel Generator System Summary of Aging Management Evaluation	Sections 8.3.1.8 9.5.9.1	SLR-DRE-M-4305 SLR-DRE-M-4305A SLR-DRE-M-4305B SLR-DRE-M-4306; Sheets 1 and 2 SLR-DRE-M-4307 SLR-DRE-M-4308 SLR-DRE-M-4308A SLR-DRE-M-4308B SLR-DRE-M-4308D SLR-DRE-M-4308F SLR-DRE-M-4359; Sheets 1, 2, 3, and 4 SLR-DRE-M-4360; Sheets 1, 2, 3, and 4 SLR-DRE-M-4361; Sheets 1, 2, 3, and 4 SS-Mech-8 SLR-DRE-M-4306 Sheet 1 Rev.0 update SS-Mech-8 SLR-DRE-M-4306 Sheet 2 Rev.0 update
2.3.3.22	Traversing Incore Probe System	Table 2.3.3-22, Traversing Incore Probe System Components Subject to Aging Management Review Table 3.3.2-22, Traversing Incore Probe System Summary of Aging Management Evaluation	Sections 6.2.4.2.3 7.6.1.5.4	SLR-DRE-M-37, Sheet 2 SLR-DRE-M-367, Sheet 3
SLRA Section 2.3.4, "Steam and Power Conversion Systems"				
2.3.4.1	Condensate System	2.3.4-1, Condensate System Components Subject to Aging Management Review 3.4.2-1, Condensate System Summary of Aging Management Evaluation	Sections 9.2.6 10.4.1 10.4.6 10.4.7	SLR-DRE-M-12, Sheet 2 SLR-DRE-M-13 SLR-DRE-M-15; Sheets 1, 2, and 3 SLR-DRE-M-16 SLR-DRE-M-17; Sheets 1, 2, and 3 SLR-DRE-M-18 SLR-DRE-M-21 SLR-DRE-M-24, Sheet 2 SLR-DRE-M-27 SLR-DRE-M-29, Sheet 1 SLR-DRE-M-30 SLR-DRE-M-35, Sheet 1 SLR-DRE-M-40 SLR-DRE-M-43; Sheets 1 and 2 SLR-DRE-M-44

SLRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
				SLR-DRE-M-48 SLR-DRE-M-177; Sheets 1, 2, 3, and 4 SLR-DRE-M-270 SLR-DRE-M-345, Sheet 2 SLR-DRE-M-346 SLR-DRE-M-348; Sheets 1, 2, and 3 SLR-DRE-M-349 SLR-DRE-M-350; Sheets 1 and 2 SLR-DRE-M-351 SLR-DRE-M-352 SLR-DRE-M-354; Sheets 1 and 2 SLR-DRE-M-358 SLR-DRE-M-360, Sheet 1 SLR-DRE-M-361 SLR-DRE-M-362 SLR-DRE-M-365, Sheet 1 SLR-DRE-M-366 SLR-DRE-M-370 SLR-DRE-M-371; Sheets 1, 2, and 5 SLR-DRE-M-372 SLR-DRE-M-373 SLR-DRE-M-419; Sheets 1, 2, 3, and 4

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
2.3.4.2	Feedwater System	2.3.4-2, Feedwater System Components Subject to Aging Management Review 3.4.2-2, Feedwater System Summary of Aging Management Evaluation	Sections 5.4.9 7.7.5 10.4.7	SLR-DRE-M-13 SLR-DRE-M-14 SLR-DRE-M-16 SLR-DRE-M-18 SLR-DRE-M-19 SLR-DRE-M-30 SLR-DRE-M-40 SLR-DRE-M-177, Sheet 2 SLR-DRE-M-346 SLR-DRE-M-347 SLR-DRE-M-349 SLR-DRE-M-351 SLR-DRE-M-352 SLR-DRE-M-354, Sheet 1 SLR-DRE-M-361 SLR-DRE-M-370 SLR-DRE-M-419, Sheet 2 SLR-DRE-M-4431 SLR-DRE-M-4431A SS-Mech-10 SLR-DRE-M-19 Rev.0 update
2.3.4.3	Main Generator and Auxiliaries System	2.3.4-3, Main Generator and Auxiliaries System Components Subject to Aging Management Review 3.4.2-3, Main Generator and Auxiliaries System Summary of Aging Management Evaluation	8.3.1.1 10.2	SLR-DRE-M-21 SLR-DRE-M-22 SLR-DRE-M-22A SLR-DRE-M-35, Sheet 1 SLR-DRE-M-40 SLR-DRE-M-354, Sheet 2 SLR-DRE-M-355 SLR-DRE-M-355A SLR-DRE-M-366 SLR-DRE-M-370 SLR-DRE-M-5350; Sheets 1 and 3

SLRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
2.3.4.4	Main Steam System	2.3.4-4, Main Steam System Components Subject to Aging Management Review 3.4.2-4, Main Steam System Summary of Aging Management Evaluation	Sections 5.2 5.4 10.3	SLR-DRE-M-12; Sheets 1 and 2 SLR-DRE-M-25 SLR-DRE-M-39 SLR-DRE-M-40 SLR-DRE-M-43, Sheet 2 SLR-DRE-M-345; Sheets 1 and 2 SLR-DRE-M-356 SLR-DRE-M-369 SLR-DRE-M-370 SLR-DRE-M-371, Sheet 2
2.3.4.5	Main Turbine and Auxiliaries System	2.3.4-5, Main Turbine and Auxiliaries System Components Subject to Aging Management Review 3.4.2-5, Main Turbine and Auxiliaries System Summary of Aging Management Evaluation	Sections 7.7.4 10.2 10.4.3 10.4.4	SLR-DRE-M-12, Sheet 2 SLR-DRE-M-13 SLR-DRE-M-15, Sheet 1 SLR-DRE-M-21 SLR-DRE-M-22 SLR-DRE-M-40 SLR-DRE-M-41, Sheet 1 SLR-DRE-M-43, Sheet 1 SLR-DRE-M-345, Sheet 2 SLR-DRE-M-346 SLR-DRE-M-348, Sheet 1 SLR-DRE-M-354, Sheet 1 SLR-DRE-M-355 SLR-DRE-M-370 SLR-DRE-M-371, Sheet 1 SLR-DRE-M-5650; Sheets 1, 2, 4, and 5 SLR-DRE-M-43 Sheet 1 Rev.0 update

<u>Additional Discussion</u>

<u>SLRA Section 2.3.3.8 Fire Protection System</u>

Summary of Technical Information in the Application

The fire protection system (FPS) at DNPS is an integrated complex of components and equipment designed to prevent fire initiation, quickly detect and suppress fires, and contain unmitigated fires to ensure safe shutdown. The fire protection program uses a fire protection defense-in-depth approach to ensure that safe shutdown capability is not impaired by a fire.

The FPS has active and passive features. Its equipment includes fire pumps, underground water mains, hydrants, standpipes, hose stations, sprinklers, wet pipes, pre-action and deluge spray systems, heat or thermal detectors, ionization detectors, photoelectric smoke detectors, portable fire extinguishers, portable breathing apparatus, ventilation system dampers, and associated controls and appurtenances. Total flooding automatic carbon dioxide suppression systems are provided in the auxiliary electric equipment room (AEER), three diesel generator rooms, and diesel day tank rooms. The system in the AEER is arranged for manual operation only; however, all other systems are arranged for automatic actuation with manual capability provided as a backup. Automatic Halon 1301 fire suppression systems are provided in plant areas where other forms of suppression could damage valuable equipment or documents, such as the AEER and computer rooms. Heat and smoke detection is accomplished by the appropriate detectors installed in areas where fire potential exists and, in all areas, containing safety-related equipment. Detection of fire by any smoke or heat detector will activate an audible control room alarm with visual annunciation.

The DNPS FPS uses two automatically controlled diesel-driven fire pumps (one Unit 1 pump and one Unit 2/3 pump). These pumps maintain the required water flow during manual or automatic water suppression system operation.

The passive fire protection features include fire barriers such as doors, dampers, fire-rated enclosures or electric raceway fire barriers, fire stops, fireproofing materials, penetration seals, walls, and slabs. Additionally, ventilation dampers are used to prevent spreading of a fire from one area of the plant to another.

The FPS boundaries for SLR are listed below:

LRBD SLR-DRE-M-23; Sheets 1, 2, 3, 4, and 5, SLR-DRE-M-28, SLR-DRE-M-41, Sheet 2, SLR-DRE-M-42, SLR-DRE-M-269, Sheet 2, SLR-DRE-M-270, SLR-DRE-M-273; Sheets 1 and 2, SLR-DRE-M-359, SLR-DRE-M-375; Sheets 2 and 3, SLR-DRE-M-529, Sheet 2, SLR-DRE-M-787, SLR-DRE-M-936, SLRDRE-M-947, SLR-DRE-M-972, SLR-DRE-M-973, SLR-DRE-M-974, SLR-DRE-M-1305, SLRDRE-M-3121, SLR-DRE-M4204, SLR-DRE-M-4281, SLR-DRE-M-4356: Sheets 1, 2, 3, 4, 5, and 6, provide information identifying the scope of fire systems and components credited for the fire protection program.

The FPS and its components meet the scoping requirements of 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(3). Therefore, they are within the scope of SLR, being passive, long-lived, and subject to an AMR. SLRA Table 2.3.3-8, “Fire Protection System Components Subject to Aging Management Review,” lists the components that require an AMR and their intended function, while SLRA Table 3.3.2-8, “Fire Protection System Summary of Aging Management Evaluation,” provide the results of the AMR.

Staff Evaluation

The NRC staff reviewed the SLRA, as supplemented by letter dated February 20, 2025 (ML25051A253), the initial license renewal of the safety evaluation report NUREG-1796, “Safety Evaluation Report Related to Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2,” October 2004, SLRA boundary drawings, fire hazard analysis reports, and additional fire protection documents listed in the Dresden License Conditions 2.D & 2.E for Unit 2 and 3.G for Units 3. These documents include NRC safety evaluation reports dated March 22, 1978, with supplements dated December 2, 1980, February 12, 1981, January 19, 1983, July 17, 1987, September 28, 1987, and January 5, 1989.

During its review, the NRC staff evaluated the FPS and components described in the SLRA, fire hazard analysis reports, and SLR boundary drawings to verify that CEG included within the scope of SLR all components with intended functions as described in 10 CFR 54.4(a). The NRC staff then reviewed those components CEG identified as within the scope of SLR to verify it included all passive or long-lived components subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

On January 7, 2025, a virtual audit was held with CEG to discuss fire protection scoping and screening. The NRC staff discussed audit breakout questions, interviewed CEG staff, and reviewed documentation provided by CEG.

During the discussion, CEG staff addressed the NRC staff’s questions about whether various fire protection components were within the scope of SLR and subject to an AMR. These components include Halon 1301 storage bottles, pump casing (pressure maintenance jockey pump), filter housing, orifices, standpipe risers, intake traveling screen/trash rack, floor drains for removing firefighting water, station transformer fire suppression, seismic support for standpipe system piping, passive components in the diesel-driven fire pump engine, and both shell-side components and tubes of the heat exchanger components.

CEG staff informed the NRC staff that Halon 1301 storage bottles are now included within the scope of SLR under 10 CFR 54.4(a)(3). Initially misidentified as short-lived components in the SLRA, CEG acknowledged that the bottles are subject to an AMR and included in the SLRA, as supplemented. The External Surfaces Monitoring of Mechanical Components program of the GALL-SLR will inspect the Halon 1301 storage bottles for material loss.

CEG staff indicated that DNPS does not use a jockey pump. Pressure maintenance is provided by the plant service water system. The service water pumps are within the scope of the license SLR and subject to an AMR and identified as Pump Casing (Service Water) in SLRA Table 2.3.3-12.

Additionally, all filter housings in the FPS that meet the criteria of 10 CFR 54.4(a)(2), and 10 CFR 54.4(a)(3) criteria are within the scope of SLR and subject to an AMR.

Orifices in the FPS with throttle intended functions are identified in the SLRA as flow devices, while those without a unique intended function (i.e., throttle) are identified as piping or piping components. All orifices in the FPS that meet the criteria of 10 CFR 54.4(a)(2), and 10 CFR 54.4(a)(3) are within the scope of SLR and subject to an AMR.

Standpipe risers are identified in the SLRA as piping and piping components. All standpipe risers in the FPS meet the criteria of 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3) and are within the scope for SLR and subject to an AMR.

Intake traveling screens, which are in scope for SLR and subject to an AMR, are evaluated in SLRA Section 2.3.3.12, Open Cycle Cooling Water System. Trash racks, also in scope and subject to an AMR, are evaluated in SLRA Section 2.4.4, Crib House.

Intake traveling screens are in scope for SLR and subject to an AMR, are evaluated in the SLRA Section 2.3.3.12, Open Cycle Cooling Water System. The trash racks are also in scope for SLR and subject to an AMR are evaluated in the SLRA Section 2.4.4, Crib House.

Floor drains for removing firefighting water are captured in SLRA Section 2.3.3.13, Plant Drainage System, are in scope of SLR, and are subject to an AMR. The station transformer deluge fire suppression system is within the scope of SLR and subject to an AMR.

Seismic support for standpipes system piping meets the criteria of 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3) and is within the scope of SLR and subject to an AMR, as evaluated in SLRA Section 2.4.2, “Component Support Commodity Group.”

CEG staff stated that passive components in the diesel-driven fire pump engine, heat exchanger (diesel fire water pump cooler) shell side components, and heat exchanger (diesel fire water pump cooler) tubes meet the criteria of 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3).

These components are within the scope of SLR and subject to an AMR and included in the SLRA, as supplemented.

Upon reviewing CEG’s response to the audit breakout question, the NRC staff found that each item in the question was addressed and resolved.

SLRA Table 2.3.3.8 and Table 3.3.2-8, as supplemented, appropriately identified Halon 1301 storage bottles, passive components in the diesel-driven fire pump engine, heat exchanger (diesel fire water pump cooler) shell side components, and heat exchanger (diesel fire pump water pump cooler) tubes as in scope of SLR and subject to AMR.

Conclusion

Based on its review of the SLRA, SLRA boundary drawings, NUREG-1796, fire hazard analysis reports, and other supporting DNPS FPS documents, the NRC staff concludes that DNPS appropriately identified the FPS components within the scope of SLR, as required by 10 CFR 54.4(a). The NRC staff also concludes that DNPS adequately identified the system components subject to an AMR, in accordance with the requirements in 10 CFR 54.21(a)(1).

2.3.3 Conclusion

Based on its review of the SLRA, FSAR, and license renewal boundary drawings, the NRC staff concludes that CEG identified the mechanical SCs within the scope of SLR as required by 10 CFR 54.4. The NRC staff also concludes that CEG identified the system components subject to an AMR, in accordance with the requirements in 10 CFR 54.21(a)(1).

2.4 Scoping and Screening Results: Structures

This section documents the NRC staff's review of CEG's scoping and screening results for structures and structural components. To verify that CEG properly implemented its methodology, the NRC staff focused its review on the implementation results. This focus allowed the NRC staff to confirm that there were no omissions of SCs that meet the scoping criteria and that are subject to an AMR.

The NRC staff's evaluation of the information in the SLRA was the same for all structures and structural components. The objective was to determine whether CEG identified, in accordance with 10 CFR 54.4, structures and structural components that meet the SLR scoping criteria. Similarly, the NRC staff evaluated CEG's screening results to verify that all passive, long-lived SCs are subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

In the scoping evaluation, the NRC staff reviewed the applicable SLRA sections, focusing on components that were not identified as within the scope of SLR. The NRC staff reviewed relevant licensing basis documents, including the UFSAR, for each structure to determine whether CEG omitted from the scope of SLR components with intended functions delineated under 10 CFR 54.4(a). The NRC staff also reviewed the licensing basis documents to determine whether the SLRA specified all intended functions delineated under 10 CFR 54.4(a).

After reviewing the scoping results, the NRC staff evaluated CEG's screening results. For those SCs with intended functions included under 10 CFR 54.4(a), the NRC staff verified that CEG properly screened out either (1) SCs that have functions performed with moving parts or that have a change in configuration or properties or (2) SCs that are subject to replacement after a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). The NRC staff confirmed that CEG included in the AMR those SCs that do not meet either of these criteria, as required by 10 CFR 54.21(a)(1).

2.4.1 Summary of Technical Information in the Application

SLRA Sections 2.4.1 through 2.4.16 describe the SSCs subject to an AMR and the boundaries of the structures. SLRA Tables 2.4-1 through 2.4-16 list the SSC types subject to an AMR and their intended functions. SLRA Tables 3.5.2-1 through 3.5.2-16 provide the results of CEG's AMR for SSCs.

2.4.2 Staff Evaluation

The NRC staff evaluated the system functions described in the SLRA and UFSAR to verify that CEG has included within the scope of SLR all components with intended functions delineated under 10 CFR 54.4(a). The NRC staff then reviewed those components that CEG identified as within the scope of SLR to verify that CEG has included all passive and long-lived components subject to an AMR, in accordance with the requirements of 10 CFR 54.21(a)(1). The documents that the NRC staff reviewed to verify CEG's results are described in the following table.

<table>
<tr><th colspan="5">SLRA Section 2.4, “Scoping and Screening Results: Structures”</th></tr>
<tr><th>SLRA Sections</th><th>SLRA Section Title</th><th colspan="3">Documents Reviewed by Staff</th></tr>
<tr><th colspan="2"></th><th>SLRA Tables</th><th>UFSAR</th><th>SLRA Drawings</th></tr>
<tr><td>2.4.1</td><td>Circulating Water Inlet Tunnel</td><td rowspan="16">Table 3.5.1 and 3.5.2-1 through 3.5.2-16

Table A.5 Item 10, 13, 29 through 34</td><td rowspan="16">FSAR Sections 1.2.1.3, 1.2.2, 1.2.2.2, 1.2.2.4, 1.2.2.10, 1.2.4.4.8, 2.3.3, 2.4.4, 2.4.7, 2.4.8, 2.5.5, 3.3.1.1.2, 3.1.1.3.1, 3.2, 3.2.1, 3.2.2.2, 3.3.2.2.3, 3.3.2.3.1, 3.3.2.3.2, 3.4.1, 3.4.1.2, 3.5.1, 3.5.4, 3.6.1.1.4, 3.6.2.3.1, 3.7.1, 3.7.2.2, 3.7.2.2.1, 3.7.2.3, 3.7.2.4, 3.8.2, 3.8.4, 3.8.4.2, 3.8.4.3, 3.8,4.6, 3.8.5, 3.9.3, 3.10.3, 5.2.3.2.3, 5.4.6, 5.4.6.2, 6.1.1.1, 6.1.2, 6.2.1.2, 6.2.3, 6.2.2.3.2, 6.2.3.2.2, 6.4, 7.2.5, 8.2, 8.2.1.3.1, 8.3.1.6, 8.3.1.8, 8.3.1.8.1.1, 9.1.2.2.3, 9.2.4.2, 9.2.5, 9.2.6, 9.2.6.3, 9.5.4, 9.5.5, 9.5.9, 10.3.4, 11.2.2, 11.3, 11.4.4.3, 12.3.2.2.1, and 12.3.2.2.4.</td><td rowspan="16">SLR-DRE-M-36
SLR-DRE-B-01A
SLR-DRE-M-1A</td></tr>
<tr><td>2.4.2</td><td>Component Supports</td></tr>
<tr><td>2.4.3</td><td>Cooling Water Structures</td></tr>
<tr><td>2.4.4</td><td>Crib Houses</td></tr>
<tr><td>2.4.5</td><td>Diesel Generator & HPCI Building</td></tr>
<tr><td>2.4.6</td><td>Insulation Commodity Group</td></tr>
<tr><td>2.4.7</td><td>Isolation Condenser Pump House</td></tr>
<tr><td>2.4.8</td><td>Main Control Room and Auxiliary Electric Equipment Room</td></tr>
<tr><td>2.4.9</td><td>Primary Containment</td></tr>
<tr><td>2.4.10</td><td>Radwaste Structures</td></tr>
<tr><td>2.4.11</td><td>Reactor Building</td></tr>
<tr><td>2.4.12</td><td>Stacks</td></tr>
<tr><td>2.4.13</td><td>Structural Commodity Group</td></tr>
<tr><td>2.4.14</td><td>Switchyard Structures</td></tr>
<tr><td>2.4.15</td><td>Turbine Building</td></tr>
<tr><td>2.4.16</td><td>Yard Structures</td></tr>
</table>

2.4.3 Conclusion

Based on its review of the SLRA, UFSAR, and license renewal boundary drawings, the NRC staff concludes that CEG appropriately identified the structures and structural components within the scope of SLR, as required by 10 CFR 54.4(a). The NRC staff also concludes that CEG adequately identified the passive, long-lived SCs subject to an AMR in accordance with the requirements in 10 CFR 54.21(a)(1).

2.5 Scoping and Screening Results: Electrical and Instrumentation and Controls

This section documents the NRC staff's review of CEG's scoping and screening results for electrical and I&C systems as described in SLRA Section 2.5 and its subsections. To verify that CEG's methodology is properly implemented, the NRC staff focused its review on the implementation results. This focus allowed the NRC staff to confirm that there were no omissions of electrical and I&C components that meet the scoping criteria and that are subject to an AMR.

The NRC staff's evaluation of the information in the SLRA was the same for all electrical and I&C components. The objective was to determine whether CEG identified, in accordance with 10 CFR 54.4, components that meet the SLR scoping criteria. Similarly, the staff evaluated CEG's screening results to verify that all passive, long-lived SCs are subject to an AMR in accordance with 10 CFR 54.21(a)(1).

In the scoping evaluation, the NRC staff reviewed the applicable SLRA sections, focusing on components that had not been identified as within the scope of SLR. The NRC staff reviewed relevant licensing basis documents, including the UFSAR, for each component to determine whether CEG omitted from the scope of SLR components with intended functions delineated under 10 CFR 54.4(a). The NRC staff also reviewed the licensing basis documents to determine whether the SLRA specified all intended functions delineated under 10 CFR 54.4(a).

After reviewing the scoping results, the NRC staff evaluated CEG's screening results. For those SCs with intended functions included under 10 CFR 54.4(a), the NRC staff verified that CEG properly screened out only: (1) SCs that have functions performed with moving parts or that have a change in configuration or properties, or (2) SCs that are subject to replacement after a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). The NRC staff confirmed in the AMR that CEG only included SCs that do not meet either of these criteria, as required by 10 CFR 54.21(a)(1).

2.5.1 Summary of Technical Information in the Application

SLRA Section 2.5.1 describes the electrical and I&C system components that were evaluated and determined to be subject to an AMR. SLRA Table 2.5.2-1 lists the electrical and I&C system components subject to an AMR and their intended functions. SLRA Table 3.6.2-1 provides the results of CEG's AMR for electrical and I&C system components.

2.5.2 Staff Evaluation

The NRC staff evaluated the system functions described in the SLRA and UFSAR to verify that CEG has included within the scope of SLR all components with intended functions delineated under 10 CFR 54.4(a). The NRC staff then reviewed those components that CEG identified as within the scope of SLR to verify that CEG has included all passive and long-lived components subject to an AMR, in accordance with the requirements of 10 CFR 54.21(a)(1). The documents that the NRC staff reviewed to verify CEG's results are described in the following table.

<table>
<tr><th colspan="5">SLRA Section 2.5, "Scoping and Screening Results: Electrical"</th></tr>
<tr><th>SLRA Section</th><th>SLRA Section Title</th><th colspan="3">Documents Reviewed by Staff</th></tr>
<tr><th colspan="2"></th><th>SLRA Tables</th><th>UFSAR</th><th>SLRA Drawings</th></tr>
<tr><td>2.1.3.1

2.1.4

2.1.5

2.1.6

2.2

2.5</td><td>Scoping for Regulated Events

Interim Staff Guidance Discussion

Scoping Procedure

Screening Procedure

Plant Level Scoping Result

Scoping and Screening Results: Electrical</td><td>Table 2.1-1, Passive Structure and Component Intended Function Definitions

Table 2.2-1, Plant Level Scoping Results

Table 2.5.2-1, Electrical Commodities Components Subject to Aging Management Review</td><td>Chapter 8

Section 9.5.9</td><td>Figure 2.1-2</td></tr>
</table>

2.5.2.1 Components within the Scope of Subsequent License Renewal

Section 54.4(a) of 10 CFR identifies plant systems, structures, and components (SSCs) that perform specific functions within the scope of license renewal. SRP-SLR and Regulatory Guide (RG) 1.188, Rev. 2, provide the guidance on the scoping of electrical and instrumentation and controls (I&C) SSCs based on the license renewal intended functions identified in 10 CFR 54.4(a). SRP-SLR, Section 2.5.2.1.1, “Components Within the Scope of SBO (10 CFR 50.63),” provides the guidance to identify components in the onsite and offsite power systems that are relied upon to meet the requirements of 10 CFR 50.63 (station blackout (SBO) rule) for license renewal, as required by 10 CFR 54.4(a)(3). The electrical components used to meet 10 CFR 50.63 includes electrical components used to cope with and recover from an SBO. The offsite power system for SBO recovery includes the portion that is used to connect the plant to the offsite power source meeting the requirements under 10 CFR 54.4(a)(3).

CEG performed an initial plant-level scoping of the plant’s electrical and I&C systems in accordance with the scoping criteria identified in 10 CFR 54.4(a) using the scoping methodology described in the SLRA, Section 2.1, “Scoping and Screening Methodology.” CEG identified the safety classifications and functions of the electrical and I&C systems and evaluated these systems’ functions against the criteria of 10 CFR 54.4(a)(1), (a)(2), and (a)(3). In SLRA Section 2.1.5.5, “Scoping Boundary Determination,” CEG stated that it used a bounding approach for electrical equipment and that all electrical components within in scope systems were included in the scope of SLR. CEG also stated that electrical and I&C components of in-scope electrical and in scope mechanical systems are consolidated into commodity groups and are screened as commodities.

The results of CEG’s plant-level scoping for electrical and I&C systems are provided in the SLRA Table 2.2-1, “Plant Level Scoping Report Results.” The NRC staff’s evaluation for the plant-level scoping results for the electrical and I&C systems is provided in Section 2.2, “Plant Level Scoping Results,” of this SE.

SLRA Section 2.5.1, “Electrical Systems,” states that in addition to the electrical and I&C systems and components, certain switchyard components are credited to restore offsite power following a station blackout (SBO). SLRA Table 2.2-1 indicates the 345-kilovolts (kV), and 138 kV distribution systems are in-scope of license renewal. In SLRA Section 2.1.3.4, “Scoping for Regulated Events,” CEG describes the in-scope electrical components that are relied upon to recover from an SBO event in accordance with the guidance in the SRP-SLR. The boundary for offsite power restoration following an SBO is shown in SLRA Figure 2.1-2, “Dresden SBO Recovery Power Path.” The recovery path includes circuit breakers that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead circuits between circuit breaker and transformer and between the transformer and onsite electrical distribution system, and the associated control circuits and structures. The in-scope electrical components for recovery from an SBO event include components in the offsite power systems as follows:

> <u>Unit 3 Normal Source of Offsite Power</u> – 345 kV Bus 8, fed by 345 kV breakers BT 8-9, BT 8-15, and BT 4-8 and associated motor operated disconnects and a manual disconnect which feeds reserve auxiliary transformer (RAT) 32 which then feeds 4 kV buses 34 and 33 via 4 kV bus incoming breakers.
>
> <u>Unit 3 Alternate Source of Offsite Power</u> – RAT 22 (Unit 2’s Normal Source RAT) via 4 kV Buses 23 and 24, outgoing and incoming 4 kV breakers to Buses 23-1 and 24-1

respectively, crosstie breakers to 4 kV buses 33-1 and 34-1 respectively, which then feed 4 kV buses 33 and 34, respectively via outgoing and incoming 4 kV breakers.

Unit 2 Normal Source of Offsite Power – 345 kV Bus 3, fed by 345 kV breakers BT 3-4 and BT 2-3 and associated motor operated disconnects which feeds 345 kV / 138 kV transformer 86 via a motor operated disconnect, which then feeds reserve auxiliary transformer (RAT) 22, via a breaker and disconnects, which then feeds 4 kV buses 24 and 23 via 4 kV bus incoming breakers.

Unit 2 Alternate Source of Offsite Power – RAT 32 (Unit 3's Normal Source RAT) via 4 kV Buses 34 and 33, outgoing and incoming 4 kV breakers to Buses 34-1 and 33-1 respectively, crosstie breakers to 4 kV buses 24-1 and 23-1 respectively, which then feed 4 kV buses 24 and 23 respectively via outgoing and incoming 4 kV breakers.

The in-scope electrical components for recovery from an SBO event also include the SBO alternate alternating current source and the onsite standby power source (i.e., the three emergency diesel generators).

The NRC staff reviewed the in-scope electrical systems in the SLRA, and UFSAR Chapter 8, "Electrical Power," and UFSAR Section 9.5.9, "Station Blackout System," to confirm that CEG did not omit any equipment required to comply with 10 CFR 54.4(a) and 10 CFR 50.63 for SLR in accordance with the guidance in SRP-SLR. Based on its review, the NRC staff finds that the electrical components identified in the SLRA for the restoration of offsite power following an SBO event conforms to the guidance in SRP-SLR for meeting 10 CFR 50.63 and are, therefore, acceptable. In addition, because all electrical and I&C components within in-scope systems in SLRA Table 2.2-1 were included within the scope of SLR, the NRC staff has reasonable assurance that CEG has identified the components within the scope of SLR for the electrical and I&C systems.

2.5.2.2 Components Subject to an Aging Management Review

Section 54.21(a)(1) of 10 CFR specifies the requirement to identify structures and components subject to an AMR. SRP-SLR and RG 1.188, Rev. 2, provide the guidance on the screening of electrical and I&C components based on the screening criteria in 10 CFR 54.21(a)(1) and the commodity grouping of components. SRP-SLR Table 2.1-6, "Typical Structures, Components, and Commodity Groups," and 10 CFR 54.21(a)(1)(i), "Determinations for Integrated Plant Assessment," provide typical electrical and I&C component commodity groups that are within the scope of SLR.

CEG's screening methodology for the in-scope electrical and I&C components is described in Section 2.1.6.1, "Identification of Structures and Components Subject to AMR," of the SLRA. CEG used a component commodity group approach, as described in the SRP-SLR and NEI 17-01, as endorsed in RG 1.188, Rev.2, to screen the electrical and I&C components subject to AMR. This screening methodology involved (1) placing the in-scope electrical and I&C components in commodity groups and (2) applying the screening criteria of 10 CFR 54.21(a)(1) to the in-scope electrical and I&C commodity groups to identify passive and long-lived commodity groups that perform/support a license renewal intended function and require an AMR.

In SLRA Section 2.5, CEG stated that the electrical and I&C components for the in-scope systems were assigned to commodity groups based on similar design and/or functional characteristics. CEG also stated that the electrical and I&C commodity groups are based on the listing of SRP-SLR Table 2.1-6. CEG applied the screening criterion of 10 CFR 54.21(a)(1)(i) to the commodity groups to identify those that perform their functions without moving parts or without a change in configuration or properties (i.e., passive). The passive electrical and I&C commodity groups are provided in SLRA, Section 2.5. CEG eliminated passive electrical and I&C commodity groups that did not perform an intended function, which is defined in SLRA Table 2.1-1, “Passive Structure and Component Intended Function Definitions.”

The following electrical components and commodities were identified in SLRA Section 2.5.2.2, “Application of Screening Criterion 10 CFR 54.21(a)(1)(i) to the Electrical Components and Commodities,” as meeting the screening criterion of 10 CFR 54.21(a)(1)(i):

- Cable Connections (Metallic Parts)
- Electrical Penetrations
- Cable Tie Wraps
- Uninsulated Ground Conductors
- Fuse Holders (Not Part of Active Equipment)
- High Voltage Electrical Insulators
- Insulation for Electrical Cables and Connections
- Metal Enclosed Bus
- Switchyard Bus and Connections
- Transmission Conductors
- Transmission Connections
- Passive electrical equipment subject to 10 CFR 50.49 EQ requirements

CEG eliminated cable tie wraps and uninsulated ground conductors from the passive commodity groups because cable tie wraps functionality is not credited during and following design basis events and ground conductors are provided for equipment and personnel protection, and they do not perform an intended function for LR. Based on its review of CEG’s basis UFSAR, the NRC staff confirmed that cable tie wraps and uninsulated ground conductors are not credited in the DNPS design basis and have no requirements associated with them. Therefore, the NRC staff finds it acceptable to eliminate cable tie wraps uninsulated ground conductors from the scope of SLR since they have no license renewal intended function, as described in 10 CFR 54.4.

CEG applied the screening criterion of 10 CFR 54.21(a)(1)(ii) to the remaining passive electrical and I&C component commodity groups to determine those that are long-lived (i.e., not subject to replacement based on a qualified life or specified time period) to be subjected to an AMR. Based on 10 CFR 54.21(a)(1)(ii), CEG excluded from the AMR all electrical and I&C components and commodities included in the Environmental Qualification (EQ) program because these commodities have defined qualified lives and are subject to replacement based on their qualified lives. The NRC staff finds it acceptable to eliminate electrical and I&C components that are included in the EQ Program from the passive, long-lived commodity groups because it is consistent with the requirements of 10 CFR 54.21(a)(1)(ii).

The following electrical and I&C commodities subject to AMR are summarized in SLRA Table 2.5.2-1, “Electrical Commodities Components Subject to Aging Management Review,” along with their associated component intended functions:

- Cable Connections (Metallic Parts) – Electrical Continuity
- Electrical Insulation for Electrical Cables and Connections – Insulate (Electrical)
- Fuse Holders (not part of active equipment) – Insulate (Electrical), Electrical Continuity
- High Voltage Electrical Insulators – Insulate (Electrical)
- Metal Enclosed Bus – Electrical Continuity, Insulate (Electrical), Shelter, Protection
- Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors – Electrical Continuity

The NRC staff reviewed the above list of components and commodity groups in SLRA Section 2.5.1 to verify that CEG did not omit any passive and long-lived components that meet the screening criteria of 10 CFR 54.21(a)(1). Based on its review, the NRC staff finds that the DNPS electrical and I&C component commodity groups subject to an AMR are consistent with the guidance in SRP-SLR Table 2.1-6 and meet the criteria in 10 CFR 54.21(a)(1)(i) and 10 CFR 54.21(a)(1)(ii). Therefore, the NRC staff concludes that there is reasonable assurance that CEG has identified the electrical and I&C components subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.5.3 Conclusion

Based on its evaluation in SE Section 2.5.2 and its review of the SLRA and UFSAR, the NRC staff concludes that CEG appropriately identified the electrical and I&C system components within the scope of SLR as required by 10 CFR 54.4(a). The NRC staff also concludes that CEG identified the components subject to an AMR in accordance with the requirements in 10 CFR 54.21(a)(1).

2.6 Conclusion for Scoping and Screening

Based on its review of the information in SLRA Section 2.0, the NRC staff determined that CEG’s scoping and screening methodology is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

Furthermore, the NRC staff found that CEG adequately identified those SSCs that are within the scope of SLR, as required by 10 CFR 54.4(a), and SCs subject to an AMR, as required by 10 CFR 54.21(a)(1).

SECTION 3 AGING MANAGEMENT REVIEW RESULTS

This section of the safety evaluation (SE) contains the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's evaluation of the Constellation Energy Generation, LLC (CEG or the applicant), aging management reviews (AMRs) and aging management programs (AMPs) for Dresden Nuclear Power Station (Dresden or DNPS), Units 2 and 3.

The applicant described these AMRs and AMPs in its subsequent license renewal application (SLRA) for Dresden, Units 2 and 3. SLRA Section 3 provides the results of the applicant's AMRs for those structures and components (SCs) identified in SLRA Section 2 as within the scope of subsequent license renewal (SLR) and subject to an AMR. SLRA Appendix B lists the 45 AMPs that the applicant will rely on to manage or monitor the aging of passive, long-lived SCs.

The NRC staff evaluated the applicant's AMRs for in-scope components subject to an AMR, as grouped into the following six SC categories:

(1) reactor vessel, internals, and reactor coolant system (SE Section 3.1)

(2) engineered safety features (SE Section 3.2)

(3) auxiliary systems (SE Section 3.3)

(4) steam and power conversion systems (SE Section 3.4)

(5) containments, structures, and component (SSC) supports (SE Section 3.5)

(6) electrical and instrumentation and controls (SE Section 3.6)

3.0 Applicant's Use of the Generic Aging Lessons Learned for Subsequent License Renewal Report

In preparing its SLRA, the applicant credited NUREG-2191, Revision 0, *Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report*, issued July 2017 (ADAMS Accession Nos. ML17187A031 and ML17187A204) (GALL-SLR Report) for programs and AMR items as modified by the following:

- SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the Subsequent License Renewal Guidance," issued February 2021 (ML20181A395)
- SLR-ISG-2021-02-MECHANICAL, "Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance," issued February 2021 (ML20181A434)
- SLR-ISG-2021-03-STRUCTURES, "Updated Aging Management Criteria for Structures Portions of Subsequent License Renewal Guidance," issued February 2021 (ML20181A381)
- SLR-ISG-2021-01-PWRVI, "Updated Aging Management Criteria for Reactor Vessel Internal Components for Pressurized-Water Reactors," issued January 2021 (ML20217L203)

As stated in Title 10 of the Code of Federal Regulations (10 CFR) 54.29(a)(1), the NRC may issue a renewed license if the agency finds that actions have been identified and have been or will be taken to manage the effects of aging during the period of extended operation on the functionality of SCs that have been identified to require review under 10 CFR 54.21(a)(1). The GALL-SLR Report provides summaries of generic AMPs that the staff has determined would be adequate to manage the effects of aging on related SCs subject to an AMR. The GALL-SLR Report identifies the following AMPs:

- SSCs
- SC materials
- environments to which the SCs are exposed
- aging effects associated with the material and environment combinations
- AMPs credited with managing or monitoring these aging effects
- recommendations for further evaluation of combinations of certain materials, environments, and aging effects

3.0.1 Format of the Subsequent License Renewal Application

The applicant submitted an application based on the guidance in NUREG-2192, Revision 0, *Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants*, issued July 2017 (ML17188A158) (SRP-SLR), and the guidance provided by Nuclear Energy Institute (NEI) 17-01, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 for Subsequent License Renewal*, issued December 2017 (ML17339A599). The NRC endorsed this NEI report as acceptable for use in performing AMRs and drafting SLRAs in NRC RG 1.188, Revision 2, “Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses,” issued April 2020 (ML20017A265).

The organization of SLRA Section 3 follows the recommendations in NEI 17-01 and parallels the section structure of SRP-SLR Chapter 3. SLRA Section 3 presents the results of the applicant’s AMRs in the following two table types:

(1) Table 1s: Table 3.x.1, where “3” indicates the SLRA section number, “x” indicates the subsection number from the GALL-SLR Report, and “1” indicates that this is the first table type in SLRA Section 3

(2) Table 2s: Table 3.x.2-y, where “3” indicates the SLRA section number, “x” indicates the subsection number from the GALL-SLR Report, “2” indicates that this is the second table type in SLRA Section 3, and “y” indicates the table number for a specific system

In its Table 1s, the applicant summarized the alignment between the AMR results and the GALL-SLR Report AMR items. The applicant included a “discussion” column to document whether each of the AMR summary items in the Table 1s is (1) consistent with the GALL-SLR Report, (2) consistent with the GALL-SLR Report but uses a different AMP to manage aging effects, or (3) is not applicable at Dresden, Units 2 and 3. Each Table 1 item summarizes how Table 2 items with similar materials, environments, and aging mechanisms compare to the GALL-SLR Report, and how they will be managed for aging.

In its Table 2s, the applicant provided the detailed results of the AMR for those SCs identified in SLRA Section 2 as being subject to an AMR. Table 2 includes a column linking each AMR item to the associated Table 1 summary item.

3.0.2 Staff's Review Process

The staff conducted the following three types of evaluations of the AMR items and the AMPs listed in SLRA Section 3 and Appendix B that are credited for managing the effects of aging:

(1) For items that the applicant stated are consistent with the GALL-SLR Report, the staff conducted either an audit or a technical review to determine consistency. Because GALL-SLR Report AMPs and AMR analyses are an acceptable method for managing the effects of aging, the staff did not reevaluate those AMPs and AMRs that were determined to be consistent with the GALL-SLR Report.

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

(3) The SRP-SLR states that an applicant may take one or more exceptions to specific GALL-SLR Report AMP elements; however, any exception to the GALL-SLR Report AMP should be described and justified. Therefore, the staff considers exceptions as being part of the GALL-SLR Report AMP that the applicant does not intend to implement.

For all other items, such as plant-specific AMPs and AMR items that do not correspond to items in the GALL-SLR Report, the staff conducted a technical review to determine if the findings in 10 CFR 54.29(a)(1) are met.

As part of its SLRA review, the staff conducted a regulatory audit from June 17, 2024, to March 14, 2025, in accordance with the audit plan dated June 18, 2024 (ML24138A181) and as detailed in the audit report dated June 12, 2025 (ML25126A252).

These audits and technical reviews were conducted to determine if the staff can make the findings of 10 CFR 54.29(a)(1) such that there is reasonable assurance that activities authorized by the subsequent renewed licenses will continue to be conducted in accordance with the current licensing basis (CLB); that is, if the applicant has taken or will be taking actions to manage the effects of aging during the period of extended operation on the functionality of SCs that it has identified as requiring review under 10 CFR 54.21(a)(1).

3.0.2.1 Review of Aging Management Programs

For those AMPs that the applicant asserted are consistent with the GALL-SLR Report AMPs, the staff conducted either an audit or a technical review to confirm this assertion. For each AMP that has one or more deviations, the staff evaluated each deviation to determine whether it is acceptable and whether the AMP, as modified, could adequately manage the aging effect(s) for which it was credited. For AMPs that are not addressed in the GALL-SLR Report, the staff performed a full review to determine their adequacy. The staff evaluated the AMPs against the 10 program elements defined in Table A.1-1 of the SRP-SLR:

In addition, the ongoing review of both plant-specific and industry operating experience (OE), including relevant research and development, ensures that the AMP is effective in managing the aging effects for which it is credited. The AMP is either enhanced or new AMPs are developed, as appropriate, when it is determined through the evaluation of OE that the effects of aging may not be adequately managed.

Details of the staff's audit evaluation of program elements 1 through 6 and 10 are documented in the audit report and summarized in SE Section 3.0.3. Portions of program element 10 are also documented in SE Section 3.0.5. The staff's evaluation of the quality assurance (QA) program, including an assessment of program elements 7,8, and 9, is documented in SE Section 3.0.4.

3.0.2.2 Review of Aging Management Review Results

Each SLRA Table 2 contains information concerning whether the AMRs identified by the applicant align with the GALL-SLR Report AMRs. For a given AMR in a Table 2, the staff reviewed the intended function, material, environment, aging effect requiring management, and AMP combination for a particular system component type. Item numbers in column seven, "NUREG-2191 Item," of each SLRA Table 2 correlate to an AMR combination identified in the GALL-SLR Report. The staff also conducted a technical review of combinations not consistent with the GALL-SLR Report. Column eight, "Table 1 Item," in each SLRA Table 2 refers to a number indicating the correlating row in Table 1.

For component groups evaluated in the GALL-SLR Report for which the applicant claimed consistency and for which the GALL-SLR Report does not recommend further evaluation, the staff determined, on the basis of its review, whether the plant-specific components of these GALL-SLR Report component groups were bounded by the GALL-SLR Report evaluation.

The applicant noted for each AMR item how the information in the tables aligns with the information in the GALL-SLR Report. The staff audited those AMRs with notes A through E, indicating how the AMR is consistent with the GALL-SLR Report.

- Note A indicates that the AMR item is consistent with the GALL-SLR Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the GALL-SLR Report AMP. The staff audited these items to verify consistency with the GALL-SLR Report and to confirm the validity of the AMR for the site-specific conditions. The staff also determined whether the applicant's AMP is consistent with the GALL-SLR Report AMP.
- Note B indicates that the AMR item is consistent with the GALL-SLR Report for component, material, environment, and aging effect. However, the AMP takes one or more exceptions to the GALL-SLR Report AMP. The staff audited these AMR items to verify consistency with the GALL-SLR Report and to confirm the validity of the AMR for the site-specific conditions. The staff also confirmed that it reviewed and accepted the identified exceptions to the GALL-SLR Report AMPs.
- Note C indicates that the component for the AMR item is different than that in the GALL-SLR Report but that the item is otherwise consistent with the GALL-SLR Report for material, environment, and aging effect. In addition, the AMP is consistent with the GALL-SLR Report AMP. This note indicates that the applicant was unable to find an AMR item associated with the component in the GALL-SLR Report but found a different component with the same material, environment, aging effect, and AMP as the component under review. The staff audited these AMR items to verify consistency with the GALL-SLR Report and to confirm the validity of the AMR for the site-specific conditions. The staff also determined whether the AMR item of the different component is applicable to the component under review and whether the AMR is valid for the site-specific conditions. Finally, the staff determined whether the applicant's AMP is consistent with the GALL-SLR Report AMP.

- Note D indicates that the component for the AMR item is different than that in the GALL-SLR Report but that the item is otherwise consistent with the GALL-SLR Report for material, environment, and aging effect. In addition, the AMP takes one or more exceptions to the GALL-SLR Report AMP. Like note C, this note indicates that the applicant was unable to find an AMR item associated with the component in the GALL-SLR Report but found a different component with the same material, environment, aging effect, and AMP as the component under review. However, note D is used to indicate that the applicant has taken one or more exceptions to the GALL-SLR Report AMP. The staff audited these items to verify consistency with the GALL-SLR Report and to confirm the validity of the AMR for the site-specific conditions. The staff also determined whether the AMR item of the different component is applicable to the component under review and whether the AMR is valid for the site-specific conditions. Finally, the staff confirmed that it had reviewed and accepted the identified exceptions to the GALL-SLR Report AMPs.
- Note E indicates that the AMR item is consistent with the GALL-SLR Report for material, environment, and aging effect but that a different AMP is credited or the GALL-SLR Report identifies a plant-specific AMP. The staff audited these items to verify consistency with the GALL-SLR Report and to confirm the validity of the AMR for the site-specific conditions. The staff also determined whether the credited AMP would adequately manage the aging effect(s).

3.0.2.3 Updated Final Safety Analysis Report Supplement

In 10 CFR 54.21(d), the NRC requires that each application include an updated final safety analysis report (UFSAR) supplement for the facility that must contain a summary description of the programs and activities for managing the effects of aging and the evaluation of time-limited aging analyses for the period of extended operation determined by the integrated plant assessment and the evaluation of time-limited aging analyses, respectively. Consistent with the SRP-SLR, the staff reviewed the UFSAR supplement.

3.0.2.4 Documentation and Documents Reviewed

In performing its review, the staff used the SLRA, SLRA supplements, SRP-SLR, GALL-SLR Report, and the applicant’s responses to requests for additional information (RAIs).

During the regulatory audit, the NRC staff examined the applicant’s justifications, as documented in the audit report, to verify that the applicant’s activities and programs are adequate to 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

SE Table 3.0-1 below presents the AMPs credited by the applicant and described in SLRA Appendix B, “Aging Management Programs.” The table also indicates (1) whether the AMP is an existing or new program, (2) the staff’s final disposition of the AMP, (3) the GALL-SLR Report program to which the applicant’s AMP was compared, and (4) the SE section that documents the staff’s evaluation of the program.

Table 3.0-1 Dresden, Units 2 and 3, Aging Management Programs

Dresden, Units 2 and 3, Aging Management Program	SLRA Section(s)	New or Existing Aging Management Program	Final Comparison to the NUREG-2191 GALL-SLR Report	Corresponding Aging Management Program in the GALL-SLR Report	Corresponding Section in This Safety Evaluation
ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	A.2.1.1 B.2.1.1	Existing	Consistent	XI.M1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	3.0.3.1.1
Water Chemistry	A.2.1.2 B.2.1.2	Existing	Consistent with exception	XI.M2 Water Chemistry	3.0.3.2.1
Reactor Head Closure Stud Bolting	A.2.1.3 B.2.1.3	Existing	Consistent	XI.M3 Reactor Head Closure Stud Bolting	3.0.3.1.2
BWR Vessel ID Attachment Welds	A.2.1.4 B.2.1.4	Existing	Consistent with exception	XI.M4 BWR Vessel ID Attachment Welds	3.0.3.2.2
BWR Stress Corrosion Cracking	A.2.1.5 B.2.1.5	Existing	Consistent	XI.M7 BWR Stress Corrosion Cracking	3.0.3.1.3
BWR Penetrations	A.2.1.6 B.2.1.6	Existing	Consistent	XI.M8 BWR Penetrations	3.0.3.1.4
BWR Vessel Internals	A.2.1.7 B.2.1.7	New	Consistent with enhancement	XI.M9 BWR Vessel Internals	3.0.3.2.3
Thermal Aging Embrittlement of Cast Austenitic Stainless Steel	A.2.1.8 B.2.1.8	Existing	Consistent	XI.M12 Thermal Aging Embrittlement of Cast Austenitic Stainless Steel	3.0.3.1.5
Flow-Accelerated Corrosion	A.2.1.9 B.2.1.9	Existing	Consistent with enhancement	XI.M17 Flow-Accelerated Corrosion	3.0.3.2.4
Bolting Integrity	A.2.1.10 B.2.1.10	Existing	Consistent with exception and enhancements	XI.M18 Bolting Integrity	3.0.3.2.5
Open-Cycle Cooling Water System	A.2.1.11 B.2.1.11	Existing	Consistent with enhancement	XI.M20 Open-Cycle Cooling Water System	3.0.3.2.6
Closed Treated Water Systems	A.2.1.12 B.2.1.12	Existing	Consistent with enhancement	XI.M21A Closed Treated Water Systems	3.0.3.2.7
Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	A.2.1.13 B.2.1.13	Existing	Consistent	XI.M23 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	3.0.3.1.6
Compressed Air Monitoring	A.2.1.14 B.2.1.14	Existing	Consistent with exception and enhancement	XI.M24 Compressed Air Monitoring	3.0.3.2.8
Fire Protection	A.2.1.15 B.2.1.15	Existing	Consistent	XI.M26 Fire Protection	3.0.3.1.7
Fire Water System	A.2.1.16 B.2.1.16	Existing	Consistent with exceptions and enhancements	XI.M27 Fire Water System	3.0.3.2.9

Dresden, Units 2 and 3, Aging Management Program	SLRA Section(s)	New or Existing Aging Management Program	Final Comparison to the NUREG-2191 GALL-SLR Report	Corresponding Aging Management Program in the GALL-SLR Report	Corresponding Section in This Safety Evaluation
Outdoor and Large Atmospheric Metallic Storage Tanks	A.2.1.17 B.2.1.17	Existing	Consistent with enhancements	XI.M29 Outdoor and Large Atmospheric Metallic Storage Tanks	3.0.3.2.10
Fuel Oil Chemistry	A.2.1.18 B.2.1.18	Existing	Consistent with enhancements	XI.M30 Fuel Oil Chemistry	3.0.3.2.11
Reactor Vessel Material Surveillance	A.2.1.19 B.2.1.19	Existing	Consistent with enhancement	XI.M31 Reactor Vessel Material Surveillance	3.0.3.2.12
One-Time Inspection	A.2.1.20 B.2.1.20	New	Consistent	XI.M32 One-Time Inspection	3.0.3.1.8
Selective Leaching	A.2.1.21 B.2.1.21	New	Consistent with exception	XI.M33 Selective Leaching	3.0.3.2.13
ASME Code Class 1 Small-Bore Piping	A.2.1.22 B.2.1.22	New	Consistent	XI.M35 ASME Code Class 1 Small-Bore Piping	3.0.3.1.9
External Surfaces Monitoring of Mechanical Components	A.2.1.23 B.2.1.23	New	Consistent	XI.M36 External Surfaces Monitoring of Mechanical Components	3.0.3.1.10
Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	A.2.1.24 B.2.1.24	New	Consistent	XI.M38 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	3.0.3.1.11
Lubricating Oil Analysis	A.2.1.25 B.2.1.25	New	Consistent	XI.M39 Lubricating Oil Analysis	3.0.3.1.12
Monitoring of Neutron-Absorbing Materials Other than Boraflex	A.2.1.26 B.2.1.26	Existing	Consistent with enhancement	XI.M40 Monitoring of Neutron-Absorbing Materials Other than Boraflex	3.0.3.1.14
Buried and Underground Piping and Tanks	A.2.1.27 B.2.1.27	Existing	Consistent with exception and enhancements	XI.M41 Buried and Underground Piping and Tanks	3.0.3.2.15
Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks	A.2.1.28 B.2.1.28	New	Consistent	XI.M42 Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks	3.0.3.1.13
ASME Section XI, Subsection IWE	A.2.1.29 B.2.1.29	Existing	Consistent with exception and enhancements	XI.S1 ASME Section XI, Subsection IWE	3.0.3.2.16
ASME Section XI, Subsection IWF	A.2.1.30 B.2.1.30	Existing	Consistent with enhancements	XI.S3 ASME Section XI, Subsection IWF	3.0.3.2.17
10 CFR Part 50, Appendix J	A.2.1.31 B.2.1.31	Existing	Consistent	XI.S4 10 CFR Part 50, Appendix J	3.0.3.1.14
Masonry Walls	A.2.1.32 B.2.1.32	Existing	Consistent	XI.S5 Masonry Walls	3.0.3.1.15

Dresden, Units 2 and 3, Aging Management Program	SLRA Section(s)	New or Existing Aging Management Program	Final Comparison to the NUREG-2191 GALL-SLR Report	Corresponding Aging Management Program in the GALL-SLR Report	Corresponding Section in This Safety Evaluation
Structures Monitoring	A.2.1.33 B.2.1.33	Existing	Consistent with enhancements	XI.S6 Structures Monitoring	3.0.3.2.18
RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	A.2.1.34 B.2.1.34	Existing	Consistent with enhancements	XI.S7 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	3.0.3.2.19
Protective Coating Monitoring and Maintenance Program	A.2.1.35 B.2.1.35	Existing	Consistent	XI.S8 Protective Coating Monitoring and Maintenance Program	3.0.3.1.16
Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.1.36 B.2.1.36	Existing	Consistent with enhancements	XI.E1 Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	3.0.3.2.20
Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	A.2.1.37 B.2.1.37	Existing	Consistent	XI.E2 Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	3.0.3.1.17
Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.1.38 B.2.1.38	Existing	Consistent with enhancements	XI.E3A Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	3.0.3.2.21
Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.1.39 B.2.1.39	New	Consistent	XI.E3B Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	3.0.3.1.18

Dresden, Units 2 and 3, Aging Management Program	SLRA Section(s)	New or Existing Aging Management Program	Final Comparison to the NUREG-2191 GALL-SLR Report	Corresponding Aging Management Program in the GALL-SLR Report	Corresponding Section in This Safety Evaluation
Electrical Insulation for Inaccessible Low- Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.1.40 B.2.1.40	New	Consistent with exception	XI.E3C Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	3.0.3.2.22
Metal Enclosed Bus	A.2.1.41 B.2.1.41	Existing	Consistent with enhancement	XI.E4 Metal Enclosed Bus	3.0.3.2.23
Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.1.42 B.2.1.42	New	Consistent	XI.E6 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	3.0.3.1.19
Fatigue Monitoring	A.3.1.1 B.3.1.1	Existing	Consistent with enhancements	X.M1 Fatigue Monitoring	3.0.3.2.24
Neutron Fluence Monitoring	A.3.1.2 B.3.1.2	Existing	Consistent	X.M2 Neutron Fluence Monitoring	3.0.3.1.20
Environmental Qualification of Electric Equipment	A.3.1.3 B.3.1.3	Existing	Consistent with enhancement	X.E1 Environmental Qualification of Electric Equipment	3.0.3.2.25

3.0.3.1 Aging Management Programs Consistent with the GALL-SLR Report

SE Table 3-1 above identifies those AMPs the applicant identified as consistent with the GALL-SLR Report in SLRA Appendix B, as amended by letter dated February 20, 2025.

In the following sections, the staff discusses the results of the evaluation for these AMPs. The discussion includes amendments to the programs during the review, a summary of the staff's determination of consistency, RAIs and applicant responses, OE, and a review of the applicant's UFSAR supplement summary of the program.

3.0.3.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

SLRA Section B.2.1.1 describes the existing ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program as consistent with GALL-SLR Report AMP XI.M1 "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M1.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M1.

Operating Experience. SLRA Section B.2.1.1 summarizes OE related to the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify any age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMP to manage the effects of aging during the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.1 provides the UFSAR supplement for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-SLR Report Table XI-01. The staff also noted that the applicant committed to the ongoing implementation of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. 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 subsequent 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 Reactor Head Closure Stud Bolting

SLRA Section B.2.1.3 describes the existing Reactor Head Closure Stud Bolting AMP as consistent with GALL-SLR Report AMP XI.M3, "Reactor Head Closure Stud Bolting."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M3.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements are consistent with the corresponding program elements of GALL-LR Report AMP XI.M3.

Operating Experience. SLRA Section B.2.1.3 summarizes OE related to the Reactor Head Closure Stud Bolting AMP. The staff reviewed OE information in the application and during the audit. As discussed in the audit report for the OE, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Reactor Head Closure Stud Bolting AMP was evaluated.

UFSAR Supplement. SLRA Section A.2.1.3 provides the UFSAR supplement for the Reactor Head Closure Stud Bolting Aging Management Program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-SLR Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Reactor Head Closure Stud Bolting AMP for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Reactor Head Closure Stud Bolting AMP, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. 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 subsequent 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 BWR Stress Corrosion Cracking

SLRA Section B.2.1.5 describes the existing BWR Stress Corrosion Cracking program as consistent with GALL-SLR Report AMP XI.M7, "BWR Stress Corrosion Cracking."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M7.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP XI.M7.

Operating Experience. SLRA Section B.2.1.5 summarizes OE related to the BWR Stress Corrosion Cracking program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMP to manage the effects of aging during the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the BWR Stress Corrosion Cracking program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.5 provides the UFSAR supplement for the BWR Stress Corrosion Cracking program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the BWR Stress Corrosion Cracking program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's BWR Stress Corrosion Cracking program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR report are consistent. 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 subsequent 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 BWR Penetrations

SLRA Section B.2.1.6 describes the existing BWR Penetrations program as consistent with GALL-SLR Report AMP XI.M8, "BWR Penetrations."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M8.

The staff noted that the applicant is implementing normal water chemistry at DNPS. Regarding the weld inspection criteria for the penetrations, the applicant is implementing the NRC-approved BWRVIP-27-A, "BWR Standby Liquid Control (SLC) System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines"; BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines"; and BWRVIP-49-A, "Instrument Penetration Inspection and Flaw Evaluation Guidelines."

The applicant stated that in the BWR instrumentation penetrations, control rod drive housing and incore-monitoring housing penetrations, and the SLC/core plate differential pressure (ΔP) nozzle, no leakage or cracking was identified, on either Unit 2 or Unit 3, during the system inspections. Inspections of the Unit 2 and 3 SLC/Core Plate ΔP safe end and nozzle were performed every refueling outage, and no relevant indications were revealed. In addition to the periodic inspections of the penetrations, the applicant's corrective action, trending, and monitoring activities provide reasonable assurance that if any emerging aging degradation were to be detected, the corrective actions would be expected to resolve the issue in a timely manner. The staff finds that the use of the inspection criteria specified in the staff-approved BWRVIP reports provides reasonable assurance that aging effects due to stress corrosion cracking and cyclic loading in the penetrations at DNPS Unit 2 and Unit 3 are being managed.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria” and “corrective actions” program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M8.

Operating Experience. SLRA Section B.2.1.6 summarizes OE related to the BWR Penetrations program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the BWR Penetrations program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.6 provides the UFSAR supplement for the BWR Penetrations program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing BWR Penetrations program for managing the effects of aging for applicable components during the period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s BWR Penetrations program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Thermal Aging Embrittlement of Cast Austenitic Stainless Steel

SLRA Section B.2.1.8 describes the new Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program as consistent with GALL-SLR Report AMP XI.M12 “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS).”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M12. For the “detection of aging effects,” the applicant described that an enhanced visual inspection and/or a qualified ultrasonic testing to monitor cracking in the susceptible CASS components will be used during the subsequent period of extended operation.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria” and “corrective actions” program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M12. The staff finds that the AMP is adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.8 summarizes OE related to the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS). The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.8 provides the UFSAR supplement for the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-SLR Table XI-01. The staff also noted the applicant committed to implementing the new Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program not later than 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

SLRA Section B.2.1.13, as amended by letter dated February 20, 2025 (ML25051A253) describes the existing Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program as consistent with GALL-SLR Report AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems." The applicant.

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M23.

Based on its review of the SLRA and amendment, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," “monitoring and trending,” “acceptance criteria” and “corrective actions” program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M23.

Operating Experience. SLRA Section B.2.1.13 summarizes OE related to the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.13 provides the UFSAR supplement for the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Fire Protection

SLRA Section B.2.1.15, as amended this SLRA section by letter dated February 20, 2025, states that the Fire Protection program is an existing program that will be consistent with the program elements in the GALL-SLR Report AMP XI.M26, “Fire Protection.” The application is consistent with SLR-ISG-2021-02-MECHANICAL, “Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance” (ML20181A434), for cementitious coatings, silicates, and subliming compounds used as fireproofing/fire barriers.

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of the GALL-SLR Report AMP XI.M26, as modified by SLRISG202102MECHANICAL.

Based on its review of the SLRA and amendment, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” "monitoring and trending," "acceptance criteria," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of the GALL-SLR Report AMP XI.M26, as modified by SLR-ISG-2021-02-MECHANICAL.

Operating Experience. SLRA Section B.2.1.15 summarizes OE related to the Fire Protection AMP. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Fire Protection AMP was evaluated.

UFSAR Supplement. SLRA Section A.2.1.15, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the Fire Protection AMP. The staff reviewed the UFSAR supplement descriptions of the program and noted that they are consistent with the recommended description in the GALL-SLR Report Table XI-01. The staff also noted that, in SLRA Table A.5, that the applicant committed to continue using the existing Fire Protection AMP. The staff finds that the information in the UFSAR supplement provides an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Fire Protection AMP, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 One-Time Inspection

SLRA Section B.2.1.20 describes the new One-Time Inspection program as consistent with GALL-SLR Report AMP XI.M32, "One-Time Inspection."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program element(s) of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M32.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M32.

Operating Experience. SLRA Section B.2.1.20 summarizes OE related to the One-Time Inspection program. The staff reviewed OE information in the application and during the audit.

As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the One-Time Inspection was evaluated.

UFSAR Supplement. SLRA Section A.2.1.20 provides the UFSAR supplement for the One-Time Inspection program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI.M32. The staff also noted the applicant committed to implement the new One-Time Inspection program no later than 6 months prior to the subsequent period of extended operation. Inspections will be completed within 10 years prior to the subsequent period of extended operation and no later than the last refueling outage prior to the subsequent period of extended operation for managing the effects of aging for applicable components. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's One-Time Inspection program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 ASME Code Class 1 Small-Bore Piping

SLRA Section B.2.1.22, as amended by letter dated February 20, 2025, describes the new ASME Code Class 1 Small-Bore Piping program as consistent with GALL-SLR Report AMP XI.M35, "ASME Code Class 1 Small-Bore Piping."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program element(s) of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M35.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M35.

Operating Experience. SLRA Section B.2.1.22 summarizes OE related to the ASME Code Class 1 Small-Bore Piping program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMP to manage the effects of aging during the period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the ASME Code Class 1 Small-Bore Piping program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.22 provides the UFSAR supplement for the ASME Code Class 1 Small-Bore Piping program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-SLR Table XI-01. The staff also noted that the applicant committed to implementing the ASME Code Class 1 Small-Bore Piping program for managing the effects of aging for applicable components prior to the start of the period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's ASME Code Class 1 Small-Bore Piping program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. 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 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).

3.0.3.1.10 External Surfaces Monitoring of Mechanical Components

SLRA Section B.2.1.23, as amended by letter dated February 20, 2025, describes the new External Surfaces Monitoring of Mechanical Components program as consistent with GALL-SLR Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M36.

Based on its review of the SLRA and amendments, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M36.

Operating Experience. SLRA Section B.2.1.23 summarizes OE related to the External Surfaces Monitoring of Mechanical Components program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the External Surfaces Monitoring of Mechanical Components program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.23 provides the UFSAR supplement for the External Surfaces Monitoring of Mechanical Components program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted the applicant committed to implementing the new External Surfaces Monitoring of Mechanical Components program no later than 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's External Surfaces Monitoring of Mechanical Components program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. 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 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).

3.0.3.1.11 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

SLRA Section B.2.1.24, as amended by letter dated February 20, 2025, describes the new Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program as consistent with GALL-SLR Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program element(s) of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M38.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M38.

Operating Experience. SLRA Section B.2.1.24 summarizes OE related to the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.24 provides the UFSAR supplement for the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted the applicant committed to implementing the new Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program no later than 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. 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 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).

3.0.3.1.12 Lubricating Oil Analysis

SLRA Section B.2.1.25 describes the existing Lubricating Oil Analysis as consistent with GALL-SLR Report AMP XI.M39, "Lubricating Oil Analysis."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M39.

Based on its review of the SLRA and amendments, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M39.

Operating Experience. SLRA Section B.2.1.25 summarizes OE related to the Lubricating Oil Analysis program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Lubricating Oil Analysis program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.25 provides the UFSAR supplement for the Lubricating Oil Analysis program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table SRP-SLR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Lubricating Oil Analysis program for managing the effects of aging for applicable components during the period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Lubricating Oil Analysis program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.13 Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks

SLRA Section B.2.1.28 describes the new Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks Aging Management Program as consistent with GALL-SLR Report AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks," as modified by SLR-ISG-2021-02-MECHANICAL, "Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M42.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M42.

Operating Experience. SLRA Section B.2.1.28 summarizes OE related to the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks Aging Management Program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks Aging Management Program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.28 provides the UFSAR supplement for the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks Aging Management Program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted the applicant committed to implementing the new Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks

Aging Management Program no later than 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components. In addition, the staff noted that the applicant committed to completing the inspections that are required to be completed prior to the subsequent period of extended operation within 10 years prior to the subsequent period of extended operation, and no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks Aging Management Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. 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 subsequent 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).

3.0.3.1.14 10 CFR Part 50, Appendix J

SLRA Section B2.1.31 describes the existing 10 CFR Part 50, Appendix J Program as consistent with GALL-SLR Report AMP XI.S4, “10 CFR Part 50, Appendix J.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program element(s) of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.S4.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria” and “corrective actions” program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.S4.

Operating Experience. SLRA Section B2.1.31 summarizes OE related to the 10 CFR Part 50, Appendix J Program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the 10 CFR Part 50, Appendix J program was evaluated.

UFSAR Supplement. SLRA Section A1.31 provides the UFSAR supplement for the 10 CFR Part 50, Appendix J Program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing 10 CFR Part 50, Appendix J Program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's 10 CFR Part 50, Appendix J Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.15 Masonry Walls

SLRA Section B.2.1.32 describes the Masonry Wall Aging Management Program as consistent with GALL-SLR- Report AMP XI.S5 "Masonry Walls."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program element(s) of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.S5.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.S5.

Operating Experience. SLRA Section B.2.1.32 summarizes OE related to the Masonry Walls Aging Management Program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Masonry Walls Aging Management Program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.32 provides the UFSAR supplement for the Masonry Walls Aging Management Program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table X-01. The staff also noted that the applicant committed to ongoing implementation of the existing Masonry Walls Aging Management Program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Masonry Walls Aging Management Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.16 Protective Coating Monitoring and Maintenance Program

The SLRA states that AMP B.2.1.35, "Protective Coating Monitoring and Maintenance," is an existing program that is consistent with NUREG-2191, Section XI.S8, Protective Coating Monitoring and Maintenance as modified by SLR-ISG-Structures-2021-03-STRUCTURES, "Updated Aging Management Criteria for Structures Portions of the Subsequent License Renewal Guidance."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program element(s) of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.S8.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria" and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.S8.

Operating Experience. SLRA Section B.2.1.35 summarizes OE related to the Protective Coating Monitoring and Maintenance program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Protective Coating Monitoring and Maintenance program was evaluated.

UFSAR Supplement. SLRA Section A.1.35, provides the UFSAR supplement for the Protective Coating Monitoring and Maintenance program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Protective Coating Monitoring and Maintenance program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Protective Coating Monitoring and Maintenance program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.17 Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

SLRA Section B.2.1.37 describes the existing Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits as consistent with GALL-SLR Report AMP XI.E2, “Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits.”

<u>Staff Evaluation</u>. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.E2.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.E2.

<u>Operating Experience</u>. SLRA Section B.2.1.37 summarizes OE related to the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits was evaluated.

<u>UFSAR Supplement</u>. SLRA Section A.2.1.37 provides the UFSAR supplement for the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01.

The staff also noted that the applicant committed to ongoing implementation of the existing Electrical Insulation for Electrical Cable and Connections Not Subject to 10 CFR 50.49 Environmental Requirement Used in Instrumentation Circuits for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Electrical Insulation for Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.18 Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

SLRA Section B.2.1.39 describes the new Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements as consistent with GALL-SLR Report AMP XI.E3B, "Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the Subsequent License Renewal Guidance."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding elements of the GALL-SLR Report AMP XI.E3B, as modified by SLR-ISG-2021-04-ELECTRICAL.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" are consistent with the corresponding program elements of GALL-SLR Report AMP XI.E3B, as modified by SLR-ISG-2021-04-ELECTRICAL.

Operating Experience. SLRA Section B.2.1.39, summarizes OE related to the Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements were evaluated.

UFSAR Supplement. SLRA Section A.2.1.39 provides the UFSAR supplement for the Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01, as modified by SLR-ISG-2021-04-ELECTRICAL.

The staff also noted that the applicant committed to implement the new Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirement AMP that will manage the effects of reduced insulation resistance or degraded dielectric strength of non-environmentally qualified, in scope, inaccessible (e.g., installed in buried conduits, cable trenches, cable troughs, duct banks, underground vaults, or direct buried installations), instrument and control cables, potentially exposed to significant moisture, no later than 6 months prior to the subsequent period of extended operation and that inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL, are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.19 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

SLRA Section B.2.1.42 describes the new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements as consistent with GALL-SLR Report AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.E6.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP XI.E6.

Operating Experience. SLRA Section B.2.1.42 summarizes OE related to the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed

AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements were evaluated.

UFSAR Supplement. SLRA Section A.2.1.42 provides the UFSAR supplement for the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to implementing the new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements that requires testing of a representative sample of electrical connections no later than 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components. The staff also noted that the applicant committed to evaluating the results of the testing to determine if there is a need for subsequent periodic testing on a 10-year frequency. Furthermore, tests that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB for the subsequent 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).

3.0.3.1.20 Neutron Fluence Monitoring

SLRA Section B.3.1.2 describes the existing Neutron Fluence Monitoring Aging Management Program at Dresden as consistent with Generic Aging Lessons Learned-Subsequent License Renewal (GALL-SLR) Report AMP X.M2, "Neutron Fluence Monitoring," specified in NUREG-2191, as modified by SLR-ISG-2021-02-MECHANICAL.

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP X.M2, "Neutron Fluence Monitoring," as modified by SLR-ISG-2021-02-MECHANICAL.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements are consistent with the corresponding program elements of GALL-SLR Report AMP X.M2, as modified by SLR-ISG-2021-02-MECHANICAL.

Operating Experience. SLRA Section B.3.1.2 summarizes OE related to the Neutron Fluence Monitoring program. The staff reviewed OE information in the application and during the audit. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on the audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those conditions and OE for which the Neutron Fluence Monitoring program was evaluated.

UFSAR Supplement. SLRA Section A.3.1.2 provides the UFSAR supplement for the Neutron Fluence Monitoring program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in the GALL-SLR Report. The staff also noted that the applicant committed to ongoing implementation of the existing Neutron Fluence Monitoring program for managing the effects of aging for applicable components during the subsequent period of operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Neutron Fluence Monitoring program, the staff concludes that those program elements for which the applicant claimed consistency with GALL-SLR Report AMP X.M2, as modified by SLR-ISG-2021-02-MECHANICAL, are consistent. 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 current licensing basis for the subsequent 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 Consistent with the GALL-SLR Report with Exceptions or Enhancements or Both

SE Table 3-1 identifies those AMPs that the applicant stated are, or will be, consistent with the GALL-SLR Report, with exceptions or enhancements, in SLRA Appendix B, as amended by letters dated February 20, 2025.

For AMPs that the applicant claimed are consistent with the GALL-SLR Report with exception(s), enhancement(s), or both, the NRC staff performed an audit and review to confirm that those attributes or features of the program for which the applicant claimed consistency with the GALL-SLR Report are indeed consistent. The staff reviewed the exceptions to the GALL-SLR Report to determine whether they are acceptable and adequate. The staff also reviewed the enhancements to determine whether they will make the AMP consistent with the GALL-SLR Report AMP to which it is compared. The results of the staff's audits and reviews are documented in the following sections.

3.0.3.2.1 Water Chemistry

SLRA Section B.2.1.2 states that the Water Chemistry program is an existing program that is consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.M2, "Water Chemistry," as modified by SLR-ISG-2021-02-MECHANICAL, "Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance", dated February 2021 (ADAMS Accession No. ML20181A434).

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M2, as modified by SLR-ISG-2021-02-MECHANICAL.

The staff also reviewed the portions of the "scope of program" program element associated with the exception to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this exception is as follows.

Exception 1. SLRA Section B.2.1.2 includes an exception to the "scope of program," program element related to expanding the scope of the Water Chemistry program to include treated water within the main generator and auxiliary system, which does not fall within the scope of BWRVIP-190, Revision 1, as an applicable environment. The specific environment that is being included is the stator cooling water. An EPRI water chemistry consensus standard for stator cooling water would be applied to the main generator and auxiliary system, and a one-time inspection would be performed to verify the effectiveness. The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.M2, as modified by SLR-ISG-2021-02-MECHANICAL, and finds it acceptable because managing aging effects of components exposed to treated water using water chemistry guidelines is consistent with the GALL-SLR report, the proposed water chemistry guidelines are appropriate for stator cooling water, and the applicant proposed using the One-Time Inspection program to verify the effectiveness in managing aging of the in scope components.

Operating Experience. SLRA Section B.2.1.2 summarizes OE related to the Water Chemistry program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Water Chemistry program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.2 provides the UFSAR supplement for the Water Chemistry Program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Water Chemistry program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Water Chemistry program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception, and finds that, with the exception, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.2.2 BWR Vessel ID Attachment Welds

SLRA Section B.2.1.4, as amended by letter dated February 20, 2025, states that the BWR Vessel ID Attachment Welds Program is an existing program that will be consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.M4, "BWR Vessel ID Attachment Welds." The exception is for the use of BWRVIP-48 Revision 2 in lieu of BWRVIP-48-A as specified in GALL-SLR Report AMP XI.M4.

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M4.

During its review, the staff identified an exception associated with the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," program elements that was not identified by the applicant in its SLRA. The general framework of the GALL-SLR Report AMP XI.M4 relies on the inspection guidelines contained in BWRVIP-48-A and ASME Section XI for reactor vessel attachments welds. The applicant's AMP relies on inspection guidelines contained in ASME Section XI and BWRVIP-48, Revision 2, which has not received generic NRC approval, in lieu of BWRVIP-48-A. By letter dated February 20, 2025, the applicant provided its plant-specific technical justification for the use of BWRVIP-48 Revision 2.

As such, the staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements associated with the exception to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this exception follows.

Exception 1. SLRA Section B.2.1.4, as amended by letter dated February 20, 2025, includes an exception to the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending," program elements related to the applicant's use of the inspection, evaluation, and repair guidelines contained in BWRVIP-48 Revision 2.

The staff noted that a portion of the applicant's basis for the use of BWRVIP-48, Revision 2, references a screening evaluation performed in accordance with Appendix C of NEI 03-08, Rev. 4, "Document Screening," including the conclusions that BWRVIP-48, Revision 2, could be generically released for implementation by the United States BWRVIP members without prior NRC review and approval. The staff noted that the following have not been reviewed, approved, or endorsed by the NRC staff at the time of the staff's SLRA review: (1) BWRVIP-48, Revision 2, (2) Appendix C of NEI 03-08, Rev. 4, "Document Screening," and (3) the screening evaluation, including the results, for BWRVIP-48, Revision 2. As such, the staff review of the applicant's use of the guidelines in BWRVIP-48, Revision 2 to demonstrate adequate aging management of reactor vessel inner-diameter attachment welds is specific to DNPS and does not constitute generic approval of any of these documents.

The staff noted that the differences between the inspection strategy in BWRVIP-48-A and BWRVIP-48, Revision 2, that are applicable to DNPS are limited to the stainless steel welds for the (1) core spray piping bracket attachment, (2) the steam dryer support bracket attachment, and (3) jet pump riser brace attachment. The applicant indicated that the technical justification for the revised inspection strategy for these attachments is contained in BWRVIP-48, Revision 2, Appendix G, Section G.4, "Qualitative Risk Assessment for

BWRVIP-48, Rev. 2," and Section G.5, "Summary of Inspection Program Revisions." Appendix G of BWRVIP-48, Revision 2, can be found in letter dated June 8, 2023 (ML23159A230, non-proprietary) (ML23159A231, proprietary). The staff's review of each attachment weld type for DNPS is documented below.

Plant-specific and industry operating experience

The applicant explained that examination data at both DNPS units for the relevant attachment, including the welds, were reviewed to assess whether site-specific data was reflective of the data identified in the conclusions drawn from the qualitative risk assessment in Appendix G of BWRVIP-48, Revision 2. The applicant confirmed that DNPS, Unit 2, has performed 195 examinations and DNPS, Unit 3, has performed 152 examinations between 1995 and 2024. Of these examinations, 99 were EVT-1 examinations of the core spray piping bracket attachment welds, 24 were EVT-1 examinations of the steam dryer support bracket attachment welds, and 170 were EVT-1 examinations of the jet pump riser brace attachment, which represents a full baseline examination of the entire population with at least one full reinspection of the entire population at both DNPS units. The staff noted that, in particular, the core spray piping bracket and steam dryer support bracket attachment welds at both DNPS units had multiple full re-inspections between 1995 and 2024.

The applicant explained that for those examinations, minor surface wear, gouges, and scratches on the steam dryer support bracket lug (i.e., typical surface-to-surface contact wear) were discovered and none of these indications are associated with any reported degradation of the attachment welds to the reactor pressure vessel (i.e., the scope of the AMP).The applicant indicated that its plant-specific OE and inspection history is comparable to the data collected by EPRI during the development of BWRVIP-48, Revision 2.

Based on its review, the staff finds that the plant-specific OE (1) is consistent with the fleetwide OE for the BWR vessel inner-diameter attachment welds, (2) demonstrates the implementation of effective aging management of these attachment welds at the site, and (3) indicates that age-related degradation has been adequately managed.

Core spray piping bracket attachment

The BWRVIP-48-A examination guidance for the core spray piping bracket attachments relevant to the DNPS, Units 2 and 3, is to perform an enhanced visual test (EVT-1) of 100 percent of the core spray piping bracket attachments every 8 years. The applicant selected to use the guidelines in Table G-10 of BWRVIP-48, Revision 2, for core spray piping bracket attachments with stainless steel welds, which include a significant reduction to the inspection guidance such that the core spray piping bracket attachments would not be part of the leading group in the overall inspection strategy in the BWRVIP-48, Revision 2. The applicant explained that it also implements the NRC-approved guidance in BWRVIP-18, Revision 2-A, and thus inspects 100 percent of bracket side of the core spray piping bracket attachment welds by EVT-1 every 10 years. The staff noted that the bracket side and vessel side attachment welds are exposed to the same environment and would be subject to the same or similar age-related degradation; thus, the staff finds it is reasonable that inspection of the bracket side of the core spray piping bracket attachment will be representative of the entire attachment and be indicative of age-related degradation that may exist.

Thus, even though BWRVIP-48, Revision 2, includes a significant reduction to the inspection guidance for the attachment welds, as described above, with the applicant's implementation of

BWRVIP-18, Revision 2-A, there is only a resultant reduction in inspection periodicity with no reduction in sample size when compared to BWRVIP-48-A. The staff confirmed that BWRVIP-18, Revision 2-A is implemented as part of the applicant's BWR Vessel Internals Program, and its review is documented in SE Section 3.0.3.2.3.

The staff reviewed the exception as related to the core spray piping bracket attachments, against the corresponding program elements in GALL-SLR Report AMP XI.M4 and finds the applicant's inspection strategy (i.e., EVT-1 of 100% population every 10 years) acceptable because it is consistent with the inspection strategy in BWRVIP-18, Revision 2-A for the same attachments and the applicant's plant-specific inspection results and OE demonstrate implementation of effective aging management at the site such that age-related degradation is adequately managed, which supports the reduction (i.e., 2 years) to the inspection periodicity compared to BWRVIP-48-A.

Steam dryer support bracket attachment

The BWRVIP-48-A examination guidance for the steam dryer support bracket attachments relevant to DNPS, Units 2 and 3, is to perform an EVT-1 of 100 percent of the subject attachment welds every 10 years. The applicant selected to use the guidelines in Table G-10 of BWRVIP-48, Revision 2, for the steam dryer support bracket attachments with stainless steel welds, which include a reduction in inspection periodicity and sample size. The applicant explained that it also implements vendor guidance that includes a VT-1 of 100 percent of the subject attachment welds every refueling outage, which includes the attachment weld to the reactor pressure vessel, unless engineering evaluations are performed to extend the frequency.

The staff reviewed the exception as related to the steam dryer support bracket attachments with stainless steel welds against the corresponding program elements in GALL-SLR Report AMP XI.M4 and finds the applicant's inspection strategy acceptable because the examination methods (i.e., VT-1 and EVT-1) are capable of identifying and ensuring timely detection of relevant age-related degradation (i.e., cracking due to stress corrosion cracking (SCC)) and the applicant's plant-specific inspection results and OE demonstrates implementation of effective aging management at the site such that age-related degradation is adequately managed, which supports the applicant's inspection strategy compared to BWRVIP-48-A.

Jet pump riser brace attachment

The BWRVIP-48-A examination guidance for the reinspection of jet pump riser brace attachments relevant to DNPS, Units 2 and 3, is to perform an EVT-1 of 25 percent of the population every 6 years. The applicant selected to use the guidelines in Table G-10 of BWRVIP-48, Revision 2, for the jet pump riser brace attachments with stainless steel welds, which includes a reduction in inspection periodicity.

The applicant explained that when implementing the inspections for the jet pump riser brace attachment welds, the weld inspection populations are rotated in such a manner that the entire population of the welds are examined, with the welds that were examined the furthest in the past being selected for subsequent inspection campaigns. The staff find this approach to be appropriate and reasonable because it incorporates rotating the sample population being inspected such that (1) the subject attachments are not re-inspected until the entire population is sampled and (2) each inspection cycle focuses on the bounding subject attachment welds most susceptible to aging due to time in service and exposure to the operating environment. The applicant also explained that it implements the NRC-approved guidance in BWRVIP-41, Revision 4-A, and thus, inspects 25 percent of brace side of the jet pump riser brace attachment welds by EVT-1 every 12 years (i.e., an inspection interval to greater than that in BWVIP-48-A). The staff noted that the brace side and vessel side attachment welds are exposed to the same environment and would be subject to the same or similar age-related degradation; thus, finds it is reasonable that inspection of the brace side of the jet pump riser brace attachment will be representative of the entire attachment and be indicative of age-related degradation that may exist. The staff confirmed that BWRVIP-41, Revision 4-A, is implemented as part of the applicant's BWR Vessel Internals Program, and its review is documented in SE Section 3.0.3.2.3.

The staff reviewed the exception as related to jet pump riser brace attachments with stainless steel welds against the corresponding program elements in GALL-SLR Report AMP XI.M4 and finds the applicant's inspection strategy as described in Table G-10 of BWRVIP-48, Revision 2 acceptable because (1) the applicant's strategy focuses on susceptibly of age-related degradation, (2) the applicant implements BWRVIP-41, Revision 4-A for inspection of jet pump riser brace attachment, and (3) the plant-specific inspection results and OE demonstrates implementation of effective aging management at the site such that age-related degradation is adequately managed, which supports the extension to the inspection periodicity when compared to BWRVIP-48-A.

Based on its review of this exception, as documented above, against the corresponding program elements in GALL-SLR Report AMP XI.M4, the staff finds that the applicant has demonstrated that its inspection strategy for the reactor vessel inner-diameter attachment welds will be adequate to manage the effects of aging so that the intended function of these attachment welds will be maintained consistent with the CLB for the subsequent period of extended operation.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M4. The staff also reviewed the exception associated with the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending," program elements, and its justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.4 summarizes OE related to the BWR Vessel ID Attachment Welds Program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the BWR Vessel ID Attachment Weld Program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.4, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the BWR Vessel Attachment Welds Program.

The staff reviewed this UFSAR supplement description of the program against the recommended description for this type of program as described in GALL-SLR Report Table XI-01. As a result of the audit,

SLRA Section A.2.1.4 was revised to clearly identify the applicant's aging management approach for the reactor pressure vessel inner-diameter attachment welds during the subsequent period of extended operation, which include aspects from the following:

- inspections of in scope components performed in accordance with guidance in BWRVIP-48 Revision 2 and the requirements in ASME Code, Section XI, as documented above in the staff's review of Exception 1
- inspections of the core spray piping brackets performed in accordance with BWRVIP-18 Revision 2-A
- inspections of the jet pump riser brace performed in accordance with BWRVIP-41 Revision 4-A
- inspections of the steam dryer support brackets performed in accordance with vendor guidance
- maintain high water purity as described in the Water Chemistry (B.2.1.2) program

The staff also noted that the applicant committed to ongoing implementation of the existing BWR Vessel Attachment Welds Program for managing the effects of aging for applicable components during the subsequent period of extended operation.

Therefore, the UFSAR supplement for the BWR Vessel Attachment Welds Program includes appropriate details of the applicant's program. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's BWR Vessel ID Attachment Welds Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception, and finds that, with the exception, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 BWR Vessel Internals

SLRA Section B.2.1.7, as amended by letter dated February 20, 2025, states that the BWR Vessel Internals Program is an existing program with an enhancement that will be consistent, with two exceptions, with the program elements in the GALL-SLR Report AMP XI.M9, "BWR Vessel Internals." The exceptions are for deviations between the BWRVIP report revisions in the SLRA and GALL-SLR.

<u>Staff Evaluation</u>. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M9.

The staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements associated with the exceptions and enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of these two exceptions during its audit, and one enhancement is as follows.

- *<u>Exception 1</u>*. During its review of SLRA Section B.2.1.7, as amended by letter dated February 20, 2025, the staff identified a difference in the "scope of program" and "monitoring and trending" program elements related to the use of later NRC-approved revisions of BWRVIP documents than is recommended in the GALL-SLR Report AMP XI.M9. Specifically, the use of: BWRVIP-18 Revision 2-A in lieu of BWRVIP-18-A
- BWRVIP-25 Revision 1-A in lieu of BWRVIP-25 Revision 0
- BWRVIP-41 Revision 4-A in lieu of BWRVIP-41 Revision 0
- BWRVIP-76 Revision 1-A in lieu of BWRVIP-76-A
- BWR-100 Revision 1-A lieu of BWRVIP-100-A
- BWR-139 Revision 1-A lieu of BWRVIP-139-A
- BWRVIP-183-A and lieu of BWRVIP-183 Revision 0

The staff finds this exception acceptable because the proposed later revisions were previously approved for generic use by the NRC in their respective safety evaluations and will be adequate to manage the applicable aging effects of the components covered by each BWRVIP report. Additionally, although BWRVIP-100 Revision 1-A was approved for generic use by the NRC, it was later determined to be non-conservative. This non-conservatism resulted in a Part 21 notice issued via BWRVIP Letter 2021-030 (ML21084A164). This resulted in the applicant performing a fleetwide assessment, which the staff confirmed during its audit. The staff determined that Dresden Unit 2 and Unit 3 are not impacted by the non-conservatism.

<u>Exception 2</u>. During its review of SLRA Section B.2.1.7, as amended by letter dated February 20, 2025, the staff identified a difference in the "scope of program" and "detection of aging effects" program elements related to the use of later revisions of BWRVIP documents than is recommended in the GALL-SLR Report and which have not been approved for generic use by the NRC staff. Specifically, the use of:

- BWRVIP-03 Revision 20 in lieu of BWRVIP-03 Revision 1
- BWRVIP-180 Revision 1 and lieu of BWRVIP-180 Revision 0

The staff finds acceptable because:

- BWRVIP-03 provides standards for demonstration of nondestructive evaluation techniques and the use of BWRVIP-03 Revision 20 in lieu of BWRVIP-03 Revision 1 does not change any component-specific technical criteria that would impact aging management.

- The use of the updated guidance in BWRVIP-180 Revision 1 in lieu of BWRVIP-180 Revision 0 regarding inspection and evaluation of access hole covers ensures periodic examinations to detect age-related degradation in a timely manner and will allow for adequate aging management of the access hole covers.

Enhancement 1. SLRA Section B.2.1.7, as amended by letter dated February 20, 2025, includes an enhancement to the “scope of program” and “parameters monitored or inspected” program elements that relates to limiting the scope expansion exemption detailed in BWRVIP-41, Revision 4-A, to 60 years of operation. The scope expansion exemption applies to the large diameter jet pump diffuser, adapter, and lower ring welds (i.e., DF-1, DF-2, DF-3, AD-1, AD-2, and AD-3a,b) that are inspected by ultrasonic inspection. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M9 and finds it acceptable because, when implemented, the applicant’s BWR Vessel Internals program will comply with Limitation 4 in Section 4.5.1 of BWRVIP-315-A (ML24191A417).

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M9, with the exception of the staff-identified exceptions. The staff also reviewed the exceptions associated with the “scope of program,” “detection of aging effects,” and “monitoring and trending” program elements, and their justifications, and finds that the AMP, with the exceptions, is adequate to manage the applicable aging effects.

In addition, the staff reviewed the enhancement associated with “scope of program” and “parameters monitored or inspected” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Review of License Renewal Applicant Action Items

In the staff safety evaluations for the topical reports listed in Appendix C to the SLRA, the staff issued license renewal applicant action items on the reports. The applicant described these action items in the tables in SLRA Appendix C, as amended by letter dated February 20, 2025. The staff confirmed that the applicant responded appropriately in SLRA Appendix C to the applicant action items issued for the following BWRVIP topical reports:

- BWRVIP-18, Revision 2-A, “BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines”
- BWRVIP-25, Revision 1-A, “BWR Core Plate Inspection and Flaw Evaluation Guidelines”
- BWRVIP-26-A, “BWR Top Guide Inspection and Flaw Evaluation Guidelines”
- BWRVIP-38, “BWR Shroud Support Inspection and Flaw Evaluation Guidelines”
- BWRVIP-41, Revision 4-A, “BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines”
- BWRVIP-42, Revision 1-A, “BWR LPCI Coupling Inspection and Flaw Evaluation Guidelines”
- BWRVIP-47-A, “BWR Lower Plenum Inspection and Flaw Evaluation Guidelines”
- BWRVIP-76, Revision 1-A, “BWR Core Shroud Inspection and Flaw Evaluation Guidelines”

- BWRVIP-139, Revision 1-A, “Steam Dryer Inspection and Flaw Evaluation Guidelines”
- BWRVIP-315-A, “Reactor Internals Aging Management Evaluation for Extended Operations”

The staff confirmed that the applicant addressed the relevant action items. This includes the applicant’s responses in SLRA Appendix C to the following types of action items that have been issued related to the specific BWRVIP report methodologies:

- information supporting the implementation of BWRVIP-defined inspections or evaluations of reactor vessel internal component-specific locations
- evaluations of reactor vessel internal component-specific TLAAs
- needed UFSAR supplement information for describing programmatic bases used to implement specific BWRVIP guideline methodologies

For these action items, the staff finds the responses to be acceptable because the applicant:

- included the applicable UFSAR supplement describing the applicable inspection or evaluation used to manage aging effects of applicable components addressed in the applicant action item
- identified, included, and evaluated the applicable TLAAs for the component in the SLRA
- implemented appropriate procedural controls to ensure that updated NRC-approved BWRVIP reports are incorporated into the AMP
- evaluated design-specific considerations (e.g., whether the core shroud had been modified to include tie rod repairs)
- addressed specific technical issues related to operations beyond 60 years, as identified by BWRVIP-315-A

<u>Operating Experience</u>. SLRA Section B.2.1.7 summarizes OE related to the BWR Vessel Internals Program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the BWR Vessel Internals Program was evaluated.

<u>UFSAR Supplement</u>. SLRA Section A.2.1.7, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the BWR Vessel Internals Program.

The staff reviewed this UFSAR supplement description of the program against the recommended description for this type of program as described in GALL-SLR Report Table XI-01. As a result of the audit, the applicant revised SLRA Section A.2.1.7 to specify that a future version of BWRVIP-47 that addresses extended operations will be implemented, as applicable, which the staff finds satisfactorily addresses Limitation 2 in Section 4.5.1 of BWRVIP-315-A (ML24191A417).

The staff also noted that the applicant committed to enhancing the BWR Vessel Internals Program by limiting the scope expansion exemption detailed in BWRVIP-41, Revision 4-A, to 60 years of operation. The scope expansion exemption applies to the large diameter jet pump diffuser, adapter and lower ring welds (DF-1, DF-2, DF-3, AD-1, AD-2, and AD-3a,b) that are inspected by ultrasonic inspection.

Therefore, the UFSAR supplement for the BWR Vessel Internals Program includes appropriate details of its program. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's BWR Vessel Internals Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent, with the exception of staff-identified differences between the applicant's program and GALL-SLR Report XI.M9. The staff also reviewed the exception, the additional staff-identified differences, and the enhancement, and finds that, with the exceptions and the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Flow-Accelerated Corrosion

SLRA Section B.2.1.9 states that the Flow-Accelerated Corrosion Program is an existing program with enhancement that will be consistent with the program elements in the GALL-SLR Report AMP XI.M.17, "Flow-Accelerated Corrosion."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M17. The staff also reviewed the portions of the "detection of aging effects" program element associated with the enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this enhancement is as follows.

Enhancement. SLRA Section B.2.1.9 includes an enhancement to the "detection of aging effects" program element that relates to reassessing infrequently used piping systems excluded from the scope of the program. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M17 and finds it acceptable because, when implemented, it will allow expansion of the scope of the Flow-Accelerated Corrosion Program if adequate bases no longer exist to justify exclusion of infrequently used piping systems from the scope of the Flow-Accelerated Corrosion program.

Based on its review of the SLRA and amendments, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M42. In addition, the staff reviewed the enhancement associated with the “detection of aging effects” program element and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.9 summarizes OE related to the Flow-Accelerated Corrosion program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Flow-Accelerated Corrosion program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.9 provides the UFSAR supplement for the Flow-Accelerated Corrosion program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Flow-Accelerated Corrosion Program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff also noted that the applicant committed to enhance the program no later than 6 months prior to the subsequent period of extended operation to reassess infrequently used piping systems excluded from the scope of the program.

Conclusion. Based on its review of the applicant’s Flow-Accelerated Corrosion Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement and finds that with the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Bolting Integrity

SLRA Section B.2.1.10, as amended by letters dated February 20, 2025, and March 13, 2025 (ML25072A153), states that the Bolting Integrity program is an existing program with enhancements will be consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.M18, “Bolting Integrity.” .

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of

GALL-SLR Report AMP XI.M18. The staff also reviewed the portions of the "scope of program," "preventive actions," "detection of aging effects," and "corrective actions" program elements associated with the exception and enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of the one exception and four enhancements, as amended, are as follows.

Exception 1. SLRA Section B.2.1.10 includes an exception to the "scope of program" program element related to including in the scope of the Bolting Integrity program the aging management of submerged mechanical bolting for the traveling water screens. The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because the component, material, environment, and aging effects associated with the submerged mechanical bolting for the traveling water screens are the same as for submerged pressure-retaining closure bolting that are included within the scope of the Bolting Integrity program; and the alternate means of inspection or testing provided within the Bolting Integrity program for submerged bolting, which is based on sample-based visual inspections, is capable of managing aging effects associated with the submerged mechanical bolting for the traveling water screens.

Enhancement 1. SLRA Section B.2.1.10, as amended by letter dated February 20, 2025, includes an enhancement to the "preventive actions" program element that relates to prohibiting the use of lubricants that contain molybdenum disulfide. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation to not use as a lubricant molybdenum disulfide, which has been shown to be a potential contributor to stress corrosion cracking.

Enhancement 2. SLRA Section B.2.1.10, as amended by letter dated February 20, 2025, includes an enhancement to the "detection of aging effects" program element that relates to performing periodic visual inspections of a representative sample of bolting for which leakage is difficult to detect, such as those used in joints that are submerged, in systems that are not normally pressurized, and in systems containing air or gas. The staff's evaluation of the provisions of this enhancement are as follows.

- A provision included in Enhancement 2 relates to performing, during each 10-year period of the subsequent period of extended operation, periodic visual inspections of a representative sample consisting of 20 percent of closure bolting or a maximum of 19 bolts for each material and environment population per unit, whichever is less. The staff reviewed this enhancement provision against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because, when implemented, it will be consistent with the GALL-SLR Report recommendation to inspect 20 percent of the population of bolts or a maximum of 25 bolts per population, which can be reduced to 19 bolts per unit for two-unit sites. The staff additionally noted that the use of this reduced sample size is appropriate because both units are of comparable age and changes to water chemistry practices, plant equipment, and operating conditions have been implemented in a consistent manner across both units; water chemistry programs monitor various chemistry parameters and require out-of-spec conditions to be corrected under the corrective action program in a timely manner; and raw water systems for both units draw from the same source.
- A provision included in Enhancement 2 relates to performing alternative inspections, such as diver inspections or remote video inspections, for submerged bolting exposed to treated water if the minimum sample size is not achieved during a 10-year period.

The staff reviewed this enhancement provision against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because, when implemented, the enhancement will supplement visual inspections and provide alternative means of inspection. The staff additionally noted that no alternative inspection options are required for the submerged bolting exposed to raw water because the traveling screens as well as the service water and fire protection pumps provide the population of bolting exposed to raw water.

- A provision included in Enhancement 2 relates to performing alternative inspections for systems containing air or gas. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because, when implemented, the AMP will be consistent with the GALL-SLR Report recommendation to either:

    - perform alternative inspections for systems containing air or gas, such as visual inspection for discoloration when leakage from inside the piping system would discolor the external surfaces of the component,

    - conduct monitoring and trending of pressure decay when the bolted connection is located within an isolated boundary,

    - perform soap bubble testing on the external mating surface of the bolted component, or

    - conduct thermography, when the temperature of the process fluid is higher than ambient conditions around the component.

Enhancement 3. SLRA Section B.2.1.10 includes an enhancement to the “detection of aging effects” program element that relates to including inspection parameters such as lighting, distance, and offset in the procedures governing the direct visual examination of bolted joints. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation to include inspection parameters for lighting, distance, and offset to provide an adequate examination of bolted joints.

Enhancement 4. SLRA Section B.2.1.10 includes an enhancement to the “corrective actions” program element that relates to performing additional inspections for each sample-based inspection that does not meet acceptance criteria. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.M18 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation to: (1) conduct additional inspections for each sample-based inspection that does not meet acceptance criteria, where no fewer than five additional bolts are inspected, or 20 percent of the total bolt population for each applicable material, environment, and aging effect combination is inspected, whichever is less; (2) conduct extent of condition and extent of cause analyses to determine the further extent of inspections if these subsequent inspections do not meet acceptance criteria; and (3) complete these additional inspections within the interval in which the original inspection is conducted.

Based on its review of the SLRA, the staff finds that the “parameters monitored or inspected,” “monitoring and trending,” and “acceptance criteria” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M18. The staff also reviewed the exception between the applicant's program and GALL-SLR Report XI.M18 associated with the "scope of program" program element, and its justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects. In addition, the staff reviewed the enhancements associated with the "preventive actions," "detection of aging effects," and "corrective actions" program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.10 summarizes OE related to the Bolting Integrity program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Bolting Integrity program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.10, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the Bolting Integrity program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Bolting Integrity program for managing the effects of aging for applicable components during the subsequent period of extended operation. Additionally, the staff noted that the applicant committed to implementing the enhancements no later than 6 months prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Bolting Integrity program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception and the enhancements, and finds that, with the exception and the enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Open-Cycle Cooling Water System

SLRA Section B.2.1.11 states that the Open-Cycle Cooling Water System program is an existing program with an enhancement that will be consistent with the program elements in the GALL-SLR Report AMP XI.M20, "Open-Cycle Cooling Water System."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M20.

The staff also reviewed the portions of the “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “corrective actions” program elements associated with the enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of the enhancement is as follows.

Enhancement. SLRA Section B.2.1.11 includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “corrective actions” program elements that relates to performing additional inspections of raw water systems where recurring internal corrosion is an active degradation mechanism, until the rate of recurring internal corrosion no longer meets the criteria defined in SLRA section 3.3.2.2.7. The staff reviewed this enhancement against the corresponding program elements in SRP-SLR Section 3.3.2.2.7 and finds it acceptable, because, when implemented, the program elements will be consistent with GALL-SLR Report AMP XI.M20.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M20. In addition, the staff reviewed the enhancement associated with the “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “corrective actions program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.11 summarizes OE related to the Open-Cycle Cooling Water System program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Open-Cycle Cooling Water System program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.11 provides the UFSAR supplement for the Open-Cycle Cooling Water System program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to implementation of the enhanced program no later than 6 months prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s Open-Cycle Cooling Water System program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement, and finds that with the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. 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 subsequent 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 Closed Treated Water Systems

SLRA Section B.2.1.12 states that the Closed Treated Water System program is an existing program with an enhancement that will be consistent with the program elements in the GALL-SLR Report AMP XI.M21A, "Closed Treated Water System," as modified by SLR-ISG-2021-02-MECHANICAL.

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M21A.

The staff also reviewed the portions of the "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements associated with the enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this enhancement is as follows.

Enhancement. SLRA Section B.2.1.12 includes an enhancement to the "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements that relates to performing opportunistic and periodic sample-based inspections using visual, surface, or volumetric techniques to verify the effectiveness of water chemistry control to mitigate aging effects in each 10-year period of the subsequent period of extended operation. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M21A, as modified by SLR-ISG-2021-02-MECHANICAL and finds it acceptable because, when implemented, the program elements will be consistent with the GALL-SLR.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M21A, as modified by SLR-ISG-2021-02-MECHANICAL. In addition, the staff reviewed the enhancement associated with the "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.12 summarizes OE related to the Closed Treated Water System program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Closed Treated Water System was evaluated.

UFSAR Supplement. SLRA Section A.2.1.12 provides the UFSAR supplement for the Closed Treated Water System program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted the applicant committed to implementation of the enhanced program no later than 6 months prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Closed Treated Water System program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement, and finds that with the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. 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 subsequent 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 Compressed Air Monitoring

SLRA Section B.2.1.14 states that the Compressed Air Monitoring program is an existing program with enhancement that, with one exception, will be consistent with the program elements in the GALL-SLR Report AMP XI.M24, "Compressed Air Monitoring."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M24.

The staff also reviewed the portions of the "scope of the program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements associated with the exception and enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this one exception and one enhancement is as follows.

*Exception 1. S*LRA Section B.2.1.14 includes an exception to the "detection of aging effects" program element related to the GALL-SLR recommendation that compressed air systems have in-line dew point instrumentation that either continuously monitors using an automatic alarm system or is checked at least daily to determine whether moisture content is within the recommended range. DNPS does not have in-line dewpoint monitors. The staff reviewed this exception against the corresponding program elements in GALL-SLR Report AMP XI.M24 and finds it acceptable because DNPS has desiccant moisture indicators at the outlet of each dryer package that support in scope components and are inspected at least daily by Operations rounds to identify the presence of moisture intrusion into the system. Dew point is measured periodically at various locations and there are automatic alarms in the main control room to indicate issues with the dryers. Deficiencies are documented in the corrective action program and evaluated. Additionally, the staff noted that the plant OE has shown the original design, along with continuous operator rounds and continuous automatic alarms for moisture, to be an effective method to monitor the compressed air system dryer outlet to provide reasonable assurance that the components in the compressed air system will continue to perform the specified intended functions.

*Enhancement 1. S*LRA Section B.2.1.14 includes an enhancement to the "scope of the program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending," program elements that relates to performing opportunistic visual inspections of in scope component internal surfaces exposed to a dry air environment for signs of loss of material. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M24 and finds it acceptable because, when implemented, the program elements will be consistent with the recommendations of the GALL-SLR Report.

Operating Experience. SLRA Section B.2.1.14 summarizes OE related to the Compressed Air Monitoring program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) to identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application the staff finds that the conditions and OE at the plant are bounded by those for which the Compressed Air Monitoring program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.14 provides the UFSAR supplement for the Compressed Air Monitoring program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table 3.0-1. The staff also noted that the applicant committed to implement the enhancement of the existing program no later than 6 months prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Compressed Air Monitoring program the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception and the enhancement, and finds that, with the exception and the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Fire Water System

SLRA Section B.2.1.16, as amended by letter dated February 20, 2025, states that the Fire Water System program is an existing program with enhancements that, with three exceptions, will be consistent with the program elements in the GALL-SLR Report AMP XI.M27, "Fire Water System."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M27.

For the "parameters monitored or inspected" program element, the staff requested confirmation regarding the applicable aging effects for polymeric (polyurethane based cured-in-place-polymer-pipe liner) piping and piping components and issued RCI 3.3.2-1. The staff's request and the applicant's response are documented in letter dated April 10, 2025 (ML25100A134). The staff's evaluation of the applicant's response to RCI 3.3.2-1 is in SE Section 3.3.2.1.2.

The staff also reviewed the portions of the "parameters monitored or inspected," "detection of aging effects," "acceptance criteria," and "corrective actions" program elements associated with the exceptions and enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluations of the exceptions and enhancements to the program are as follows.

Exception 1. SLRA Section B.2.1.16, as amended by letter dated February 20, 2025, includes an exception to the "detection of aging effects" program element related to main drain tests. To determine whether there has been any change in the condition of the water supply piping or control valves, Section 13.2.5 of the 2011 Edition of NFPA 25 specifies an annual main drain test at each system riser. In lieu of the annual main drain testing, the applicant stated that it will (1) perform main drain testing of 47 of the 72 in scope water-based fire protection systems every 18 months and (2) perform the following tests and inspections for the remaining 25 of the 72 in scope water-based fire protection systems:

- fire water valve position verification
- fire protection valve cycling
- fire protection loop flow test every 5 years
- fire suppression water system flow test
- fire protection water system flush
- hydrant flush
- post indicator valve testing
- wet pipe, deluge, and pre-action system inspections.

The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.M27, and finds it acceptable because:

(1) Footnote 10 for Table XI.M27-1 in GALL-SLR Report AMP XI.M27 would allow these tests to be performed on a refueling outage interval if plant-specific OE has shown no loss of intended function of the specific component due to the aging effects being managed, and therefore, the 47 main drain tests that will be performed every 18 months does not exceed Dresden's refueling outage interval and plant-specific OE did not identify the need to increase the main drain tests to annually.

(2) The tests that will be performed in lieu of main drain tests for the remaining 25 in scope water-based fire protection systems are capable of identifying changes in condition of the water supply piping and control valves.

Exception 2. SLRA Section B.2.1.16, as amended by letter dated February 20, 2025, includes an exception to the “detection of aging effects” program element related to inspections of strainers for water spray fixed systems. Table XI.M27-1 in GALL-SLR Report AMP XI.M27 recommends strainers for water spray fixed systems be removed and inspected for damage or corrosion every 5 years in accordance with Section 10.2.1.7 of the 2011 Edition of NFPA 25. In lieu of removing and inspecting strainers for water spray fixed systems every 5 years, the applicant stated that it will inspect the strainers every 6 years. The applicant stated that the strainers are inspected after they experience flow, that is, after automatic system actuation, periodic flow testing, or flushing. The applicant stated that the evaluation that extended the frequency from 5 years to 6 years was based on a review of the last three inspections. The applicant stated that in the last three inspections that “All strainers were either found to be as expected or better than expected condition.” The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.M27, and finds it acceptable because (1) the strainers will continue to be inspected after automatic system actuation, periodic flow testing, or flushing and (2) plant-specific OE from the last three strainer inspections did not identify damage or corrosion that warrants the need to increase the removal and inspection of strainers for water spray fixed systems to every 5 years.

Exception 3. SLRA Section B.2.1.16 includes an exception to the “detection of aging effects” program element related to operational testing of water spray fixed systems. Table XI.M27-1 in GALL-SLR Report AMP XI.M27 recommends operational testing of water spray fixed systems every refueling outage in accordance with Section 10.3.4.3 of the 2011 Edition of NFPA 25. The applicant stated that the control room charcoal filter manual deluge system will not be tested in accordance with Section 10.3.4.3 of the 2011 Edition of NFPA 25. The applicant stated that control room charcoal filter manual deluge system is maintained dry and is not subject to periodic wetting during testing and plant-specific OE did not identify instances of the system being actuated. In addition, the system is isolated from the supply header by two locked closed isolating valves. A tell-tale drain with a normally open drain valve is located between the two locked closed isolating valves. The normally closed system isolation valve is downstream of the two locked closed isolating valves. The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.M27 and finds it acceptable because the control room charcoal filter manual deluge system is (1) maintained dry and is not subject to periodic wetting during testing, (2) the two locked closed isolating valves are verified to be locked closed, (3) the tell-tale drain valve is verified to be open, and (4) the tell-tale is inspected quarterly for leakage.

Enhancement 1. SLRA Section B.2.1.16 includes an enhancement to the “parameters monitored or inspected” program element related to performing “a one-time volumetric wall thickness inspection on a representative sample of piping that is periodically subjected to flow during functional testing.” The staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when implemented, a representative sample of piping that is periodically subjected to flow will receive a one-time volumetric wall thickness inspection, and the inspection includes criteria for selecting inspection locations, acceptance criteria, and when follow-up inspections are needed based on inspection results.

Enhancement 2. SLRA Section B.2.1.16 includes an enhancement to the “detection of aging effects” program element related to visually inspecting all sprinklers every 2 years. The staff reviewed this enhancement and finds it acceptable because (as provided in GALL-SLR Report Table XI.M27-1, Footnote 10 associated with Section 5.2.1.1 of the 2011 Edition of NFPA 25) plant-specific OE did not identify a loss of intended function due to leaking, corroded, or damaged sprinklers, which allows the sprinklers to be visually inspected every 2 years, consistent with Dresden’s refueling outage interval.

Enhancement 3. SLRA Section B.2.1.16 includes an enhancement to the “detection of aging effects” program element related to revising the hydrant flushing procedure to include acceptance criteria to require that hydrants drain within 1 hour. The staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable, because when it is implemented, it will be consistent with the recommendations in GALL-SLR Report AMP XI.M27 related to fully draining hydrant barrels (Section 7.3.2.4 of the 2011 Edition of NFPA 25).

Enhancement 4. SLRA Section B.2.1.16 includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria,” and “corrective actions” program elements related to internal visual inspections of wet pipe sprinkler and pre-action sprinkler system piping to identify corrosion, foreign material, and flow obstructions. The staff reviewed this enhancement against the corresponding program elements in the associated AMP and finds it acceptable because, when implemented, the program will be consistent with the recommendations in GALL-SLR Report Table XI.M27-1, related to internal inspection of piping and obstruction investigation, as provided in Sections 14.2 and 14.3 of the 2011 Edition of NFPA 25.

Enhancement 5. SLRA Section B.2.1.16 includes an enhancement to the “detection of aging effects” program element related to revising the test frequency for the transformer deluge systems to every 2 years. The staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because the 2-year test frequency, which aligns with Dresden’s refueling outage interval, will be consistent with the recommended test frequency for water spray fixed systems, as provided in GALL-SLR Report Table XI.M27-1, for Section 10.3.4.3 of the 2011 Edition of NFPA 25.

Enhancement 6. SLRA Section B.2.1.16 includes an enhancement to the “corrective actions” program element related to updating procedures to include additional tests when acceptance criteria are not met. The staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when implemented, program element will be consistent with the GALL-SLR Report AMP XI.M27 recommendations associated with (1) conducting additional tests if flow tests or main drain tests do not meet acceptance criteria due to current or projected degradation, (2) performing no fewer than two additional tests for each test not meeting acceptance criteria, and (3) completing additional inspections within the same interval as the original test.

Based on its review of the SLRA and response to RCI 3.3.2-1, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M27. The staff also reviewed the exceptions associated with the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements, and their justifications, and finds that the AMP, with the exceptions, is adequate to manage the applicable aging effects. In addition, the staff reviewed the enhancements associated with the “parameters monitored or inspected,” “detection of aging effects,” “acceptance criteria,” and “corrective actions” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.16 summarizes OE related to the Fire Water System program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Fire Water System program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.16, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the Fire Water System program. The staff reviewed the UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to enhancing the Fire Water System program no later than 6 months prior to the subsequent period of extended operation, and one-time inspections will be completed no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s Fire Water System program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report AMP XI.M27 are consistent. The staff also reviewed the exceptions and enhancements, and finds that, with the exceptions and the enhancements, when implemented prior to the subsequent period of extended operation, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Outdoor and Large Atmospheric Metallic Storage Tanks

SLRA Section B.2.1.17 states that the Outdoor and Large Atmospheric Metallic Storage Tanks program is an existing program with enhancements that will be consistent with the program elements in the GALL-S-LR Report AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M29.

The staff also reviewed the portions of the “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” and “monitoring and trending” program elements associated with the enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff evaluation for these three enhancements is as follows.

*Enhancement 1. S*LRA Section B.2.1.17 includes an enhancement to the “preventive actions” program element that relates to applying sealant to provide a moisture barrier at the perimeter of the base of the clean and contaminated demineralized water storage tanks. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.M29 and finds it acceptable because, when implemented, the program element will be consistent with the recommendations of the GALL-SLR Report.

Enhancement 2. SLRA Section B.2.1.17 includes an enhancement to the ”parameters monitored or inspected” and ”detection of aging effects” program elements that relates to performing an inspection of the sealant at the perimeter of the base of the contaminated condensate storage tanks and demineralized water storage tanks for signs of degradation every 2 years. The visual inspections of sealant and caulking are supplemented with physical manipulation to detect degradation. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M29 and finds it acceptable, because, when implemented, the program elements will be consistent with the recommendations of the GALL-SLR Report.

Enhancement 3. SLRA Section B.2.1.17 includes an enhancement to the ”parameters monitored or inspected,” ”detection of aging effects,” and “monitoring and trending,” program elements that relates to performing periodic volumetric inspections of the contaminated condensate storage tanks, clean demineralized water storage tank, and contaminated demineralized water storage tank bottoms in each 10-year period starting 10 years prior to the subsequent period of extended operation to monitor the tank bottoms for loss of material and cracking. Volumetric inspections are performed at representative sample locations to include 25 1-square-foot locations or 20 percent coverage conducted in different locations unless the program states the basis for why repeated inspections are conducted in the same location (i.e., previous findings). Additionally, a minimum of 10 of the random one square foot sample locations will be performed within the 30-inch band at the perimeter of the shell. The scope of subsequent examinations may be adjusted based upon the results of previous examinations. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M29 and finds it acceptable because, when implemented, the program elements will be consistent with the recommendations of the GALL-SLR Report.

Operating Experience. SLRA Section B.2.1.17 summarizes OE related to the Outdoor and Large Atmospheric Metallic Storage Tanks program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that applicant should modify its proposed program beyond that incorporated during the development of the SLRA. Based on its audit and review of the application the staff finds that the conditions and OE at the plant are bounded by those for which the Outdoor and Large Atmospheric Metallic Storage Tanks program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.17 provides the UFSAR supplement for the Outdoor and Large Atmospheric Metallic Storage Tanks program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table 3.0-1. The staff also noted that applicant committed to ongoing implementation the existing Outdoor and Large Atmospheric Metallic Storage Tanks program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's "Outdoor and Large Atmospheric Metallic Storage Tanks" program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancements, and finds that, with the enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Fuel Oil Chemistry

SLRA Section B.2.1.18 states that the Fuel Oil Chemistry program is an existing program with enhancements that will be consistent with the program elements in the GALL-SLR Report AMP XI.M30, "Fuel Oil Chemistry."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M30.

The staff also reviewed the portions of the "preventive actions," "parameters monitored and inspected," "detection of aging effects," and "monitoring and trending" program elements associated with enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of these three enhancements is as follows.

Enhancement 1. SLRA Section B.2.1.18 includes an enhancement to the "preventive actions," "parameters monitored and inspected," and "detection of aging effects" program elements that relates to performing periodic internal inspection of the emergency diesel generator fuel oil day tanks and Unit 2/3 fire pump fuel oil day tank at least once during each 10-year period starting 10 years prior to the subsequent period of extended operation. Each tank will be drained and cleaned, the internal surfaces visually inspected (if physically possible), and, if evidence of degradation is observed during inspections, or if visual inspection is not possible, then these diesel fuel tanks will be volumetrically inspected. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M30 and finds it acceptable because, when implemented, the program elements will be consistent with the recommendations of the GALL-SLR Report.

<u>Enhancement 2</u>. SLRA Section B.2.1.18 includes an enhancement to the “preventive actions” and “detection of aging effects” program elements that relates to changing the path through which periodic fuel oil sampling and periodic draining of accumulated water are performed for the station blackout diesel fuel oil day tanks to the existing drain valves that are connected to the flush drain connections of these tanks. The staff reviewed this enhancement, against the corresponding program elements in GALL-SLR Report AMP XI.M30 and finds it acceptable because, when implemented, the program elements will be consistent with the recommendations of the GALL-SLR Report.

<u>Enhancement 3</u>. SLRA Section B.2.1.18 includes an enhancement to the “monitoring and trending” program element that relates to performing periodic (quarterly) particulate contamination, water and sediment checks, and microbiological activity checks for the isolation condenser makeup pump fuel oil day tanks. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M30 and finds it acceptable because, when implemented, the program element will be consistent with the recommendations of the GALL-SLR Report.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M31. In addition, the staff reviewed the enhancements associated with the “preventive actions,” “parameters monitored and inspected,” “detection of aging effects” and “monitored and trending” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

<u>Operating Experience</u>. SLRA Section B.2.1.18 summarizes OE related to the Fuel Oil Chemistry program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program beyond that incorporated during the development of the SLRA. Based on its audit and review of the application the staff finds that the conditions and OE at the plant are bounded by those for which the Fuel Oil Chemistry program was evaluated.

<u>UFSAR Supplement</u>. SLRA Section A.2.1.18 provides the UFSAR supplement for the Fuel Oil Chemistry program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Fuel Oil Chemistry program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

<u>Conclusion</u>. Based on its review of the applicant’s Fuel Oil Chemistry program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancements and finds that, with the enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained

consistent with the CLB for the subsequent 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 Reactor Vessel Material Surveillance

SLRA Section B.2.1.19 states that the Reactor Vessel Material Surveillance program is an existing program with enhancements that will be consistent with the program elements in the GALL-SLR Report AMP XI.M31, “Reactor Vessel Material Surveillance.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M31.

The applicant currently participates in an Integrated Surveillance Program (ISP), which was previously reviewed and approved by the NRC staff in BWRVIP-86, Rev. 1-A, to manage the loss of fracture toughness for the reactor pressure vessel (RPV) beltline materials and to demonstrate compliance with Appendix H to 10 CFR Part 50. The staff determined the following in its approval of BWRVIP-86, Revision 1-A (ML131760082):

- BWRVIP-86, Revision 1-A is acceptable for reference to establish compliance for both the original 40-year and 60-year extended operating licenses.
- BWRVIP-86, Revision 1-A is an acceptable alternative to all existing BWR plant-specific RPV surveillance program for the purpose of maintaining compliance with the requirements of Appendix H to 10 CFR Part 50 through the end of the current facility 40-year and 60-year extended operating licenses.
- The ISP and ISP(E), which are associated with the initial license renewal period, continue to adequately address the requirements of Appendix H to 10 CFR Part 50 for BWR licensees through the end of the facility’s proposed 60-year operating licenses.

The staff also reviewed the portions of the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” and “monitoring and trending,” program elements associated with enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of this enhancement is as follows.

Enhancement 1. SLRA Section B.2.1.19 includes an enhancement to the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” program elements that relates to implementation of BWRVIP-321 Revision 1-A to maintain compliance with 10 CFR 50 Appendix H during the subsequent period of extended operation.

As documented in BWRVIP-321, Revision 1-A (ML23143A345), the staff concluded the BWRVIP ISP for SLR, including the alternate withdrawal schedule, is acceptable for generic use and can be referenced to satisfy the requirements of Appendix H to 10 CFR Part 50 for all existing BWR licensees through the end of the facility's 80-year operating license if subsequent license renewal is pursued by licensees.

The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M31 and finds it acceptable because when BWRVIP-321 Revision 1-A is implemented, the applicant's program will be consistent with GALL-SLR AMP XI.M31 because it is an acceptable alternative, per BWRVIP-321 Revision 1-A, to a plant-specific RPV surveillance program for the purpose of maintaining compliance with the requirements of Appendix H to 10 CFR Part 50 through the subsequent period of extended operation.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M31. In addition, the staff reviewed the enhancement associated with the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending," program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.19 summarizes OE related to the Reactor Material Surveillance Program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the RPV Material Surveillance was evaluated.

UFSAR Supplement. SLRA Section A.2.1.19 provides the UFSAR supplement for the Reactor Material Surveillance program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Reactor Vessel Material Surveillance program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Reactor Vessel Material Surveillance program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement and finds that, with the enhancement implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Selective Leaching

SLRA Section B.2.1.21, as amended by letter dated February 20, 2025, states that the Selective Leaching program is a new program that will be consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.M33, “Selective Leaching.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M33.

For the “detection of aging effects” program element, the staff noted during its audit that a basis was not provided with respect to utilizing the multi-unit site sample size reduction for components exposed to a soil environment. The SLRA was amended to reflect that the multi-unit site sample size reduction will not be used for components exposed to a soil environment, which addressed the staff’s concern. In addition, the staff reviewed the portions of the “detection of aging effects” program element associated with the exception to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of this exception follows.

Exception 1. SLRA Section B.2.1.21, as amended by letter dated February 20, 2025, includes an exception to the “detection of aging effects” program element related to performing volumetric non-destructive examinations (NDE) in lieu of destructive examinations for gray cast iron, malleable iron, and ductile iron populations. The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.M33 and finds it acceptable for the following reasons:

- The applicant committed to an NDE performance demonstration to an Intermediate Rigor level of qualification per ASME Boiler and Pressure Vessel Code Section V, “Nondestructive Examination,” Article 14, “Examination System Qualification,” paragraph T-1424(b). This level of qualification requires a limited performance demonstration, providing the staff reasonable assurance that the NDE method will be capable of detecting loss of material due to selective leaching for cast iron components.
- The applicant committed to performing two volumetric examinations for each destructive examination recommended in GALL-SLR Report AMP XI.M33. Although not directly applicable, this ratio of volumetric to destructive examinations is consistent with the staff’s position in GALL-SLR Report AMP XI.M35, “ASME Code Class 1 Small-Bore Piping.”
- Performing NDE will allow for more accurate trending of the dealloying rates (i.e., ability to perform follow-up examinations on the same locations) when compared to performing destructive examinations.
- The NDE technique will be qualified for each specific material type to which it will be applied, which the staff considers appropriate due to differences in graphite morphology (i.e., spherical graphite nodules for ductile iron, irregularly shaped graphite nodules for malleable iron, graphite flakes for gray cast iron) between the different types of cast irons.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M33. The staff also reviewed the exception associated with the “detection of aging effects” program element, and its justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.21 summarizes OE related to the Selective Leaching program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Selective Leaching program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.21, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the Selective Leaching program. The staff reviewed the UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted the applicant committed to (1) implement the new Selective Leaching program 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components and (2) complete inspections that are required to be completed prior to the subsequent period of extended operation within the 10 years prior to the subsequent period of extended operation and no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s Selective Leaching program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception and finds that, with the exception, the AMP will be adequate to manage the applicable aging effects. 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 subsequent 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 Monitoring of Neutron-Absorbing Materials Other than Boraflex

SLRA Section B.2.1.26, as amended by letter dated February 20, 2025, states that the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program is an existing program with one enhancement that will be consistent with the program elements in the GALL-SLR Report AMP XI.M40, “Monitoring of Neutron-Absorbing Materials Other Than Boraflex.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M40.

The staff also reviewed the portions of the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements associated with the enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of this enhancement is as follows.

Enhancement 1. SLRA Section B.2.1.26, as amended by letter dated February 20, 2025, includes an enhancement to the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria ” program elements that relates to conducting in situ neutron attenuation testing on the Unit 2 spent fuel rack (Boral Material) according to NEI 16-03-A Revision 1 guidelines at a frequency not to exceed 10 years during the subsequent period of extended operation. The first in situ neutron attenuation test of the Boral material will be conducted within three years of entering the subsequent period of extended operation and any results found outside of the established criteria will be entered into the corrective action program for engineering evaluation. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.M40 and finds it acceptable because, when implemented, the program elements will be consistent with the GALL-SLR Report.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M40. In addition, the staff reviewed the enhancement associated with the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.26 summarizes OE related to the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.26, as amended by letter dated February 20, 2025, provides the UFSAR supplement for the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to enhancing the program no later than 6 months prior to the subsequent period of extended operation in addition to conducting the first in situ neutron attenuation test of the Unit 2 Boral material within 3 years of entering the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement, and finds that, with the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Buried and Underground Piping and Tanks

SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, states that the Buried and Underground Piping and Tanks program is an existing program with enhancements that will be consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.M41, “Buried and Underground Piping and Tanks.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.M41.

The staff also reviewed the portions of the “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements associated with the exception and enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of this exception and these eleven enhancements follows.

Exception 1. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an exception to the “preventive actions” and “detection of aging effects” program elements related to (1) in-scope buried aluminum alloy piping being backfilled in controlled low strength material and (2) not performing direct inspections prescribed in GALL-SLR Report AMP XI.M41 (i.e., external visual inspections or internal ultrasonic inspections) for in-scope buried aluminum alloy piping. The staff reviewed this exception and finds it acceptable because the combination of preventive measures (i.e., coatings and cathodic protection), periodic guided wave inspections, and activities to monitor the piping for leakage provides the staff reasonable assurance that loss of material on the external surfaces of in-scope buried aluminum alloy piping will be adequately managed during the subsequent period of extended operation. Additional details on preventive measures, periodic guided wave inspections, and activities to monitor the piping for leakage are provided in the paragraphs below.

- The piping is provided with a 50-mil (thousandth of an inch) thick cold applied tape coating system, an 8-mil-thick polyethylene wrap, and cathodic protection (see Enhancement No. 9 below), all three of which minimize the potential for corrosion on the external surfaces of the piping.
- As shown in Enhancement No. 4 below, the applicant committed to performing guided wave inspections on approximately 34 percent of the piping (i.e., 60 feet divided by 175 feet) in each 10-year period beginning 10 years prior to the subsequent period of extended operation. Although GALL-SLR Report AMP XI.M41 states that guided wave

inspections may not be substituted for direct inspections, the staff recognizes that guided wave inspections are a useful screening tool that can identify areas of buried piping that require direct inspection, which the applicant committed to doing if guided wave inspection results indicate that active corrosion is occurring. In addition, the applicant committed to a guided wave inspection sample size that is significantly greater that the inspection percentages listed in GALL-SLR Report Table XI.M41-2, "Inspection of Buried and Underground Piping and Tanks," (i.e., the maximum percentage listed for any Preventive Action Category is 10 percent).

- The applicant will be able to determine if leakage is occurring in the piping through routine level monitoring in the contaminated condensate storage tanks (CSTs), monitoring the volume of makeup water supplied to the 2/3 A(B) CSTs from the makeup demineralizer system (see Enhancement No. 11 below), and ongoing groundwater well monitoring. This addressed a concern raised by the staff during the audit related to being able to monitor the condition of the piping that was either not covered by the guided wave inspections (i.e., approximately 115 feet) or where the guided wave inspections were unable to detect the degradation due to its localized nature (i.e., pitting).

Enhancement 1. SLRA Section B.2.1.27, amended by letter dated March 13, 2025, includes an enhancement to the "parameters monitored or inspected" and "acceptance criteria" program elements related to performing direct visual inspections of one 10-linear foot section of buried stainless steel piping during each 10-year period beginning 10 years prior to the subsequent period of extended operation. The staff noted that the total length of in-scope buried stainless steel piping was less than 60 feet. The staff reviewed this enhancement and finds it acceptable for the following reasons: (1) although GALL-SLR Report AMP XI.M41 recommends two inspections in each 10-year period for a two-unit site, inspecting approximately 17 percent of the piping length is significantly greater that the inspection percentages listed in GALL-SLR Report Table XI.M41-2 for any Preventive Action Category and (2) 17 percent is similar to the 20 percent sample size identified in other sampling-based GALL-SLR Report AMPs.

Enhancement 2. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an enhancement to the "parameters monitored or inspected" and "acceptance criteria" program elements related to performing direct visual inspections of two 10-linear foot sections of buried carbon fiber reinforced polymer piping during each 10-year period beginning 10 years prior to the subsequent period of extended operation. The staff reviewed this enhancement and finds it acceptable for the following reasons: (1) performing two inspections is consistent with GALL-SLR Report Table XI.M41-2 when adjusted for a two-unit site and where backfill is in accordance with preventive actions program element and (2) aging management of other buried polymeric piping (e.g., polyvinyl chloride), which is limited to the fire protection system, will be accomplished through Enhancement No. 10.

Enhancement 3. SLRA Section B.2.1.27 includes an enhancement to the "detection of aging effects" program element related to performing (1) two direct visual inspections of 10-linear foot segments of buried carbon steel piping within the scope of license renewal during each 10-year period beginning 10 years prior to the subsequent period of extended operation or (2) nine inspections of buried carbon steel piping within the scope of license renewal during each 10-year period if cathodic protection availability and effectiveness criteria are not met. The staff reviewed this enhancement and finds it acceptable because this inspection sampling approach is consistent with GALL-SLR Report AMP XI.M41 recommendations.

Enhancement 4. SLRA Section B.2.1.27 includes an enhancement to the “detection of aging effects” and “corrective actions” program elements related to performing guided wave inspections of buried aluminum alloy piping during each 10-year period beginning 10 years prior to the subsequent period of extended operation. The staff noted that this enhancement is part of an alternative approach for managing the effects of aging for in-scope buried aluminum alloy piping, which is addressed in Exception 1 above.

Enhancement 5. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an enhancement to the “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements related to performing extent of condition inspections for steel and stainless steel piping when measured pipe wall thickness, projected to the end of the subsequent period of extended operation, does not meet the minimum pipe wall thickness requirements due to degradation of the external surface. The staff reviewed this enhancement and finds it acceptable because it is consistent with GALL-SLR Report AMP XI.M41 recommendations.

Enhancement 6. SLRA Section B.2.1.27 includes an enhancement to the “preventive actions” program element related to performing annual system monitoring of the cathodic protection system to ensure effective protection of buried piping. The staff reviewed this enhancement and finds it acceptable because it is consistent with GALL-SLR Report AMP XI.M41 recommendations.

Enhancement 7. SLRA Section B.2.1.27 includes an enhancement to the “detection of aging effects” program element related to performing volumetric examination of a minimum of 25 percent of the internal tank surface of buried fuel oil tanks within the scope of license renewal during each 10-year period, beginning 10 years prior to the subsequent period of extended operation, if cathodic protection availability and effectiveness criteria are not met. The staff reviewed this enhancement and finds it acceptable because it is consistent with GALL-SLR Report AMP XI.M41 recommendations.

Enhancement 8. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effects” program element related to performing direct visual inspection of one 10-linear foot section of underground steel pipe located in the condensate piping vault during each 10-year period beginning 10 years prior to the subsequent period of extended operation. The staff noted that the total length of in-scope underground steel piping was less than 60 feet. The staff reviewed this enhancement and finds it acceptable because inspecting approximately 17 percent of the piping length is significantly greater than GALL-SLR Report Table XI.M41-2 recommendations (i.e., 2 percent).

Enhancement 9. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an enhancement to the “acceptance criteria” program element related to using the 100 millivolt minimum polarization cathodic protection acceptance criterion for aluminum alloy piping within the scope of the program. The staff noted that the single in-scope buried aluminum alloy line is electrically isolated (i.e., insulating flanges are installed at both ends of the line, work orders and drawings do not indicate that the line is connected to the grounding grid). The staff reviewed this enhancement and finds it acceptable because using the 100-millivolt minimum polarization criterion for electrically isolated sections of aluminum alloy piping is consistent with GALL-LR Report AMP XI.M41, Table 6a, “Cathodic Protection Acceptance Criteria,” as modified by LR-ISG-2011-03, “Changes to the GALL Report Revision 2 AMP XI.M41, ‘Buried and Underground Piping and Tanks’.”

Enhancement 10. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements related to performing monthly monitoring of the makeup flow rate from the plant service water system to the fire protection system. The staff reviewed this enhancement and finds it acceptable for the following reasons:

(1) Monitoring of the makeup flow rate from the plant service water system to the fire protection system will indicate if leakage from buried fire main piping is occurring, similar to jockey pump monitoring prescribed in GALL-SLR Report AMP XI.M41.

(2) The frequency of flow rate monitoring is consistent with the jockey pump monitoring frequency prescribed in GALL-SLR Report AMP XI.M41.

(3) If unexplained changes to the makeup rate to the fire protection system are identified, then a flow test will be performed by the end of the next refueling outage, consistent with GALL-SLR Report AMP XI.M41 recommendations.

Enhancement 11. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effects” program element related to performing monitoring of the volume of makeup water supplied to the 2/3 A(B) CSTs from the makeup demineralizer system. The staff noted that this enhancement is part of an alternative approach for managing the effects of aging for in-scope buried aluminum alloy piping, which is addressed in Exception 1 above.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.M41. The staff also reviewed the exception associated with the “preventive actions” and “detection of aging effects” program elements, and its justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects. In addition, the staff reviewed the enhancements associated with the “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.27, as amended by letter dated March 13, 2025, summarizes OE related to the Buried and Underground Piping and Tanks program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff identified OE related to degradation of a “protective moisture barrier wrap,” which resulted in two through-wall leaks in buried piping. Based on this OE, the applicant added an additional operating example to the SLRA to clarify that the “protective moisture barrier wrap” is not representative of the coating systems used on in-scope buried piping (i.e., carbon fiber reinforced polymer wrap, elastomeric pipe wrap with polypropylene mesh backing and a secondary polyethylene encasement, tape wrap coating system, two-component epoxy coating system). Based on its audit and review of the amended application, the staff finds that the conditions and OE at the plant are bounded by those for which the Buried and Underground Piping and Tanks program was evaluated.

UFSAR Supplement. SLRA Section A.2.1.27, as amended by letter dated March 13, 2025, provides the UFSAR supplement for the Buried and Underground Piping and Tanks program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01 (other than additional aspects related to aging management of in-scope buried aluminum alloy piping, which is addressed by the staff in Exception 1 above). The staff also noted that the applicant committed to (1) implement the Buried and Underground Piping and Tanks program enhancements no later than 6 months prior to the subsequent period of extended operation for managing the effects of aging for applicable components and (2) perform inspections that are required to be performed prior to the subsequent period of extended operation within the 10 years prior to the subsequent period of extended operation, and no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Buried and Underground Piping and Tanks program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception and enhancements, and finds that with the exception and enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. 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 subsequent 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).

3.0.3.2.16 ASME Section XI, Subsection IWE

SLRA Section B.2.1.29, as amended by letter dated March 13, 2025, states that the ASME Section XI, Subsection IWE AMP is an existing program with enhancements that will be consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.S1, "ASME Section XI, Subsection IWE."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.S1.

The staff also reviewed the portions of the "preventive actions," "parameters monitored or inspected" and "detection of aging effects" program elements associated with the exception and enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of the one exception and three enhancements are as follows.

Exception 1. SLRA Section B.2.1.29, as amended by letter dated March 13, 2025, includes an exception to the "parameters monitored or inspected" and "detection of aging effects" program elements related to not monitoring for cracking utilizing supplemental surface examination or enhanced visual examination (EVT-1) for the drywell shell and non-high temperature and non-piping Class MC drywell penetrations that have no CLB fatigue analysis. As justification for the exception, the SLRA states that the primary containment was designed per ASME Section III, Subsection B,1965 edition, and that no fatigue evaluation was required per this code year or original construction specifications. The SLRA further states that for SLR the applicant performed a fatigue waiver analysis demonstrating that the six criteria stipulated in Subsection NE-3222.4(d), "Vessels Not Requiring Analysis for Cyclic Operation," of the ASME Code Section III, 1974 edition, are satisfied for the drywell shell and Class MC drywell penetrations (except high temperature mechanical penetrations) and penetration sleeves. The six conditions evaluated fatigue cycles through the end of the subsequent period of extended operation due to the following:

(1) atmospheric-to-operating pressure cycle

(2) normal operation pressure fluctuation

(3) temperature difference—startup and shutdown

(4) temperature difference—normal operation

(5) temperature difference—dissimilar materials

(6) mechanical loads

SLRA Section 3.5.2.2.1.5, as amended by letter dated March 13, 2025, documents the bounding number of cycles for 80 years used in the evaluation and demonstrates how the six conditions stipulated in NE-3222.4(d) of the ASME Code were satisfied. Based on this code fatigue waiver assessment, the applicant concluded that the stated drywell components are, by design evaluation, subject to an acceptable amount of fatigue for the subsequent period of extended operation, and therefore no supplemental surface examinations need to be performed to detect cracking due to cyclic loading. The applicant further noted that the high temperature mechanical penetrations, subject to cyclic loading with no CLB fatigue analysis, are not addressed by this exception and the accessible portions of the penetrations will be inspected for cracking using supplemental surface examinations or enhanced visual examinations.

The staff reviewed the justification for the exception against the corresponding program elements in GALL-SLR Report AMP XI.S1. As discussed in SER Section 3.5.2.2.1.5, the applicant demonstrated analytically that the stated drywell components (i.e., drywell shell, non-high temperature and non-piping Class MC drywell penetrations, and penetration sleeves) are capable of withstanding the fatigue cycles expected through the end of the subsequent period of extended operation without any further fatigue evaluation for cyclic operation, satisfying the six fatigue waiver conditions stipulated in paragraph NE-3222.4(d) "Vessel Not Requiring Analysis for Cyclic Operation" of the ASME Code, Section III, Division 1, 1974 edition. The staff finds this justification for the exception acceptable; therefore, the aging effect does not require management beyond the periodic IWE general visual examinations; so, no supplemental surface or enhanced examinations recommended in GALL-SLR AMP XI.S1, for components without CLB fatigue analysis, are required for managing the aging effect of cracking due to cyclic loading for these components.

Enhancement 1. SLRA Section B.2.1.29, as amended by letter dated March 13, 2025, includes an enhancement to the "parameters monitored or inspected," and "detection of aging effects" program elements that relate to performing periodic supplemental surface examinations or enhanced visual examinations (EVT-1) once every 10-years to detect cracking due to cyclic loading and/or SCC for accessible portions of a representative sample (i.e., 20 percent of population) of high temperature (exceeding 140°F) penetrations per unit from a population of 16 in each unit, identified in SLRA Table 3.5.2.2.1.5-1, that have no CLB fatigue analysis. The NRC staff finds that the frequency of examination of once in a 10-year interval is reasonable because there has been no identified plant-specific OE of cracking in these components. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S1 and finds it acceptable because, when implemented:

(1) The AMP requires periodic supplemental surface examinations or EVT-1 examinations in addition to visual examinations, once in a 10-year interval, to detect cracking for a 20 percent sample (i.e., four per unit) representative of high temperature penetrations that have no CLB fatigue analysis and potentially susceptible to SCC.

(2) The inspection methods will be consistent with the recommendations of the GALL-SLR Report to detect and manage cracking in pressure-retaining components subject to cyclic loading or SCC.

(3) The 20 percent sample size will be consistent with GALL-SLR Report recommendations for sampling-based inspection and the selected sample will be leading indicators of cracking due to either mechanism.

Enhancement 2. SLRA Section B.2.1.29, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effects” program element that relates to conducting a one-time volumetric examination of the primary containment metallic shell surfaces that are inaccessible from one side, if triggered by plant-specific OE of corrosion initiated on the inaccessible side exceeding 10 percent over a defined circular local area with radius one half the square root of the product of the drywell shell diameter times the shell thickness at the location using criteria in paragraph N-513.3 of ASME Section III, 1965 edition. From a review of plant-specific OE and the SLRA, the staff noted that the triggering OE has not occurred to date at DNPS. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S1 and finds it acceptable because, when implemented:

(1) The AMP will include actions, sampling criteria (random and focused areas), and statistical-based acceptance criteria consistent with GALL-SLR Report AMP XI.S1 recommendations to conduct a one-time supplemental volumetric examination of the containment metallic shell surfaces inaccessible from one side, if triggered by plant-specific OE of corrosion initiated on the inaccessible side since the issuance of the first renewed license through the end of the subsequent period of extended operation.

(2) If the triggering OE occurs, the one-time volumetric examination will be completed within two refueling outages of identification, or sooner, as determined by the corrective action program based on the severity of the identified condition.

(3) The corrective action program will be used to assess the results and determine the extent of examinations for the other unit.

Enhancement 3. SLRA Section B.2.1.29, as amended by letter dated March 13, 2025, includes an enhancement to the “preventive actions” program element that relates to providing guidance for the selection of bolting and coating material, lubricants, storage and appropriate installation torque or tension to prevent or minimize loss of bolting preload and cracking of high-strength (HS) bolting consistent with EPRI NP-5067, TR-104213 and Section 2 of the Research Council for Structural Connections publication, “Specification for Structural Joints Using High-Strength Bolts.” The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S1 and finds it acceptable because, when implemented, plant procedures will specify preventive actions for storage, material selection, lubricants, installation torque for structural bolting and SCC potential of high-strength bolting in accordance with recommended industry standards, which is consistent with the recommendations in the GALL-SLR Report AMP.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent, or will be consistent with enhancements, with the corresponding program elements of GALL-SLR Report AMP XI.S1. The staff also reviewed the exception between the applicant’s program and GALL-SLR Report XI.S1 associated with the “parameters monitored or inspected” and “detection of aging effects” program elements and related justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects. In addition, the staff reviewed the enhancements associated with the “preventive actions,” “parameters monitored or inspected” and “detection of aging effects” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.29, as amended by letter dated March 13, 2025, summarizes OE related to the ASME Section XI, Subsection IWE AMP. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) to identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

Based on its audit and review of the application, as amended, the staff finds that the conditions and OE at the plant are bounded by those for which the ASME Section XI, Subsection IWE AMP was evaluated.

UFSAR Supplement. SLRA Section A.2.1.29, as amended by letter dated March 13, 2025, provides the UFSAR supplement for the ASME Section XI, Subsection IWE AMP. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff noted that the amended UFSAR supplement description states that the IWE examinations include the existing ultrasonic thickness measurements of the Unit 3 drywell shell at locations in the spherical, cylindrical, and sand bed region, which will continue during the subsequent period of extended operation. The staff also noted that the applicant committed to ongoing implementation of the existing ASME Section XI, Subsection IWE AMP for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff specifically noted that the program includes from the first renewal ultrasonic thickness measurements of the Unit 3 drywell shell from within the drywell at locations in the spherical, cylindrical, and sand bed region which would continue into the subsequent period of extended operation. The staff also noted that the applicant committed to implementing the enhancements no later than 6 months prior to the subsequent period of extended operation and, if triggered, supplemental one-time volumetric examinations will be conducted per the schedule in the commitment. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's ASME Section XI, Subsection IWE AMP, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception and the enhancements and finds that, with the exception and the enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.2.17 ASME Section XI, Subsection IWF

SLRA Section B.2.1.30, as amended by letter dated March 13, 2025, states that the ASME Section XI, Subsection IWF Aging Management Program (AMP) is an existing program with enhancements that will be consistent with the program elements in the GALL-SLR Report AMP XI.S3, "ASME Section XI, Subsection IWF."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.S3, ASME Section XI, Subsection IWF.

The staff also reviewed portions of the "scope of program," "detection of aging effects," "monitoring and trending" and "corrective actions" program elements associated with enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of the five enhancements is as follows.

Enhancement 1. SLRA Section B.2.1.30 includes an enhancement to the "scope of program" program element that relates to performing periodic evaluations every 10 years of the acceptability of inaccessible areas of Class 1, 2, 3 and MC component supports based on conditions found in accessible areas. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S3 and finds it acceptable because, when implemented, the program will periodically evaluate the acceptability of inaccessible areas of component supports when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas, which is consistent with the recommendation in the GALL-SLR AMP XI.S3 for aging management of inaccessible areas of component supports.

Enhancement 2. SLRA Section B.2.1.30 includes an enhancement to the "detection of aging effects" program element that relates to a one-time inspection of an additional 5 percent sample of the code sample populations for Class 1, 2, 3 piping supports specified in Table IWF-2500-1 within 5 years prior to the subsequent period of extended operation. The staff reviewed this enhancement against the corresponding program element in GALL-SLR

Report AMP XI.S3 and finds it acceptable because, when implemented, the AMP will provide inspections of an additional sample of susceptible component supports not previously inspected by the program to assure that routinely inspected sample is representative of the aging of the remaining population of supports, consistent with recommendation in GALL-SLR Report AMP XI.S3.

Enhancement 3. SLRA Section B.2.1.30, as amended by letter dated March 13, 2025, includes an enhancement to the "detection of aging effects" program element that relates to revising procedures to require volumetric examination comparable to Table IWB-2500-1 (Examination Category B-G-1) to detect cracking due to SCC in HS bolting greater than one inch in diameter if additional (new) HS bolting is installed in ASME Class 1, 2, and 3 and MC component supports. The SLRA states that this volumetric examination will be performed at least once in a 10-year inspection interval. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S3 and finds it acceptable because, when implemented, the AMP will assure that any additional HS bolting (actual measured yield strength greater than or equal to 150 ksi) greater than 1-inch diameter installed prior to or during the subsequent period of extended examination will be volumetrically examined for cracking due to SCC at least once in every 10-year interval. The volumetric examination method is consistent with GALL-SLR Report recommendations in AMPs XI.S3 and XI.M18 and provides reasonable assurance that SCC will be detected in susceptible new HS bolts during the subsequent period of extended operation, if installed.

Enhancement 4. SLRA Section B.2.1.30 includes an enhancement to the "monitoring and trending" program element that relates to providing guidance for increasing or modifying the component support inservice inspection sample, when a component support within the inspection sample that is acceptable for continued service is restored to as-new (original) condition. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S3 and finds it acceptable because, when implemented, the program will require inspection of a sample that is representative of the aging effects of the remaining population of component supports when a support is restored to as-new to correct an observed condition, consistent with recommendations in GALL-SLR Report AMP XI.S3.

Enhancement 5. SLRA Section B.2.1.30, as amended by letter dated March 13, 2025, includes an enhancement to the "detection of aging effects" and "corrective actions" program elements that relates to performing volumetric examination comparable to that of Table IWB-2500-1 (Examination Category B-G-1) to detect cracking due to SCC in HS bolting (i.e., greater than 1 inch in diameter) at each of the reactor vessel (RV) support skirts. The enhancement also states that a representative sample consisting of 12 HS bolts at each RPV skirt susceptible to SCC will be inspected by volumetric examination on a 10-year interval during the subsequent period of extended operation. The enhancement also states that if the inspection reveals conditions that do not meet acceptance criteria, then the condition will be entered in the corrective action program and the inspection is expanded to include additional RPV skirt bolts. The staff noted from SLRA Section B.2.1.30 that as of the time of SLRA submittal the only HS structural bolting in sizes greater than 1 inch diameter used in DNPS IWF component supports were the 60 bolts for the RPV support skirt to ringer girder connection of each unit. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S3 and finds it acceptable because, when implemented:

(1) A representative sample of 12 existing susceptible HS bolting (actual measured yield strength greater than or equal to 150 ksi) from the identified RPV support skirt population

will be volumetrically examined for cracking due to SCC once in every 10-year interval during the subsequent period of extended operation.

(2) The volumetric examination method and sample size of 20 percent (12 out of 60 for each unit) will be consistent with GALL-SLR Report recommendations in AMPs XI.S3 and XI.M18.

(3) Results of the examination that do not meet acceptance criteria will be addressed in the corrective action program.

(4) The AMP will provide reasonable assurance that SCC is not occurring for the entire population of existing susceptible HS bolts during the subsequent period of extended operation.

Based on its review of the SLRA and amendments, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent, or will be consistent with enhancements, with the corresponding program elements of GALL-SLR Report AMP XI.S3, as applicable to DNPS (noting that the DNPS IWF supports do not have elastomeric vibration elements). In addition, the staff reviewed the enhancements associated with the “scope of program” “detection of aging effects,” “monitoring and trending,” and “corrective actions” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.30 summarizes OE related to the ASME Section XI, Subsection IWF AMP. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff conducted a search of applicant provided plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) to provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMP to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE to indicate that the applicant should modify its proposed program beyond that incorporated during the development of the SLRA. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant is bounded by those for which the ASME Section XI, Subsection IWF AMP was evaluated.

UFSAR Supplement. SLRA Section A.2.1.30, as amended by letter dated March 13, 2025, provides the UFSAR supplement for the ASME Section XI, Subsection IWF AMP. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff noted that the UFSAR supplement description states that the program manages loss of fracture toughness of reactor vessel support components. The staff also noted that the applicant committed to ongoing implementation of the existing ASME Section XI, Subsection IWF AMP for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff also noted that the applicant committed to implementing the SLRA AMP enhancements no later than 6 months prior to the subsequent period of extended operation, and complete one-time inspections within 5 years prior to and no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s ASME Section XI, Subsection IWF Aging Management Program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent, as applicable to

DNPS. The staff also reviewed the enhancements and finds that with the enhancements implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging 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 UFSAR supplement, as amended, 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 Structures Monitoring

SLRA Section B.2.1.33, as amended by letters dated March 13, 2025, and May 8, 2025 (ML25128A184), states that the Structures Monitoring program is an existing program with enhancements that will be consistent with the program elements in the GALL-SLR Report AMP XI.S6, “Structures Monitoring.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA AMP to the corresponding program elements of GALL-SLR Report AMP XI.S6.

The staff also reviewed the portions of the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements associated with enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of the 19 enhancements is as follows.

Enhancement 1. SLRA Section B.2.1.33 includes an enhancement to the “scope of program” program element that relates to enhancing the Structures Monitoring program to add the following structures to the scope of the program: (1) bridge over the Units 2 and 3 intake canal, (2) radwaste solidification building, (3) reactor building interlock (Unit 3), and (4) turbine building (Unit 1). The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with GALL-SLR Report recommendations to include these SCs determined to be in scope for subsequent license renewal.

Enhancement 2. SLRA Section B.2.1.33 includes an enhancement to the “scope of program” program element that relates to clarifying that the138 kV control building and the 345 kV control building are within the scope of the program. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the enhancement will expand the scope of the program to include these structures determined to be in scope for subsequent license renewal.

Enhancement 3. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “scope of program” and “detection of aging effects” program elements that relates to shortening frequency for inspecting non-segregated bus ducts supports and the ring girder for the reactor vessel support skirt. The staff reviewed the enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the enhancement will expand the scope of the program to include non-segregated bus duct supports and the ring girder for the reactor vessel support skirt determined to be in scope of subsequent license renewal and be consistent with GALL-SLR

Report recommendations to monitor non-segregated bus ducts supports and the ring girder for the reactor vessel support skirt at an interval not to exceed 5 years.

Enhancement 4. SLRA Section B.2.1.33 includes an enhancement to the “scope of program” program element that relates to explicitly including manholes, sliding surfaces, and trash racks within the scope of the program. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the enhancement will expand the scope of the program to include these components and commodities determined to be in scope for subsequent license renewal.

Enhancement 5. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “preventive actions” program element that relates to implementing preventive actions to emphasize proper selection of bolting material and lubricants, appropriate installation torque or tension to prevent or minimize loss of bolting preload and cracking of high-strength bolting, and include storage, lubricant selection, and bolting and coating material selection in accordance with Section 2 of the Research Council for Structural Connections publication, “Specification for Structural Joints Using High-Strength Bolts” for structural bolting consisting of ASTM A325, ASTM A490. SLRA Section B.2.1.33, as modified by SLRA Supplement 2 (ML25072A153), states that structural bolts consisting of ASTM F1852 and ASTM F2280 were not used within the scope of the program. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to ensure that preventive actions are in accordance with applicable industry guidelines and to ensure that structural bolting integrity is maintained.

Enhancement 6. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “parameters monitored or inspected” program element that relates to clarifying procedures to state that evidence of cracking, spalling, scaling, discoloration, and leaching could indicate the presence of increased porosity and permeability due to mechanisms of aggressive chemical attack or leaching of calcium hydroxide and carbonation. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to clarify the signs of degradation that could indicate the presence of increased porosity and permeability.

Enhancement 7. SLRA Section B.2.1.33 includes an enhancement to the “parameters monitored or inspected” and “acceptance criteria” program elements that relates to expanding the program to include parameters monitored or inspected and acceptance criteria for accessible sliding surfaces. The staff reviewed the enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program elements will be consistent with the GALL-SLR Report recommendations to:

- monitor accessible sliding surfaces for indications of significant loss of material due to wear or corrosion and for accumulation of debris or dirt, and
- establish acceptance criteria for sliding surfaces such that there is no significant loss of material due to wear or corrosion and that no debris or dirt that could restrict or prevent sliding of the surfaces, as required by design.

Enhancement 8. SLRA Section B.2.1.33 includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” “acceptance criteria” program elements that relates to expanding the program to include parameters monitored or inspected, monitoring, and acceptance criteria for elastomeric structural sealants, seismic joint fillers, vibration isolators, and bearing pads. The staff reviewed the enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program elements will be consistent with the GALL-SLR Report recommendations to (1) monitor these elastomeric components for cracking, loss of material, and hardening by supplementing visual inspection with tactile inspections when the intended function is in question and (2) ensure no significant loss of material, cracking, or hardening that could lead to loss of intended function.

Enhancement 9. SLRA Section B.2.1.33 includes an enhancement to the “parameters monitored or inspected” and “detection of aging effects” program elements that relates to developing a new implementing procedure or revising an existing implementing procedure to address aging management of inaccessible areas exposed to raw water and groundwater/soil environments.

The staff noted that the enhancement implements plant-specific actions that include the following:

(1) monitor water chemistry (pH, chlorides, sulfates) every 5 years, considering seasonal variations

(2) evaluate water chemistry impacts on below-grade concrete and determine if further actions (inspections, testing) are needed

(3) complete initial engineering evaluations before the subsequent period of extended operation, with follow-ups every 5 years

(4) perform focused inspections on accessible structures or excavate affected areas if degradation is identified

(5) address degradation exceeding ACI 349.3R Tier 2 criteria through the corrective action program

Because this is a plant-specific enhancement, the staff reviewed the enhancement against the corresponding program elements in SRP-SLR Section A.1.2.3 and finds it acceptable because, when implemented, the AMP will ensure that plant-specific actions are in place when aggressive groundwater or soil environment is identified, so that the extent of degradation can be detected and evaluated, and corrective actions be taken before a loss of intended function.

Enhancement 10. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “parameters monitored or inspected” and “detection of aging effects” program elements that relate to monitoring and trend indications of groundwater infiltration or through-concrete leakage. The staff reviewed the enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program elements will be consistent with the GALL-SLR Report recommendations to monitor groundwater infiltration or through-concrete leakage volumes, with water chemistry analysis if needed to assess potential degradation, which may include engineering evaluation, more frequent inspections, or destructive testing of affected concrete to validate existing concrete properties.

Enhancement 11. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effects” program element that relates to requiring qualifications of inspection and evaluation personnel. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to ensure qualifications of inspection and evaluation personnel are in accordance with requirements specified in ACI 349.3R-02.

Enhancement 12. SLRA Section B.2.1.33 includes an enhancement to the “detection of aging effects” program element that relates to evaluating the accessibility of inaccessible, below-grade concrete structural elements. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas.

Enhancement 13. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “monitoring and trending” program element that relates to establishing quantitative baseline inspection data. The applicant stated that new baseline inspection is not needed for previously performed inspections that were conducted using comparable acceptance criteria, which is acceptable to the staff since it is consistent with the GALL-SLR Report. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to establish quantitative baseline inspection data against acceptance criteria prior to the subsequent period of extended operation.

Enhancement 14. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “acceptance criteria” program element that relates to providing evaluation criteria for structural concrete. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to use acceptance criteria for concrete surfaces based on the ”second-tier” evaluation criteria provided in Chapter 5 of ACI 349.3R-02.

Enhancement 15. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “acceptance criteria” program element that relates to clarifying acceptance criteria for loose bolts and nuts. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to accept loose bolts and nuts based on engineering evaluations.

Enhancement 16. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effect” program element that relates to providing additional guidance on detecting accessible concrete for visual indications of aggregate reactions, in addition to detecting “map” or “patterned” cracking and alkali-silica gel. The staff reviewed the enhancement against the corresponding program element in the GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the SRP-SLR Report recommendations to manage cracking due to expansion from reaction with aggregates for concrete components.

Enhancement 17. SLRA Section B.2.1.33, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effects” program element that relates to inspecting degraded steel structural components located in the Unit 2 torus basement due to water in-leakage on a two-year frequency. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations to include provisions for more frequent inspections based on an evaluation of the observed degradation.

Enhancement 18. SLRA Section B.2.1.33, as amended by letter dated May 8, 2025, includes an enhancement to the “scope of program” program element that relates to replacing the degraded components of the cable tray assembly between the 2A and 2B circulating water pumps in the Units 2 and 3 Crib House. The staff confirmed that the current OE of the cable tray assembly managed by the Structures Monitoring program demonstrated that the cable tray assembly can perform its intended function more than 20 years. The staff noted that the applicant committed to replace and restore the cable tray assembly to full structural design capacity every 20 years. The staff reviewed the enhancement against the corresponding program element in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented, the degraded components of the cable tray assembly will be replaced and restored to full structural design capacity no later than the last refueling outage prior to entering the subsequent period of extended operation.

Enhancement 19. SLRA Section B.2.1.33, as amended by letter dated May 8, 2025, includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements that relates to performing detailed evaluation of the Units 2 and 3 chimneys in accordance with Section 5.3 of ACI 349.3R-02. The staff reviewed the enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S6 and finds it acceptable because, when implemented:

(1) The AMP will require an initial detailed evaluation using the quantitative results obtained during baseline inspections to assess the current condition of the chimneys.

(2) The AMP will identify the need for material testing, supplemental inspections, and other corrective actions during the initial evaluation to establish a degradation trend.

(3) The AMP will require that the applicant conduct a final detailed evaluation using the data collected from the initial evaluation to determine the structural condition and degradation extent.

(4) Future inspections will be modified and corrective actions performed, as needed, to ensure the structural integrity and intended functions of the chimneys are maintained during the subsequent period of extended operation.

Therefore, the staff concludes that these enhancements, as added by the applicant’s responses to RAI B.2.1.33-1 (ML25128A184), provide reasonable assurance that the effects of aging on the Units 2 and 3 chimneys will be adequately managed so that their intended functions will be maintained consistent with the CLB during the subsequent period of extended operation.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.S6. In addition, the staff reviewed the enhancements associated with the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.33, as modified by letter dated March 13, 2025, summarizes OE related to the Structures Monitoring program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation.

The staff identified the need for additional information relating to OE, which resulted in the issuance of RAI B.2.1.33-1, RAI B.2.1.33-2, and RCI B.2.1.33-1. The staff reviewed the applicant’s response to RCI B.2.1.33-1 (ML25128A184) and noted that replacement of the Units 2 and 3 turbine building roof is currently planned for completion prior to the subsequent period of extended operation. The staff also reviewed the SLRA (as amended), RAI B.2.1.33-1, and RAI B.2.1.33-2 (ML25128A184), and finds that OE prompted the applicant to modify its proposed program with enhancements in the following three areas: (1) performing inspections of steel structural components in the Unit 2 torus basement at 2-year intervals; (2) replacing degraded components of the cable tray assembly to restore the assembly to its full structural design capacity prior to entering the subsequent period of extended operation and every 20 years thereafter; and (3) performing a detailed evaluation of the Units 2 and 3 chimney in accordance with section 5.3 of ACI 349.3R-02. The staff’s evaluation of the enhancements to the Structures Monitoring program in these areas is documented in the previous section in this SER.

Based on its audit and review of the SLRA, and review of the applicant’s responses to RAI B.2.1.33-1, RAI B.2.1.33-2, and RCI B.2.1.33-1 (ML25128A184), the staff finds that the conditions and OE at the plant are bounded by those for which the Structures Monitoring program was evaluated.

UFSAR Supplement. SLRA Appendix A Section A.2.1.33, as amended by letter dated March 13, 2025, and May 8, 2025, provides the UFSAR supplement for the Structures Monitoring program. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff noted that the applicant committed to ongoing implementation of the existing Structures Monitoring program for managing the effects of aging for applicable components during the subsequent period of extended operation. The staff also noted that the applicant committed to:

(1) implement AMP enhancements for SLR no later than 6 months prior to the subsequent period of extended operation

(2) complete baseline inspections no later than the last refueling outage prior to the subsequent period of extended operation

(3) perform initial replacement of the degraded components of the cable tray assembly no later than the last refueling outage prior to the subsequent period of extended operation

(4) perform final detailed evaluation of the Units 2 and 3 chimney no later than 2 years after entry into the subsequent period of extended operation

The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant’s Structures Monitoring program, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancements, and finds that, with the enhancements when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement, as amended, 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 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, states that the Inspection of Water-Control Structures Associated with Nuclear Power Plants is an existing program with enhancements that will be consistent, with one exception, with the program elements in the GALL-SLR Report AMP XI.S7, “Inspection of Water-Control Structures Associated with Nuclear Power Plants.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.S7.

The staff also reviewed the portions of the “scope of program,” “preventive actions,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements associated with the exception and enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of the exception and 13 enhancements are as follows.

Exception 1. SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, includes an exception to the “Detection of Aging Effects” program element related to inspection of the submerged discharge outfall structures once every three refueling cycles instead of once every 5 years. The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable for the following reasons:

(1) As stated in the program description, the submerged components in the Unit 2 and 3 crib house are of similar design to the submerged discharge outfall structures, are exposed to equivalent conditions, and are inspected every 5 years, therefore, inspection findings at the crib house are reasonably indicative of conditions at the outfall structures.

(2) Raw water at DNPS is not considered aggressive; therefore, corrosion is not expected to be accelerated.

(3) Inspections every three refueling cycles is approximately once every 6 years, compared to the GALL-SLR Report recommendation of once every 5 years; therefore, the staff believes the licensee will detect any aging effects requiring corrective actions in sufficient time to maintain the safe operation of the structure.

Enhancements 1 and 2. SLRA Section B.2.1.34 includes an enhancement to the "scope of the program" program element that relates to adding the following structures to the scope of the program:

(1) the bridge over the Units 2 and 3 intake canal

(2) the deicing line

(3) the circulating water inlet tunnel

(4) the embankments of the Units 1, 2, and 3 intake canals, including the following components within the scope of the program:

- stop logs
- trash racks
- traveling screen foundations

The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the structures added into the program scope are consistent with the "scope of the program" program element of GALL-SLR Report AMP XI.S7.

Enhancement 3. SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, includes an enhancement to the "preventive actions" program element that relates to implementing preventive actions to emphasize proper bolting material and lubricant selection, installation torque and tension requirements, and if bolts are fabricated from ASTM A325 or ASTM A490, using preventive actions in accordance with Section 2 of the Research Council for Structural Connection publication. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation for selection of bolting material and lubricants, installation, and preventive actions.

Enhancements 4, 12, and 13. SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, includes enhancements to the "detection of aging effects," program element, that relate to performing inspections of discharge outfall structures above the waterline every 5 years, performing below waterline inspection of the discharge outfall structures every three refueling cycles, and requiring visual inspections of submerged structural components once every 5 years. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S7 and finds it acceptable because the enhancement is consistent with GALL-SLR and ACI 349.3R recommendations to perform inspections of structures every 5 years, except for the submerged outfall structures, which is discussed in Exception 1 above.

Enhancement 5. SLRA Section B.2.1.34 includes an enhancement to the “detection of aging effects,” program elements that relates to developing a new implementation procedure or revising an existing procedure to address aging management of inaccessible areas exposed to raw water and groundwater/soil environments. The staff’s evaluations of this enhancement is as follows.

(a) The enhancement discusses monitoring raw water and groundwater chemistry for pH, chlorides, and sulfates on a frequency not to exceed 5 years and increasing sampling locations to capture results representative of the groundwater in contact with the structures within scope. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program will monitor the chemistry of the raw water and groundwater, which is necessary to the responsible engineer for evaluating the structures in contact with the raw water.

(b) The enhancement discusses developing engineering evaluations to evaluate the impact of water chemistry results on below-grade structures and determine if additional inspections or actions are warranted. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program will be consistent with the GALL-SLR recommendation, which requires the responsible engineer to evaluate structures exposed to raw water at least once every 5 years as described in enhancement 5(a).

(c) The enhancement discusses developing initial engineering evaluations prior to entering subsequent period of extended operation and follow-up engineering evaluations on an interval not to exceed 5 years. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program will be consistent with the GALL-SLR Report recommendation to perform periodic inspections at least once every 5 years.

(d) The enhancement discusses: (1) performing focused inspections of representative accessible elements or excavate to inspect buried elements to inspect concrete elements exposed to potentially aggressive groundwater/soil if warranted by engineering evaluations; (2) and entering results of focused inspections of concrete that exceed ACI 349.3R-02 tier 2 criteria into the corrective action program and exposed inaccessible concrete to determine extent of the condition. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program will be consistent with the GALL-SLR Report recommendation to address detection of aging effects for inaccessible, below grade, and submerged concrete structural elements when conditions exist in accessible areas that could indicate degradation of inaccessible areas.

Enhancement 6. SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, includes an enhancement to the “detection of aging effects” program element to monitor and trend indications of groundwater infiltration or through-concrete leakage, including considerations of chemistry test leakage and engineering assessment of the leakage impact to concrete and reinforcement. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation to assess through-concrete leakage by more frequent inspections and testing.

Enhancement 7. SLRA Section B.2.1.34 includes an enhancement to the “detection of aging effects” program element to evaluate acceptability of inaccessible areas when conditions exist in accessible areas that could indicate degradation to inaccessible areas. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation to assess inaccessible areas when conditions exist in accessible areas that could indicate degradation in inaccessible areas.

Enhancement 8. SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, includes an enhancement to the “monitoring and trending” program element to establish quantitative baseline inspection data against the enhanced acceptance criteria prior to entering subsequent period of extended operation. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendation to establish quantitative baseline inspection data prior to the subsequent period of extended operation.

Enhancement 9, 10, 11. SLRA Section B.2.1.34, as amended by letter dated March 13, 2025, includes an enhancement to the “acceptance criteria” program element to reference ACI 349.3R-02 for quantitative acceptance criteria and inspector qualifications on concrete inspections, and to clarify that loose bolts and nuts are unacceptable unless justified by engineering evaluations. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.S7 and finds it acceptable because, when implemented, the program element will be consistent with the GALL-SLR Report recommendations that (1) personnel performing inspections and evaluations be qualified per ACI 349.3R; (2) “second-tier” evaluation criteria of Chapter 5 of ACI 349.3R-02 for concrete evaluation is acceptable; and (3) loose bolts and nuts are not acceptable unless acceptable by engineering evaluation.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.S7. The staff also reviewed the exception associated with the “detection of aging effects” program element and its justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects. In addition, the staff reviewed the enhancements associated with the “scope of program,” “preventive actions,” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.34 summarizes OE related to the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program beyond that incorporated during the staff review of the SLRA. Based on its audit and review of the application as amended, the staff finds that the conditions and OE at the plant are bounded by those for which the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP was evaluated.

UFSAR Supplement. SLRA Section A.2.1.34, as amended by letter dated March 13, 2025, provides the UFSAR supplement for the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Table X-01. The staff also noted that the applicant committed to ongoing implementation of the existing Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP for managing the effects of aging for applicable components during the period of extended operation. Additionally, the staff noted that the applicant committed to implementing the enhancements no later than 6 months prior to the period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the exception and the enhancements, and finds that, with the exception and enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging 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 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).

3.0.3.2.20 Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

SLRA Section B.2.1.36, as amended by letter dated February 20, 2025, states that the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is an existing program with enhancements that will be consistent, with the program elements in the GALL-SLR Report AMP XI.E1, "Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.E1.

The staff also reviewed the portions of the "parameters monitored or inspected" and "detection of aging effects" program elements associated with enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of these two enhancements is as follows.

Enhancement 1. SLRA Section B.2.1.36 includes an enhancement to the "parameters monitored or inspected" and "detection of aging effects" program elements that relates to the evaluation of plant-specific OE for previously identified and mitigated adverse localized environments' cumulative aging effects applicable to in scope cable and connection insulation to confirm that the insulation's intended functions continue to be supported during the subsequent period of extended operation. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.E1 and finds it acceptable because, when implemented, the program elements will be consistent with AMP XI.E1 and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the cable and connection insulation within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 2. SLRA Section B.2.1.36 includes an enhancement to the “detection of aging effects” program element that relates to testing a sample population when a large number of cables are identified as degraded where the sample size will be 20 percent of each affected cable and connection type, with a maximum sample size of 25. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.E1 and finds it acceptable because, when implemented, the program element will be consistent with AMP XI.E1 and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the cable and connection insulation within the scope of the AMP will be maintained consistent with the CLB.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP XI.E1. In addition, the staff reviewed the enhancements associated with the “parameters monitored or inspected” and “detection of aging effects” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.36 summarizes OE related to the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49, Environmental Qualification Requirements. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements were evaluated.

UFSAR Supplement. SLRA Section A.2.1.36 provides the UFSAR supplement for the Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01. The staff also noted that the applicant committed to enhance the existing Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49, Environmental Qualification Requirements, with the following two enhancements no later than 6 months prior to the subsequent period of extended operation:

(1) The applicant will evaluate plant-specific OE for previously identified and mitigated adverse localized environments’ cumulative aging effects applicable to inscope cable and connection insulation to confirm that the insulation’s intended functions continue to be supported during the subsequent period of extended operation.

(2) The applicant will perform testing of a sample population when a large number of cables are identified as degraded. The sample size will be 20 percent of each affected cable and connection type, with a maximum sample size of 25.

The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancements and finds that, with the enhancements, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.2.21 Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

SLRA Section B.2.1.38 notes that the Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is an existing program with enhancements that will be consistent with the program elements in the GALL-SLR Report AMP XI.E3A, "Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the Subsequent License Renewal Guidance."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL.

The staff also reviewed the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," and "detection of aging effects" program elements associated with enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of these three enhancements are as follows.

Enhancement 1. SLRA Section B.2.1.38 includes an enhancement to the "scope of program," "parameters monitored or inspected," and "detection of aging effects" program elements that relates to performance of cable testing of the circuits in the scope of this program at a frequency of at least once every 6 years. The first periodic test will be performed prior to the subsequent period of extended operation. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL, and finds it acceptable because, when implemented, the program elements will be consistent with AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL, and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the electrical insulation for inaccessible medium-voltage power cables not subject to 10 CFR 50.49 environmental qualification (EQ) requirements within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 2. SLRA Section B.2.1.38 includes an enhancement to the “preventive actions” and “parameters monitored or inspected” program elements that relates to performance of inspections for water accumulation in manholes, duct banks, and conduit ends in the scope of this program after event driven occurrences that could result in water accumulation and cable submergence. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL, and finds it acceptable because, when implemented, the program elements will be consistent with AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL, and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the electrical insulation for inaccessible medium-voltage power cables not subject to 10 CFR 50.49 EQ requirements within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 3. SLRA Section B.2.1.38, includes an enhancement to the “preventive actions” and “parameters monitored or inspected” program elements that relates to performance of periodic inspections for water accumulation in manholes MH-16 and SBO-4. The first periodic inspection will be performed prior to the subsequent period of extended operation. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL, and finds it acceptable because, when implemented the program elements will be consistent with AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL, and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of electrical insulation for inaccessible medium-voltage power cables not subject to 10 CFR 50.49 EQ requirements within the scope of the AMP will be maintained consistent with the CLB.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL, are consistent with the corresponding program elements of GALL-SLR Report AMP XI.E3A, as modified by SLR-ISG-2021-04-ELECTRICAL. In addition, the staff reviewed the enhancements associated with the “scope of program,” “preventive actions,” “parameters monitored or inspected,” and detection of aging effects” program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.38 summarizes OE related to the Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements was evaluated.

UFSAR Supplement. SLRA Section A.2.1.38 provides the UFSAR supplement for the Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01, as modified by SLR-ISG-2021-04-ELECTRICAL.

The staff also noted that the applicant committed to implement the following enhancements to the existing Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Requirement no later than 6 months prior to the subsequent period of extended operation and that tests and inspections that are required to be completed prior to the subsequent period of operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation:

(1) The applicant will perform cable testing of the circuits in the scope of this program at a frequency of at least once every 6 years. The first periodic test will be performed prior to the subsequent period of extended operation.

(2) The applicant will perform inspections for water accumulation in manholes, duct banks, and conduit ends in the scope of this program after event driven occurrences that could result in water accumulation and cable submergence.

(3) The applicant will perform periodic inspections for water accumulation in manholes MH-16 and SBO-4. The first periodic inspection will be performed prior to the subsequent period of extended operation.

The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL, are consistent. The staff also reviewed the enhancements and finds that, with the enhancements when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.2.22 Electrical Insulation for Inaccessible Low- Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

SLRA Section B.2.1.40 notes that the Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program that will be consistent, with one exception, with the program elements in GALL-SLR Report AMP XI.E3C, "Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the Subsequent License Renewal Guidance."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.E3C, as modified by SLR-ISG-2021-04-ELECTRICAL.

The staff also reviewed the portions of the "corrective actions" program element associated with an exception to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this exception is as follows.

Exception 1. SLRA Section B.2.1.40 includes an exception to the "corrective actions" program element related to use of DNPS corrective action program to evaluate results that do not meet acceptance criteria and determine appropriate corrective actions. The staff reviewed this exception against the corresponding program element in GALL-SLR Report AMP XI.E3C, as modified by SLR-ISG-2021-04-ELECTRICAL, and finds it acceptable because, when implemented, the AMP will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the electrical insulation for inaccessible low-voltage power cables not subject to 10 CFR 50.49 EQ requirements within the scope of the AMP will be maintained consistent with the CLB.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL, are consistent with the corresponding program elements of GALL-SLR Report AMP XI.E3C, as modified by SLR-ISG-2021-04-ELECTRICAL. The staff also reviewed the exception associated with the "corrective actions" program element and its justification, and finds that the AMP, with the exception, is adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.40 summarizes OE related to the Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements were evaluated.

UFSAR Supplement. SLRA Section A.2.1.40 provides the UFSAR supplement for the Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49, Environmental Qualification Requirements. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01, as modified by SLR-ISG-2021-04-ELECTRICAL.

The staff also noted that the applicant committed to implement the new Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental

Requirements that will manage the effects of reduced insulation resistance of non-EQ, in scope, inaccessible (e.g., installed in buried conduits, cable trenches, cable troughs, duct banks, underground vaults, or direct buried installations), low-voltage power cables (operating voltage less than 2 kV), exposed to significant moisture no later than 6 months prior to the subsequent period of extended operation and inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.

The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report, as modified by SLR-ISG-2021-04-ELECTRICAL, are consistent. The staff also reviewed the exception and finds that, with the exception when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.2.23 Metal Enclosed Bus

SLRA Section B.2.1.41 notes that the Metal Enclosed Bus is an existing program with an enhancement that will be consistent with the program elements in the GALL-SLR Report AMP XI.E4, "Metal Enclosed Bus."

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL-SLR Report. The staff compared the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP XI.E4.

The staff also reviewed the portions of the "scope of program" program element associated with the enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of this enhancement is as follows.

Enhancement 1. SLRA Section B.2.1.41 includes an enhancement to the "scope of program" program element that relates to performing periodic inspections of the 4kV switchgear 33 accessible bus duct and a sample of metal enclosed bus bolted connections. The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP XI.E4 and finds it acceptable because, when implemented, the AMP will be consistent with GALL-SLR Report AMP XI.E4 and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the cable and connection insulation within the scope of the AMP will be maintained consistent with the CLB.

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of the GALL-SLR Report AMP XI.E4. In addition, the staff reviewed the enhancement associated with the “scope of program” program element and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.2.1.41 summarizes OE related to the Metal Enclosed Bus program. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and review of the application, the staff finds that the conditions and OE at the plant are bounded by those for which the Metal Enclosed Bus was evaluated.

UFSAR Supplement. SLRA Section A.2.1.41 provides the UFSAR supplement for the Metal Enclosed Bus. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table XI-01.

The staff also noted that the applicant committed to enhancing the existing Metal Enclosed Bus with the following enhancement no later than 6 months prior to the subsequent period of extended operation with inspections required to be completed prior to the subsequent period of extended operation completed no later than the last refueling outage prior to the subsequent period of extended operation:

> Perform periodic inspections of the 4kV switchgear 33 accessible bus duct and a sample of metal enclosed bus bolted connections. The first periodic inspection will be performed prior to the subsequent period of extended operation.

The staff finds that the information in the UFSAR supplement is an adequate summary of description of the program.

Conclusion. Based on its review of the applicant’s Metal Enclosed Bus, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement and finds that, with the enhancement when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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).

3.0.3.2.24 Fatigue Monitoring

SLRA Section B.3.1.1, as amended by letter dated February 20, 2025, states that the Fatigue Monitoring AMP is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP X.M1, “Fatigue Monitoring.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP X.M1.

The staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements associated with the program enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff's evaluation of these enhancements follows.

Enhancement 1. SLRA Section B.3.1.1 includes an enhancement to the "scope of program" program element. The enhancement relates to updating the fatigue monitoring software (i.e., SI:FatiguePro software) to monitor for environmentally assisted fatigue (EAF) at additional plant-specific component locations that may be more limiting than the sample set identified in NUREG/CR-6260. In this enhancement, the environmentally adjusted cumulative usage factor (CUF_{en}) values for the additional plant-specific EAF locations will be calculated in accordance with the methodology in NUREG/CR-6909, Revision 1.

The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, the enhancement will ensure that (1) the program monitors the plant-specific limiting EAF locations that may be more limiting than the EAF locations identified in NUREG/CR-6260; and (2) the CUF_{en} values are calculated in accordance with the methodology in NUREG/CR-6909, Revision 1, consistent with GALL-SLR AMP X.M1.

Enhancement 2. SLRA Section B.3.1.1 includes an enhancement to the "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements. The enhancement relates to providing procedural direction to require periodic validation of chemistry parameters that are used to determine the environmental fatigue correction factor (F_{en}). The F_{en} values are used in the CUF_{en} calculations. The water chemistry parameters are controlled and tracked in accordance with the Water Chemistry AMP (SLRA Section B.2.1.2).

The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, the enhancement will ensure that the F_{en} and CUF_{en} calculations use the water chemistry parameters (e.g., dissolved oxygen) as monitored in the Water Chemistry AMP.

Enhancement 3. SLRA Section B.3.1.1 includes an enhancement to the "monitoring and trending" program element. The enhancement relates to updating applicable fatigue analyses and monitored component locations based on OE, plant modifications, inspection findings, changes to transient definitions, and unanticipated newly discovered fatigue loading events.

The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, the AMP will ensure that:

(1) The applicant evaluates the OE, inspection results, plant modifications, fatigue loading events and changes to transient definitions.

(2) Based on the evaluation, the applicant updates applicable fatigue analyses and component locations for fatigue monitoring such that the effectiveness of fatigue monitoring is maintained for the subsequent period of extended operation.

Enhancement 4. SLRA Section B.3.1.1 as amended by letter dated February 20, 2025, includes an enhancement to the "scope of program" program element. The enhancement relates to updating the fatigue monitoring software (SI:FatiguePro software) to include all six stress components in the stress-based fatigue monitoring.

The staff reviewed this enhancement against the corresponding program element in GALL-SLR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, the AMP will ensure that the stress-based fatigue monitoring considers all six stress components, consistent with the guidance in NRC Regulatory Issue Summary 2008-30 (i.e., considering all six stress components in the fatigue analysis and monitoring in accordance with ASME Code Section III, NB-3200).

Based on its review of the SLRA, the staff finds that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements, for which the applicant claimed consistency with the GALL-SLR Report, are consistent with the corresponding program elements of GALL-SLR Report AMP X.M1.

In addition, the staff reviewed the enhancements associated with the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.3.1.1 summarizes OE related to the Fatigue Monitoring AMP. The staff also reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE to (1) identify examples of age-related degradation as documented in the applicant's corrective action program database and (2) provide a basis for the staff's conclusion on the ability of the applicant's proposed AMP to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

UFSAR Supplement. SLRA Section A.3.1.1, as amended by letter dated February 20, 2025, provides the UFSAR supplement of the Fatigue Monitoring AMP. The staff also noted that the applicant committed to implementing the program enhancements no later than 6 months prior to the subsequent period of extended operation, as described in SLRA Table A.5. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table X-01. The staff finds that the information in the UFSAR supplement is an adequate summary of description of the program.

Conclusion. Based on its review of the applicant's Fatigue Monitoring AMP, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancements and finds that, with the enhancements when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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 Environmental Qualification of Electric Equipment

SLRA Section B.3.1.3 notes that the Environmental Qualification of Electric Equipment is an existing program with an enhancement that will be consistent, with the program elements in the GALL-SLR Report AMP X.E1, “Environmental Qualification of Electric Equipment.”

Staff Evaluation. The staff reviewed the applicant’s claim of consistency with the GALL-SLR Report. The staff compared the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA to the corresponding program elements of GALL-SLR Report AMP X.E1.

The staff also reviewed the portions of the “detection of aging effects” program element associated with an enhancement to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of this enhancement is as follows.

Enhancement 1. SLRA Section B.3.1.3 includes an enhancement to the “detection of aging effects” program element that relates to visually inspecting accessible, passive EQ equipment located in adverse localized environments at least once every 10 years. The staff reviewed this enhancement against the corresponding program elements in GALL-SLR Report AMP X.E1 and finds it acceptable because, when implemented, the program will be consistent with AMP X.E1 and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of environmentally qualified electric components within the scope of the AMP will be maintained consistent with the current licensing basis.

Based on its review of the SLRA, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent with the corresponding program elements of GALL-SLR Report AMP X.E1. In addition, the staff reviewed the enhancement associated with the “detection of aging effects” program element and finds that, when implemented, the AMP will be adequate to manage the applicable aging effects.

Operating Experience. SLRA Section B.3.1.3 summarizes OE related to the Environmental Qualification of Electric Equipment. The staff reviewed OE information in the application and during the audit. As discussed in the audit report, the staff reviewed search results of the plant OE information to (1) identify examples of age-related degradation as documented in the applicant’s corrective action program database and (2) provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs to manage the effects of aging in the subsequent period of extended operation. The staff did not identify any OE indicating that the applicant should modify its proposed program.

UFSAR Supplement. SLRA Section A.3.1.3 provides the UFSAR supplement for the Environmental Qualification of Electric Equipment. The staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-SLR Report Table X-01. The staff also noted that the applicant committed to enhance the EQ of Electric Equipment program to require visual inspection of accessible, passive EQ equipment located in adverse localized environments at least once every 10 years. The first periodic inspection will be performed prior to the subsequent period of extended operation. The EQ of Electric Equipment program will be enhanced no later than 6 months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation. The staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion. Based on its review of the applicant's Environmental Qualification of Electric Equipment, the staff concludes that those program elements for which the applicant claimed consistency with the GALL-SLR Report are consistent. The staff also reviewed the enhancement, and finds that, with the enhancement, when implemented, the AMP will be adequate to manage the applicable aging effects. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the subsequent 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

The regulations at 10 CFR 54.21(a)(3) require SLR applicants to demonstrate that, for SCs subject to an AMR, applicants will adequately manage aging in a way that maintains intended function(s) consistent with the CLB for the subsequent period of extended operation. SRP-SLR, Appendix A.1, Branch Technical Position (ASTM) RLSB-1, "Aging Management Review—Generic," describes 10 elements of an acceptable aging management program (AMP). Program elements 7, 8, and 9 are associated with the QA activities of corrective actions, confirmation process, and administrative controls, respectively. Branch Technical Position (BTP) RLSB-1, Table A.1-1, "Elements of an Aging Management program for Subsequent License Renewal," describes these program elements as follows:

- *Corrective Actions* – Corrective actions, including root cause determination and prevention of recurrence, should be timely.
- *Confirmation Process* – The confirmation process should ensure that corrective actions have been completed and are effective.
- *Administrative Controls* – Administrative controls should provide a formal review and approval process.

SRP-SLR Appendix A.2, BTP IQMB-1, "Quality Assurance for Aging Management Programs," notes that AMP aspects that affect the quality of safety-related SSCs are subject to the QA requirements of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Additionally, the SRP-SLR states that, for nonsafety-related SCs subject to an AMR, applicants may use the existing 10 CFR Part 50, Appendix B, QA program to address program element 7 ("corrective actions"), program element 8 ("confirmation process"), and program element 9 ("administrative controls"). BTP IQMB 1 provides the following guidance on the QA attributes of AMPs:

- Safety-related SCs are subject to 10 CFR Part 50 Appendix B requirements, which are adequate to address all quality related aspects of an AMP consistent with the CLB of the facility for the subsequent period of extended operation.

- For nonsafety-related SCs that are subject to an AMR for SLR, an applicant has the option to expand the scope of its 10 CFR Part 50 Appendix B program to include these SCs to address [Program Element 7] corrective actions, [Program Element 8] confirmation process, and [Program Element 9] administrative controls for aging management during the subsequent period of extended operation. The reviewer verifies that the applicant has documented such a commitment in the Final Safely Analysis Report supplement in accordance with 10 CFR 54.21(d).
- If an applicant chooses an alternative means to address corrective actions, confirmation process, and administrative controls for managing aging of nonsafety-related SCs that are subject to an AMR for SLR, the applicant's proposal is reviewed on a case-by-case basis following the guidance in BTP RLSB 1.

3.0.4.1 Summary of Technical Information in Application

SLRA Appendix A, "Updated Final Safety Analysis Report Supplement," Section A.1.5, "Quality Assurance Program and Administrative Controls," and SLRA Appendix B, "Aging Management Programs," Section B.1.3, "Quality Assurance Program and Administrative Controls," describe the elements of corrective actions, confirmation process, and administrative controls applied to the AMPs for both safety-related and nonsafety-related components.

3.0.4.2 Staff Evaluation

The staff reviewed SLRA Appendix A, Section A.1.5, and SLRA Appendix B, Section B.1.3, which describe how the applicant's existing QA program includes corrective actions, confirmation process, and administrative controls for AMPs, consistent with the staff's guidance described in BTP IQMB-1 and is applicable to safety-related and nonsafety-related SSCs and commodity groups within the scope of AMPs. Based on its review, the staff determined that the QA attributes presented in the AMP basis documents and the associated AMPs are consistent with the staff's position on QA for aging management.

3.0.4.3 Conclusion

On the basis of the staff's review of SLRA Appendix A, Section A.1.5, and SLRA Appendix B, Section B.1.3, the staff finds that the QA attributes presented in the AMP basis documents and the associated AMPs are consistent with SRP-SLR BTPs RLSB-1 and IQMB-1 and that the QA attributes will be maintained such that the applicant will adequately manage aging in a way that maintains intended function(s) consistent with the CLBs for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

3.0.5 Operating Experience for Aging Management Programs

3.0.5.1 Summary of Technical Information in the Application

SLRA Appendix A, Section A.1.6 , "Operating Experience," and SLRA Appendix B, Section B.1.4, "Operating Experience," describe the consideration of OE for AMPs. These sections state that the applicant systematically reviews plant-specific and industry OE concerning aging management and age-related degradation to ensure that the SLR AMPs will be effective in managing the aging effects for which they are credited. OE for the programs credited with managing the effects of aging are reviewed to identify corrective actions that may result in program enhancements.

3.0.5.2 Staff Evaluation

3.0.5.2.1 Overview

In accordance with 10 CFR 54.21(a)(3), an applicant is required to demonstrate that the effects of aging on SCs subject to an AMR will be adequately managed so that their intended functions will be maintained in a way that is consistent with the CLB for the subsequent period of extended operation. SRP-SLR, Appendix A.4, “Operating Experience for Aging Management Programs,” states that the systematic review of plant-specific and industry OE, including relevant research and development concerning aging management and age-related degradation, ensures that the SLR AMPs are, and will continue to be, effective in managing the aging effects for which they are credited. In addition, the SRP-SLR states that the AMPs should either be enhanced or new AMPs developed, as appropriate, when it is determined through the evaluation of OE that the effects of aging may not be adequately managed. AMPs should be informed by the review of OE on an ongoing basis, regardless of the AMPs’ implementation schedule.

3.0.5.2.2 Consideration of Future Operating Experience

The staff reviewed SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, to determine how the applicant will use future OE to ensure that the AMPs are effective. The staff evaluated the applicant’s OE review activities as described in the SLRA.

3.0.5.2.3 Acceptability of Existing Programs

SRP-SLR Section A.4.2, “Position,” describes existing programs generally acceptable to the staff for the capture, processing, and evaluation of OE concerning age-related degradation and aging management during the term of a subsequent renewed operating license. The acceptable programs are those relied on to meet the requirements of 10 CFR Part 50, Appendix B, and item I.C.5, “Procedures for Feedback of Operating Experience to Plant Staff,” in NUREG-0737, “Clarification of TMI Action Plan Requirements,” issued November 1980 (ML051400209), as incorporated into the licensee’s technical specifications. SRP-SLR Section A.4.2 also states that, as part of meeting the requirements of NUREG-0737, item I.C.5, the applicant’s OE program should rely on active participation in the Institute of Nuclear Power Operations (INPO) OE program (formerly the INPO Significant Event Evaluation and Information Network (SEE-IN)) endorsed in Generic Letter 82-04, “Use of INPO SEE-IN Program,” dated March 9, 1982.

SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, state that the applicant uses its OE program to systematically capture and review OE from plant-specific and industry sources. The SLRA also states that the OE program meets the requirements of NUREG-0737. The SLRA further states that the OE program interfaces and relies on active participation in the INPO OE program. Based on this information, the staff finds this aspect of that the applicant’s OE program is consistent with the programs described in SRP-SLR Section A.4.2.

3.0.5.2.4 Areas of Further Review

<u>Application of Existing Programs and Procedures to the Processing of Operating Experience Related to Aging.</u> SRP-SLR Section A.4.2 states that the programs and procedures relied on to meet the requirements of 10 CFR Part 50, Appendix B, and NUREG-0737, item I.C.5, should not preclude the consideration of OE in age-related degradation and aging management.

SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, state that OE from plant-specific and industry sources is systematically captured and reviewed on an ongoing basis in accordance with the QA program, which is consistent with 10 CFR Part 50, Appendix B, and the OE program, which is consistent with NUREG-0737, item I.C.5. The SLRA also states that the ongoing evaluation of OE includes a review of corrective actions, which may result in program enhancements. The SLRA further states that trending reports, program health reports, assessments, and corrective actions program items were reviewed to determine whether aging effects have been identified on applicable components.

Based on this information, the staff determined that the processes implemented under the applicant's QA, corrective actions, and OE programs would not preclude consideration of age-related OE, which is consistent with the guidance in SRP-SLR Section A.4.2.

In addition, SRP-SLR Section A.4.2 states that the applicant should use the option described in SRP-SLR Appendix A.2 to expand the scope of the QA program in 10 CFR Part 50, Appendix B, to include nonsafety-related SCs.

SLRA Appendix A, Section A.1.5, and SLRA Appendix B, Section B.1.3, state that the applicant's QA program includes nonsafety-related SCs, which the staff finds consistent with the guidance in SRP-SLR Section A.2 and SRP-SLR Section A.4.2. SE Section 3.0.4 documents the staff's evaluation of SLRA Appendix A, Section A1, and SLRA Appendix B, Section B1.3, relative to the application of the QA program to nonsafety-related SSCs.

<u>Consideration of Guidance Documents as Industry Operating Experience.</u> SRP-SLR Section A.4.2 states that NRC and industry guidance documents and standards applicable to aging management, including revisions to the GALL-SLR Report, should be considered as sources of industry OE and evaluated accordingly.

SLRA Appendix B, Section B.1.4, states that the sources of external OE include INPO documents, NRC documents, and other documents, as well as relevant research and development information.

Based on its review, the staff finds that the applicant will consider an appropriate breadth of industry OE for impacts on its aging management activities, which includes sources that the staff considers to be the primary sources of external OE information. Because the applicant's consideration of guidance documents as industry OE is consistent with the guidance in SRP-SLR Section A.4.2, the staff finds this aspect of the OE program acceptable.

<u>Screening of Incoming Operating Experience.</u> SRP-SLR Section A.4.2 states that all incoming plant-specific and industry OE should be screened to determine whether it involves age-related degradation or impacts on aging management activities.

SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, state that internal and external OE is captured and systematically reviewed on an ongoing basis and that the OE program provides for evaluation of site-specific and industry OE items that are screened to determine whether they involve lessons learned that may impact AMPs. Items are evaluated, and affected AMPs are either enhanced or new AMPs are developed, as appropriate, when it is determined that the effects of aging are not adequately managed. Based on its review, the staff finds that the applicant's OE review processes will include screening of all new OE to identify and evaluate items that can impact aging management activities. Because the applicant's screening of incoming OE is consistent with the guidance in SRP-SLR Section A.4.2, the staff finds this aspect of the OE program acceptable.

Identification of Operating Experience Related to Aging. SRP-SLR Section A.4.2 states that coding should be used within the plant corrective actions program to identify OE involving age-related degradation applicable to the plant. The SRP-SLR also states that the associated entries should be periodically reviewed, and any adverse trends should receive further evaluation.

SLRA Appendix B, Section B.1.4, states that the corrective actions program identifies either plant-specific OE related to aging or industry OE related to aging, allowing the tracking and trending of this information.

Based on its review, the staff finds that the applicant’s identification of OE related to aging is consistent with the guidance in SRP-SLR Section A.4.2; therefore, the staff finds this aspect of the OE program acceptable.

Information Considered in Operating Experience Evaluations. SRP-SLR Section A.4.2 states that OE identified as involving aging should receive further evaluation based on consideration of the information, such as the affected SSCs, materials, environments, aging effects, aging mechanisms, and AMPs. The SRP-SLR also states that actions should be initiated within the corrective actions program to either enhance the AMPs or develop and implement new AMPs if an OE evaluation finds that the effects of aging may not be adequately managed.

SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, state that the applicant’s program requires that, when evaluations indicate that the effects of aging are not being adequately managed, the affected AMPs are either enhanced or new AMPs are developed, as appropriate.

The staff determined that the applicant’s evaluations of age-related OE must include the assessment of appropriate information to determine potential impacts on aging management activities. The staff also determined that the applicant’s OE program, in conjunction with the corrective actions program, would implement any changes necessary to manage the effects of aging, as determined through its OE evaluations. Therefore, the staff finds that the information considered in the applicant’s OE evaluations and the use of the OE program and the corrective actions program to ensure that the effects of aging are adequately managed are consistent with the guidance in SRP-SLR Section A.4.2.

Evaluation of AMP Implementation Results. SRP-SLR Section A.4.2 states that the results of implementing the AMPs, such as data from inspections, tests, and analyses, should be evaluated regardless of whether the acceptance criteria of the particular AMP have been met. SRP-SLR Section A.4.2 states that this information should be used to determine whether it is necessary to adjust the inspection activities for aging management. In addition, SRP-SLR Section A.4.2 states that actions should be initiated within the plant corrective actions program to either enhance the AMPs or develop and implement new AMPs if these evaluations indicate that the effects of aging may not be adequately managed.

SLRA Appendix B, Section B.1.4, states that internal OE is found in condition reports, issue reports, OE reports, trending reports, program health reports, and program assessments. In addition, SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B1.4, state that either AMPs are enhanced or new AMPs developed, as appropriate, when it is determined through the evaluation of OE that the effects of aging may not be adequately managed. SLRA Appendix B, Section B.1.4, states that the OE program also meets the requirements of NEI 14-12, “Aging Management Program Effectiveness,” (ML15090A665) issued December 2014, for periodic program assessments.

Based on its review, the staff finds that the applicant’s treatment of AMP implementation results as OE is consistent with the guidance in SRP-SLR Section A.4.2; therefore, the staff finds this aspect of the OE program acceptable.

Training. SRP-SLR Section A.4.2 states that training on age-related degradation and aging management should be provided to those personnel responsible for implementing the AMPs and those personnel who may submit, screen, assign, evaluate, or otherwise process plant-specific and industry OE. SRP-SLR Section A.4.2 also states that the training should be periodic and include provisions to accommodate the turnover of plant personnel.

SLRA Appendix A, Section A.1.6 states that the OE program provides training to those responsible for activities including screening, evaluating, and processing OE items related to aging management and age-related degradation.

Based on its review, the staff finds that the scope of personnel included in the applicant’s training program is consistent with the guidance in SRP-SLR Section 4.2; therefore, the staff finds this aspect of the OE program acceptable.

Reporting Operating Experience to the Industry. SRP-SLR Section A.4.2 states that guidelines should be established for reporting plant-specific OE to the industry on age-related degradation and aging management.

SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, state that the applicant’s OE program actively participates in the INPO OE program. Based on its review, the staff finds that the applicant’s reporting of OE to the industry is consistent with the guidance in SRP-SLR Section 4.2; therefore, the staff finds this aspect of the OE program acceptable.

Schedule for Implementing the Operating Experience Review Activities. SRP-SLR Section A.4.2 states that the OE review activities should be implemented on an ongoing basis throughout the term of a subsequent renewed license.

SLRA Appendix B, Section B.1.4, states that the applicant’s self-assessment process provides for periodic evaluation of the effectiveness of the OE program described in the UFSAR supplement. SLRA Appendix A, Section A.1.6, and SLRA Appendix B, Section B.1.4, provides assurance that the OE program will be implemented on an ongoing basis throughout the term of the subsequent renewed license. SLRA Appendix A, Section A.1, provides the UFSAR supplement summary description of the applicant’s enhanced programmatic activities for the ongoing review of OE. Upon issuance of the subsequent renewed licenses in accordance with 10 CFR 54.3(c), this summary description will be incorporated into the CLBs, and at that time, the applicant will be obligated to conduct its OE review activities accordingly.

The staff finds the implementation schedule acceptable because the applicant will implement the OE review activities on an ongoing basis throughout the term of the subsequent renewed operating licenses.

3.0.5.2.5 Conclusion

Based on its review of the SLRA, the staff determined that the applicant's programmatic activities for the ongoing review of OE are acceptable for (1) the systematic review of plant-specific and industry OE to ensure that the SLR AMPs are, and will continue to be, effective in managing the aging effects for which they are credited, and (2) the enhancement of AMPs or the development of new AMPs when it is determined through the evaluation of OE that the effects of aging may not be adequately managed. Based on its review, the staff finds that the applicant's OE review activities are consistent with the guidance in SRP-SLR Section 4.2; therefore, the staff finds the applicant's programmatic activities for the ongoing review of OE acceptable.

3.0.5.3 UFSAR Supplement

In accordance with 10 CFR 54.21(d), the UFSAR supplement must, in part, contain a summary description of the programs and activities for managing the effects of aging. SLRA Appendix A, Section A.1.0, provides the UFSAR supplement summary description of the applicant's programmatic activities for the ongoing review of OE that will ensure that plant-specific and industry OE related to aging management will be used effectively.

Based on its review, the staff determined that the content of the applicant's summary description is consistent with guidance and is sufficiently comprehensive to describe the applicant's programmatic activities for evaluating OE to maintain the effectiveness of the AMPs. Therefore, the staff finds the applicant's UFSAR supplement summary description acceptable.

3.0.5.4 Conclusion

Based on its review of the applicant's programmatic activities for the ongoing review of OE, the staff finds that the applicant has demonstrated that OE will be reviewed to ensure that the effects of aging will be adequately managed so that the intended functions will remain consistent with the CLBs for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for these activities and finds that it provides an adequate summary description, as required by 10 CFR 54.21(d).

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

3.1.1 Summary of Technical Information in the Application

The SLRA Report Section 3.1 provides AMR results for those components the applicant identified in SLRA Section 2.3.1, "Reactor Vessel, Internals, and Reactor Coolant System," as being subject to an AMR. SLRA Table 3.1.1, "Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-SLR Report for the components and component groups.

3.1.2 Staff Evaluation

Table 3.1-1 summarizes the NRC staff's evaluation of the component groups listed in SLRA Section 3.1 and addressed in the GALL-SLR Report.

Table 3.1-1 Staff Evaluation for Reactor Vessel, Internals, and Reactor Coolant System Components in the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.1.1-001	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.1)
3.1.1-002	Not applicable to BWRs
3.1.1-003	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.1)
3.1.1-004	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.1)
3.1.1-005	Not applicable to BWRs
3.1.1-006	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.1)
3.1.1-007	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.1)
3.1.1-008	Not applicable to BWRs
3.1.1-009	Not applicable to BWRs
3.1.1-010	Not applicable to BWRs
3.1.1-011	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.1)
3.1.1-012	Not applicable to BWRs
3.1.1-013	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.3, item 1)
3.1.1-014	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.3, item 2)
3.1.1-015	Not applicable to BWRs
3.1.1-016	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.4, item 1)
3.1.1-017	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.4, item 2)
3.1.1-018	Not applicable to BWRs
3.1.1-019	Not applicable to BWRs
3.1.1-020	Not applicable to BWRs
3.1.1-021	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.7)
3.1.1-022	Not applicable to BWRs
3.1.1-023	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-024	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-025	Not applicable to BWRs
3.1.1-026	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-027	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-028	Not applicable to BWRs
3.1.1-029	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.12)
3.1.1-030	Consistent with the GALL-SLR Report
3.1.1-031	Consistent with the GALL-SLR Report
3.1.1-032	Not applicable to BWRs
3.1.1-033	Not applicable to BWRs
3.1.1-034	Not applicable to BWRs
3.1.1-035	Not applicable to BWRs
3.1.1-036	Not applicable to BWRs
3.1.1-037	Not applicable to BWRs
3.1.1-038	Consistent with the GALL-SLR Report
3.1.1-039	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.1.1-040	Not applicable to BWRs
3.1.1-040a	Not applicable to BWRs
3.1.1-041	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.12)
3.1.1-042	Not applicable to BWRs
3.1.1-043	Consistent with the GALL-SLR Report
3.1.1-044	Not applicable to BWRs
3.1.1-045	Not applicable to BWRs
3.1.1-046	Not applicable to BWRs
3.1.1-047	Not applicable to BWRs
3.1.1-048	Not applicable to BWRs
3.1.1-049	Not applicable to BWRs
3.1.1-050	Consistent with the GALL-SLR Report
3.1.1-051a	Not applicable to BWRs
3.1.1-051b	Not applicable to BWRs
3.1.1-052a	Not applicable to BWRs
3.1.1-052b	Not applicable to BWRs
3.1.1-052c	Not applicable to BWRs
3.1.1-053a	Not applicable to BWRs
3.1.1-053b	Not applicable to BWRs
3.1.1-053c	Not applicable to BWRs
3.1.1-054	Not applicable to BWRs
3.1.1-055a	Not applicable to BWRs
3.1.1-055b	Not applicable to BWRs
3.1.1-055c	Not applicable to BWRs
3.1.1-056a	Not applicable to BWRs
3.1.1-056b	Not applicable to BWRs
3.1.1-056c	Not applicable to BWRs
3.1.1-057	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-058a	Not applicable to BWRs
3.1.1-058b	Not applicable to BWRs
3.1.1-059a	Not applicable to BWRs
3.1.1-059b	Not applicable to BWRs
3.1.1-059c	Not applicable to BWRs
3.1.1-060	Consistent with the GALL-SLR Report
3.1.1-061	Not applicable to BWRs
3.1.1-062	Consistent with the GALL-SLR Report
3.1.1-063	Consistent with the GALL-SLR Report
3.1.1-064	Not applicable to BWRs
3.1.1-065	Not applicable to BWRs
3.1.1-066	Not applicable to BWRs
3.1.1-067	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.1.1-068	Not applicable to BWRs
3.1.1-069	Not applicable to BWRs
3.1.1-070	Not applicable to BWRs
3.1.1-071	Not applicable to BWRs
3.1.1-072	Not applicable to BWRs
3.1.1-073	Not applicable to BWRs
3.1.1-074	Not applicable to BWRs
3.1.1-075	Not applicable to BWRs
3.1.1-076	Not applicable to BWRs
3.1.1-077	Not applicable to BWRs
3.1.1-078	Not applicable to BWRs
3.1.1-079	Consistent with the GALL-SLR Report
3.1.1-080	Not applicable to BWRs
3.1.1-081	Not applicable to BWRs
3.1.1-082	Not applicable to BWRs
3.1.1-083	Not applicable to BWRs
3.1.1-084	Consistent with the GALL-SLR Report
3.1.1-085	Consistent with the GALL-SLR Report
3.1.1-086	Not applicable to BWRs
3.1.1-087	Not applicable to BWRs
3.1.1-088	Not applicable to BWRs
3.1.1-089	Not applicable to BWRs
3.1.1-090	Not applicable to BWRs
3.1.1-091	Consistent with the GALL-SLR Report
3.1.1-092	Not applicable to BWRs
3.1.1-093	Not applicable to BWRs
3.1.1-094	Consistent with the GALL-SLR Report
3.1.1-095	Consistent with the GALL-SLR Report
3.1.1-096	Consistent with the GALL-SLR Report
3.1.1-097	Consistent with the GALL-SLR Report
3.1.1-098	Consistent with the GALL-SLR Report
3.1.1-099	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.13)
3.1.1-100	Consistent with the GALL-SLR Report
3.1.1-101	Consistent with the GALL-SLR Report
3.1.1-102	Consistent with the GALL-SLR Report
3.1.1-103	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.12)
3.1.1-104	Not used (addressed by 3.1.1-103)
3.1.1-105	Not applicable to DNPS (see SE Section 3.1.2.2.15)
3.1.1-106	Not applicable to DNPS
3.1.1-107	Consistent with the GALL-SLR Report
3.1.1-108	This item number is not used in the SRP-SLR or the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.1.1-109	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-110	Not applicable to DNPS
3.1.1-111	Not applicable to BWRs
3.1.1-112	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-113	Consistent with the GALL-SLR Report
3.1.1-114	Consistent with the GALL-SLR Report
3.1.1-115	Not applicable to DNPS (see SE Section 3.1.2.2.15)
3.1.1-116	Not applicable to BWRs
3.1.1-117	Not applicable to BWRs
3.1.1-118	Not applicable to BWRs
3.1.1-119	Not applicable to BWRs
3.1.1-120	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.14)
3.1.1-121	Consistent with the GALL-SLR Report
3.1.1-122	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-123	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-124	Consistent with the GALL-SLR Report
3.1.1-125	Not applicable to BWRs
3.1.1-126	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-127	Not applicable to BWRs
3.1.1-128	Consistent with the GALL-SLR Report
3.1.1-129	Not applicable to DNPS
3.1.1-130	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-131	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-132	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-133	Consistent with the GALL-SLR Report
3.1.1-134	Not used (addressed by 3.4.1-064)
3.1.1-135	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-136	Consistent with the GALL-SLR Report (see SE Section 3.1.2.2.16)
3.1.1-137	Not applicable to DNPS
3.1.1-138	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.1.1-139	Not applicable to BWRs

The NRC staff's review of component groups, as described in SE Section 3.0.2.2, is summarized in the following three sections:

(1) SE Section 3.1.2.1 discusses AMR results for components that the applicant states are either not applicable to DNPS, or are consistent with the GALL-SLR Report. Section 3.1.2.1.1 summarizes the staff's review of AMR items that are not applicable, or not used, and documents any RAIs issued and the staff's conclusions. SE Section 3.1.2.1.2 documents the review of components that required additional information or otherwise required further explanation.

(2) SE Section 3.1.2.2 discusses AMR results for which the GALL-SLR Report and SRP-SLR recommend further evaluation.

(3) SE Section 3.1.2.3 discusses AMR results for components that the applicant stated are not consistent with, or not addressed in, the GALL-SLR Report. These AMR results typically are identified by generic notes F through J, and plant-specific notes in the SLRA.

3.1.2.1 Aging Management Review Results Consistent with the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Tables 3.1.2-1 through 3.1.2-3 that the applicant determined to be consistent with the GALL-SLR Report. The staff audited and reviewed the information in the SLRA. The staff did not repeat its review of the matters described in the GALL-SLR Report; the staff verified that the material presented in the SLRA was applicable and that the applicant identified the appropriate GALL-SLR Report information for AMRs. For those AMR items that the staff found to be consistent with the GALL-SLR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions as documented in the GALL-SLR Report are considered to be the basis for acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-SLR Report" is documented in SE Table 3.1-1, and no separate write-up is required or provided.

3.1.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

SE Table 3.1-1 identifies the SLRA Table 3.1.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are neither used nor applicable to DNPS. The NRC staff reviewed the SLRA and UFSAR and confirmed that the applicant's SLRA does not have any AMR results that are applicable for these AMR items.

SE Table 3.1-1 identifies the SLRA Table 3.1.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not applicable because the associated AMR items are only applicable to pressurized water reactors (PWRs) while DNPS are boiling water reactor (BWR) units. The NRC staff reviewed the SRP-SLR, confirmed that these AMR items only apply to PWRs, and finds that these AMR items are not applicable to DNPS.

SE Table 3.1-1 identifies the SLRA Table 3.1.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not used because they are addressed by other SLRA Table 1 AMR items. The NRC staff reviewed the SLRA and confirmed that aging effects will be addressed by other SLRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate AMR items acceptable.

3.1.2.1.2 Loss of Material Due to Pitting, Crevice Corrosion

SLRA Section 3.1.1, associated with SLRA Table 3.1.1, AMR item 3.1.1-043, addresses loss of material due to pitting and crevice corrosion for stainless steel and nickel-alloy reactor vessel internal components exposed to reactor coolant, which will be managed by the Water Chemistry (B.2.1.2) and the BWR Vessel Internals programs (B.2.1.7). The applicant stated that the BWR Vessel Internals program (B.2.1.7) is used in lieu of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program (B.2.1.1).

The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.1. In its review of components associated with AMR item 3.1.1-043, the staff finds that the applicant has met the further evaluation criteria because the applicant uses the Water Chemistry program to mitigate potential loss of material due to pitting and crevice corrosion, and the BWR Vessel

Internals program in lieu of the ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD program to monitor these components for potential loss of material due to pitting and crevice corrosion. The staff's evaluation of the BWR Vessel Internals program and the Water Chemistry program are documented in SE Sections 3.0.3.2.3 and 3.0.3.2.1, respectively.

For stainless steel and nickel-alloy reactor vessel internal components exposed to reactor coolant associated with AMR item 3.1-1, 043, the staff concludes that the SLRA is consistent with the GALL-SLR Report, and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

SLRA Table 3.1.1, item 3.1.1-085 addresses loss of material due to pitting, crevice corrosion for stainless steel, nickel alloy, and steel with nickel-alloy or stainless steel cladding reactor vessel flanges, nozzles, penetrations, safe ends, vessel shells, heads and welds exposed to reactor coolant. For the associated SLRA Table 2 AMR items that cite generic note E, the SLRA credits the BWR Vessel Internals program to manage the aging effects for these AMR items. In SLRA Table 3.1.2-2, "Reactor Vessel," item 3.1.1-085 addresses loss of material for stainless-steel and nickel-alloy Reactor Vessel Penetrations: control rod drive stub tubes and housing; in core monitor housings exposed to reactor coolant environment. Table 3.1.2-2 plant-specific note 4 states, "The BWR Vessel Internals (B.2.1.7) program is substituted to manage the aging effects applicable to this component, material, and environment combination." The staff noted that the BWR Vessel Internals program is an existing program that includes periodic inspection and flaw evaluation to manage age-related degradation of the reactor vessel internals.

Based on its review of the components associated with AMR item 3.1.1-085, which cite generic note E in SLRA Table 3.1.2-2, the staff finds the applicant's proposal to use the BWR Vessel Internals program acceptable because this program includes periodic inspections and flaw evaluation guidelines capable of detecting and adequately managing loss of material for these components.

3.1.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-SLR Report

In SLRA Section 3.1.2.2, the applicant further evaluates aging management for the reactor vessel, internals, and reactor coolant system components, as recommended by the GALL-SLR Report, and the applicant provides information concerning how it will manage the applicable aging effects. The NRC staff reviewed the applicant's evaluation of these component groups against the criteria contained in SRP-SLR Section 3.1.2.2. The following subsections document the staff's review.

3.1.2.2.1 Cumulative Fatigue Damage

SLRA Section 3.1.2.2.1, associated with AMR items 3.1.1-001, 003, 004, 006, 007 and 011, as amended by letter dated February 20, 2025 (ML25051A253), indicates that the TLAA on cumulative fatigue damage in the reactor vessel, reactor vessel internals, and reactor coolant pressure boundary systems is evaluated in accordance with 10 CFR 54.21(c) and is addressed in SLRA Section 4.3.

The staff finds that the applicant's AMR results for the fatigue TLAA are consistent with SRP-SLR Section 3.1.2.2.1 and are, therefore, acceptable. The staff's evaluation of the fatigue TLAA for the reactor vessel, reactor vessel internals, and reactor coolant pressure boundary systems is documented in SE Section 4.3. In addition, the staff finds that SLRA AMR items 3.1.1-002, 3.1.1-005, 3.1.1-008, 3.1.1-009, and 3.1.1-010 are appliable only to PWRs and, therefore, are not applicable to the DNPS, which is a BWR plant.

3.1.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

Items 1 and 2. The applicant claimed that this further evaluation is not applicable because it is specific to PWRs, and the DNPS units are BWRs. The staff reviewed the SLRA and the corresponding SRP-SLR AMR items and concluded that the applicant's claim is reasonable.

3.1.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

Item 1. SLRA Section 3.1.2.2.3.3, associated with SLRA Table 3.1.1, AMR item 3.1.1-013, addresses loss of fracture toughness due to neutron irradiation embrittlement for all ferritic materials that have a neutron fluence greater than 1,017 n/cm^2 (E >1 MeV) at the end of the subsequent period of extended operation. The applicant stated that the evaluation of neutron irradiation embrittlement for all ferritic reactor vessel and internals system components that have a projected neutron fluence value greater than 1,017 n/cm^2 (E >1 MeV) at the end of the subsequent license renewal term is evaluated as a TLAA as discussed in SLRA Section 4.2. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.3.3.

The staff confirmed that SLRA Section 4.2 specifically addresses the ferritic materials that have a neutron fluence greater than 1,017 n/cm^2 (E >1 MeV) at the end of the subsequent period of extended operation. Based on its review, the applicant's assessment of reactor pressure vessel (RPV) materials for loss of fracture toughness due to neutron irradiation embrittlement is consistent with SRP-SLR Section 3.1.2.2.3, item 1, and is, therefore, acceptable. The staff's evaluations regarding the neutron embrittlement TLAAs for the RPV are documented in SE Section 4.2.

Item 2. SLRA Section 3.1.2.2.3, associated with SLRA Table 3.1.1 AMR item 3.1.1-014, addresses loss of fracture toughness for reactor vessel beltline shell, nozzle, and weld materials exposed to reactor coolant and neutron flux, which will be managed by the Reactor Vessel Material Surveillance Program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.3, item 2.

In its review of components associated with AMR item 3.1.1-014, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Reactor Vessel Material Surveillance Program is acceptable because the plant is participating in an NRC-approved ISP during the subsequent period of extended operation through BWRVIP-321, Revision 1-A. The staff determined that the program outlined in BWRVIP-321, Revision 1-A provides an acceptable means to adequately address the need for surveillance data through the end of a facility's 80-year operating license and meets the requirements of Appendix H to 10 CFR Part 50.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.1.2.2.3 item 2 criteria. For SLRA Table 3.1.1, AMR item 3.1.1-014, the staff concludes that the SLRA is consistent with the GALL-SLR Report, and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

<u>Item 3.</u> SLRA Section 3.1.2.2.3.3, associated with SLRA Table 3.1.1, AMR item 3.1.1-015, addresses loss of fracture toughness for Babcock & Wilcox (B&W) reactor internals exposed to neutron flux, which will be managed by the B&W Owners Group Report BAW-2248. The staff reviewed the applicant's claim against the criteria in SRP-SLR Section 3.1.2.2.3.3.

In its review of components associated with AMR item 3.1.1-015, the staff finds this item is not applicable to DNPS because (1) this item is only applicable to B&W designed reactors and (2) the UFSAR identifies that the reactors at the DNPS facility is not a B&W designed reactor.

3.1.2.2.4 Cracking due to Stress Corrosion Cracking (SCC) and Intergranular Stress Corrosion Cracking

<u>Item 1</u>. SLRA Table 3.1.1, AMR item 3.1.1-016 addresses cracking due to SCC and IGSCC in stainless-steel and nickel-alloy reactor vessel flange leak detection line exposed to air–indoor uncontrolled environments, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.16. In its review of components associated with AMR item 3.1.1-016, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable, as plant-specific OE has not identified cracking due to SCC and IGSCC in stainless steel and nickel-alloy reactor vessel flange leak detection line exposed to air–indoor uncontrolled environments. Additionally, the applicant's One-Time Inspection program is not applicable to structures or components with known age-related degradation mechanisms, or where degradation is occurring so slowly that it will not impact the intended function of the components during the subsequent period of extended operation. The One-Time Inspection program relies on established non-destructive evaluation (NDE) techniques, including visual, ultrasonic, and surface techniques. Inspections and tests are performed by personnel qualified in accordance with site procedures and programs to perform the type of examination specified. Additionally, where an aging effect identified during an inspection does not meet acceptance criteria, or projected results of the inspections of a material, environment, and aging effect combination do not meet the acceptance criteria, a periodic inspection program is developed for the specific material, environment, and aging effect combination. The periodic inspection program is implemented at all units on site with the same combination(s) of material, environment, and aging effect.

<u>Item 2</u>. SLRA Table 3.1.1, AMR Item 3.1.1-017 addresses that cracking due to SCC and IGSCC in stainless steel BWR isolation condenser components, including tubes and cladding for the tube sheet exposed to reactor coolant, will be managed by supplemental testing and inspection activities. The applicant stated that the supplemental activities consist of temperature and radioactivity monitoring of the shell side cooling water, eddy current testing of the isolation condenser tubes, and visual inspections of the channel head, tube sheets, and internal surfaces of the shell. The applicant stated that the temperature and radioactivity monitoring will be implemented through the Water Chemistry program while the eddy current inspections of the isolation condenser tubes will be implemented through the ASME Section XI, Inservice Inspections, Subsections IWB, IWC, and IWD program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.4, item 2.

In its review of components associated with AMR items 3.1-017, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the identified supplemental testing and inspection activities is acceptable, because the associated periodic testing and inspections will be capable of detecting SCC and IGSCC for these components. Specifically, eddy current inspections will detect SCC and IGSCC prior to tube leakage, while the periodic temperature and radioactivity monitoring of the shell side cooling water will detect leakage should SCC and IGSCC occur in between eddy current inspections.

Based on the supplemental testing and inspections identified, and review of the programs through which they will be implemented, the staff concludes that the applicant's programs meet SRP-SLR Section 3.1.2.2.4 criteria. For those AMR items associated with SLRA Section 3.1.2.2.4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.1.2.2.5 Crack Growth Due to Cyclic Loading

SLRA Section 3.1.2.2.5, associated with SLRA Table 3.1.1, AMR item 3.1.1-018, addresses crack growth due to cyclic loading for RPV shell forgings clad with stainless steel using a high heat input welding process. The applicant stated that this item is not applicable. The staff reviewed the applicant's claim against the criteria in SRP-SLR Section 3.1.2.2.5 and finds it acceptable because the DNPS units are BWRS and this item is applicable only to PWRs.

3.1.2.2.6 Cracking Due to Stress Corrosion Cracking

Item 1. SLRA Section 3.1.2.2.6, associated with SLRA Table 3.1.1, AMR item 3.1.1-019, addresses cracking due to SCC for PWR stainless steel bottom-mounted instrument guide tubes exposed to reactor coolant. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.1.2.2.6 item 1 and finds it acceptable because the DNPS units are BWRs, and this item is applicable only to PWRs.

Item 2. SLRA Section 3.1.2.2.6, item 2, associated with SLRA Table 3.1.1, AMR item 3.1.1-020, addresses cracking due to SCC for the ASME Code Class 1 cast austenitic stainless steel piping and components exposed to the PWR coolant. The applicant claimed that this AMR item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.1.2.2.6 item 2 and finds it acceptable because the DNPS units are BWRs and this item is applicable only to PWRs.

Item 3. SLRA Section 3.1.2.2.6, associated with SLRA Table 3.1.1, AMR item 3.1.1-139, addresses cracking due to SCC for stainless steel, nickel alloy exposed to air–indoor uncontrolled, reactor coolant leakage. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.1.2.2.6 item 3 and finds it acceptable because the DNPS units are BWRs and this item is applicable only to PWRs.

3.1.2.2.7 Cracking Due to Cyclic Loading

SLRA Table 3.1.1, AMR Item 3.1.1-021 addresses cracking due to cyclic loading in steel and stainless steel BWR isolation condenser components exposed to reactor coolant, which will be managed by supplemental testing and inspection activities. The applicant stated that the supplemental activities consist of temperature and radioactivity monitoring of the shell side cooling water and eddy current testing of the isolation condenser tubes. The applicant stated that the temperature and radioactivity monitoring will be implemented though the Water Chemistry program while the eddy current inspections of the isolation condenser tubes will be implemented through the ASME Section XI, Inservice Inspections, Subsections IWB, IWC, and IWD program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.7.

In its review of components associated with AMR items 3.1-021, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the supplemental testing and inspection activities is acceptable, because the associated periodic testing and inspections will be capable of detecting cracking due to cyclic loading for these components. Specifically, eddy current inspections will detect cracking prior to tube leakage, while the periodic temperature and radioactivity monitoring of the shell side cooling water will detect leakage, should cracking occur in between eddy current inspections.

Based on the supplemental testing and inspections identified, and review of the programs through which they will be implemented, the staff concludes that the applicant's programs meet SRP-SLR Section 3.1.2.2.4 criteria. For those AMR items associated with SLRA Section 3.1.2.2.4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.1.2.2.8 Loss of Material Due to Erosion

The applicant claimed that this further evaluation is not applicable because it is specific to PWRs. The staff reviewed the SLRA and the corresponding SRP-SLR AMR items and concluded that the applicant's claim is reasonable because the DNPS units are BWRs.

3.1.2.2.9 Aging Management of Pressurized Water Reactor Vessel Internals (applicable to subsequent license renewal periods only)

SLRA Section 3.1.2.2.9, associated with SLRA Table 3.1.1, AMR items 3.1.1-028, 051a, 051b, 052a, 052b, 052c, 053a, 053b, 053c, 055a, 055b, 055c, 056a, 056b, 056c, 058a, 058b, 059a, 059b, 059c, 118, and 119, addresses the aging management of PWR vessel internals, which will be managed by the EPRI MRP-227, Revision 1-A guidelines. The applicant claimed that this further evaluation is not applicable because it is specific to PWRs.

The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.9, as revised by SLR-ISG-2021-01-PWRVI. In its review of components associated with these AMR items, the staff finds these items are not applicable to DNPS because the UFSAR identifies that the reactors at DNPS are a BWR design.

3.1.2.2.10 Loss of Material Due to Wear

Item 1. SLRA Section 3.1.2.2.10, item 1, associated with SLRA Table 3.1.1 AMR item 3.1.1-116, addresses loss of material due to wear for nickel-alloy control rod drive head penetration nozzles and thermal sleeves, which will be managed by a plant-specific AMP. The applicant claimed that this further evaluation is not applicable because it is specific to PWRs. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.10.1. In its review of components associated with AMR item 3.1.1-116, the staff finds this item is not applicable to DNPS because the UFSAR identifies that the reactors at DNPS are BWRs.

Item 2. SLRA Section 3.1.2.2.10, item 2, associated with SLRA Table 3.1.1 AMR item 3.1.1-117, addresses loss of material due to wear for stainless steel control rod drive head penetration nozzles and thermal sleeves, which will be managed by a plant-specific AMP. The applicant claimed that this further evaluation is not applicable because it is specific to PWRs. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.10.2. In its review of components associated with AMR item 3.1.1-117, the staff finds this item is not applicable to DNPS because the UFSAR identifies that the reactors at DNPS are BWRs.

3.1.2.2.11 Cracking Due to Primary Water Stress Corrosion Cracking

Items 1 and 2. The applicant claimed that this further evaluation is not applicable because it is specific to PWRs. The staff reviewed the SLRA and the corresponding SRP-SLR AMR items and concluded that the applicant's claim is reasonable because the reactors at DNPS are BWRs.

3.1.2.2.12 Cracking Due to Irradiation-Assisted Stress Corrosion Cracking

SLRA Section 3.1.2.2.12, associated with SLRA Table 3.1.1, AMR items 3.1-1, 029, 041, and 103, addresses irradiation-assisted SCC for stainless steel and nickel-alloy reactor vessel internal components exposed to reactor coolant and neutron flux, which will be managed by the BWR Vessel Internals program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.12.

In its review of components associated with AMR items 3.1-1, 029, 041, and 103, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the BWR Vessel Internals program is acceptable because the applicant referenced the 80-year evaluation performed for degradation of reactor internals in topical report BWRVIP-315-A (ML24191A266). The NRC issued the final safety evaluation for BWRVIP-315 on October 31, 2023 (ML23251A072). Given the staff's acceptance of the 80-year assessment in BWRVIP-315, the staff finds that supplemental evaluations and examinations described in SRP-SLR Section 3.1.2.2.12 are addressed by the applicant's use of BWRVIP-315-A and no applicant-specific evaluation is required. The staff's evaluation of BWR Vessel Internals program is documented in SE Section 3.0.3.2.3.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.1.2.2.12 criterion. For those AMR items associated with SLRA Section 3.1.2.2.12, the staff concludes that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.1.2.2.13 Loss of Fracture Toughness Due to Neutron Irradiation or Thermal Aging Embrittlement

SLRA Section 3.1.2.2.13, associated with SLRA Table 3.1.1, AMR item 3.1-1, 099 addresses loss of fracture toughness due to neutron irradiation or thermal aging for stainless steel and nickel-alloy reactor internal components exposed to reactor coolant and neutron flux, which will be managed by the BWR Vessel Internals program. The staff reviewed the applicant's proposal against the criteria in SRP-SLRA Section 3.1.2.2.13.

In its review of components associated with AMR item 3.1.1-099, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the BWR Vessel Internals program is acceptable because the applicant referenced the 80-year evaluation performed for degradation of reactor internals in topical report BWRVIP-315-A (ML24191A266). The NRC issued the final safety evaluation for BWRVIP-315 on October 31, 2023 (ML23251A072). Given the staff's acceptance of the 80-year assessment in BWRVIP-315, the staff finds that supplemental evaluations and examinations described in SRP-SLR Section 3.1.2.2.13 are addressed by the applicant's use of BWRVIP-315-A and no applicant-specific evaluation is required. The staff's evaluation of BWR Vessel Internals program is documented in SE Section 3.0.3.2.3.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.1.2.2.13 criterion. For those AMR items associated with SLRA Section 3.1.2.2.13, the staff concludes that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.1.2.2.14 Loss of Preload Due to Thermal or Irradiation-Enhanced Stress Relaxation

SLRA Section 3.1.2.2.14, associated with SLRA Table 3.1.1, AMR item 3.1-1, 120, addresses loss of preload for stainless steel core plate rim hold-down bolts exposed to reactor coolant and neutron flux, which will be managed by the BWR Vessel Internals program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.1.2.2.14.

The applicant states in SLRA Table 3.1.1, AMR item 3.1-1, 120 and in Section 3.1.2.2.14 that wedges are used in both units at DNPS as the means of precluding lateral movement of the core plate. The wedges are fixed in place and not subject to loss of preload.

Based on the lack of installed core plate rim hold-down bolts, the staff concludes that the SRP-SLR Section 3.1.2.2.14 criterion are met. For those AMR items associated with SLRA Section 3.1.2.2.14, the staff concludes that the applicant has adequately addressed why no effects of aging need to be managed for the intended function of SLRA Table 3.1.1, AMR Item 3.1-1, 120 components.

3.1.2.2.15 Loss of Material Due to General, Crevice, or Pitting Corrosion, and Cracking Due to Stress Corrosion Cracking

SLRA Section 3.1.2.2.15, associated with SLRA Table 3.1.1, AMR items 3.1.1-105 and 115, addresses (1) loss of material due to general, crevice, or pitting corrosion in steel piping and piping components exposed to concrete (AMR item 3.1.1-105) and (2) loss of material due to crevice or pitting corrosion and cracking due to SCC in stainless steel piping and piping components exposed to concrete (AMR item 3.1.1-115). The applicant stated that "There are no steel piping or piping components exposed to concrete in the reactor vessel, internals, and reactor coolant system at DNPS," and "There are no stainless steel piping or piping components exposed to concrete in the Reactor Vessel, Internals, and Reactor Coolant System at DNPS." The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.1.2.2.15 and finds it acceptable because there are no steel or stainless steel piping and piping components exposed to concrete in the reactor vessel, internals, and reactor coolant system at DNPS.

For those AMR items associated with SLRA Section 3.1.2.2.15, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.1.2.2.16 Loss of Material Due to Pitting and Crevice Corrosion in Stainless Steel and Nickel Alloys

SLRA Table 3.1.1, AMR item 3.1.1-136 addresses loss of material due to pitting and crevice corrosion in stainless steel and nickel-alloy piping and piping components exposed to air and condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant’s proposal against the criteria in SRP-SLR Section 3.1.2.2.16. In its review of components associated with AMR item 3.1.1-136, the staff finds that the applicant has met the further evaluation criteria, and the applicant’s proposal to manage the effects of aging using the One-Time Inspection program is acceptable, as plant-specific OE has not identified loss of material in piping, piping components, or tanks exposed to air and condensation. Additionally, the applicant’s One-Time Inspection program is not applicable to structures or components with known age-related degradation mechanisms, or where degradation is occurring so slowly that it will not impact the intended function of the components during the subsequent period of extended operation. The One-Time Inspection program relies on established NDE techniques, including visual, ultrasonic, and surface techniques. Inspections and tests are performed by personnel qualified in accordance with site procedures and programs to perform the type of examination specified. Additionally, where an aging effect identified during an inspection does not meet acceptance criteria, or projected results of the inspections of a material, environment, and aging effect combination do not meet the acceptance criteria, a periodic inspection program is developed for the specific material, environment, and aging effect combination. The periodic inspection program is implemented at all units on site with same combination(s) of material, environment, and aging effect.

3.1.2.2.17 Quality Assurance for Aging Management of Nonsafety-Related Components

SE Section 3.0.4 documents the NRC staff’s evaluation of the applicant’s QA Program.

3.1.2.2.18 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff’s evaluation of the applicant’s ongoing review of operating experience (OE).

3.1.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-SLR Report

This section documents the NRC staff’s review of AMR results listed in SLRA Tables 3.1.2-1 through 3.1.2-3 that are either not consistent with, or not addressed in, the GALL-SLR Report and are usually denoted with generic notes F through J. To efficiently capture and identify multiple applicable AMR items in each subsection, and because these AMR items often are not associated with an SLRA Table 1 item, the subsection is organized by applicable AMR section and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-SLR Report, the staff reviewed the applicant’s evaluation to determine whether the applicant has demonstrated that it will adequately manage the effects of aging in a way that maintains the intended function(s) consistent with the CLB for the subsequent period of extended operation. The following sections describe the staff's evaluation.

3.1.2.3.1 Reactor Vessel – Summary of Aging Management Evaluation

Carbon Steel, Carbon Steel or Low-Alloy Steel with Stainless Steel Cladding Reactor Vessel Components Exposed to Uncontrolled Indoor Air

SLRA Table 3.1.2-2, item 3.1.1-124 states that there is no aging effect requiring management for various carbon steel and low-alloy steel reactor components exposed to uncontrolled indoor air and no AMP is proposed. The AMR item cites generic note I and plant-specific note 1, which states:

> During power operation the insulated reactor vessel, nozzles, and safe end components have an external temperature greater than 212°F and are at a higher temperature than the air–indoor (uncontrolled) environment. During plant shutdown the reactor containment atmosphere is normally above the dewpoint temperature. Therefore, wetting due to condensation and moisture accumulation will not occur during power operation or plant shutdown and loss of material due to general corrosion does not apply.

The staff reviewed the associated items in the SLRA to confirm that these aging effects are not applicable for this component, material, environment combination. The staff finds the applicant's proposal acceptable because loss of material caused by external corrosion from accumulation of moisture on RPV components is unlikely at the normal operating and shutdown temperatures of these components inside containment.

3.2 Aging Management of Engineered Safety Features

3.2.1 Summary of Technical Information in the Application

SLRA Section 3.2 provides AMR results for those components the applicant identified in SLRA Section 2.3.2, "Engineered Safety Features," (ESF) as being subject to an AMR. SLRA Table 3.2.1, "Summary of Aging Management Evaluations for the Engineered Safety Features," is a summary comparison of the applicant's AMR results with those provided in the GALL-SLR Report for the ESF components.

3.2.2 Staff Evaluation

Table 3.2-1 summarizes the NRC staff's evaluation of the component groups listed in SLRA Section 3.2 and addressed in the GALL-SLR Report.

Table 3.2-1 Staff Evaluation for Engineered Safety Features Components in the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.2.1-001	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.1)
3.2.1-002	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-003	This item number is not used in the SRP-SLR or the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.2.1-004	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.2)
3.2.1-005	Not applicable to BWRs
3.2.1-006	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.3)
3.2.1-007	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.4)
3.2.1-008	Not applicable to BWRs
3.2.1-009	Not applicable to BWRs
3.2.1-010	Not applicable to DNPS
3.2.1-011	Consistent with the GALL-SLR Report
3.2.1-012	Not applicable to DNPS
3.2.1-013	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-014	Consistent with the GALL-SLR Report
3.2.1-015	Consistent with the GALL-SLR Report
3.2.1-016	Consistent with the GALL-SLR Report
3.2.1-017	Consistent with the GALL-SLR Report
3.2.1-018	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-019	Consistent with the GALL-SLR Report
3.2.1-020	Not applicable to BWRs
3.2.1-021	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-022	Consistent with the GALL-SLR Report
3.2.1-023	Not applicable to DNPS
3.2.1-024	Not applicable to BWRs
3.2.1-025	Not applicable to DNPS
3.2.1-026	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-027	Not applicable to DNPS
3.2.1-028	Not applicable to DNPS
3.2.1-029	Not applicable to DNPS
3.2.1-030	Not used (addressed by 3.3.1-046)
3.2.1-031	Consistent with the GALL-SLR Report
3.2.1-032	Consistent with the GALL-SLR Report
3.2.1-033	Not used (addressed by 3.3.1-050)
3.2.1-034	Consistent with the GALL-SLR Report
3.2.1-035	Not applicable to BWRs
3.2.1-036	Not applicable to BWRs
3.2.1-037	Not applicable to DNPS
3.2.1-038	Consistent with the GALL-SLR Report
3.2.1-039	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-040	Consistent with the GALL-SLR Report
3.2.1-041	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-042	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.10)
3.2.1-043	Consistent with the GALL-SLR Report
3.2.1-044	Not applicable to DNPS

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.2.1-045	Not applicable to BWRs
3.2.1-046	Consistent with the GALL-SLR Report
3.2.1-047	Not applicable to BWRs
3.2.1-048	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.2)
3.2.1-049	Consistent with the GALL-SLR Report
3.2.1-050	Consistent with the GALL-SLR Report
3.2.1-051	Consistent with the GALL-SLR Report
3.2.1-052	Not applicable to DNPS
3.2.1-053	Consistent with the GALL-SLR Report
3.2.1-053a	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-054	Not applicable to DNPS
3.2.1-055	Not applicable to DNPS
3.2.1-056	Not applicable to DNPS
3.2.1-057	Consistent with the GALL-SLR Report
3.2.1-058	Not applicable to BWRs
3.2.1-059	Consistent with the GALL-SLR Report
3.2.1-060	Consistent with the GALL-SLR Report
3.2.1-061	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-062	Not applicable to DNPS
3.2.1-063	Consistent with the GALL-SLR Report
3.2.1-064	Consistent with the GALL-SLR Report
3.2.1-065	Consistent with the GALL-SLR Report
3.2.1-066	Not applicable to DNPS
3.2.1-067	Not applicable to DNPS
3.2.1-068	Not applicable to DNPS
3.2.1-069	Consistent with the GALL-SLR Report
3.2.1-070	Not applicable to DNPS
3.2.1-071	Not applicable to DNPS
3.2.1-072	Consistent with the GALL-SLR Report
3.2.1-073	Consistent with the GALL-SLR Report
3.2.1-074	Not applicable to DNPS
3.2.1-075	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-076	Consistent with the GALL-SLR Report
3.2.1-077	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-078	Consistent with the GALL-SLR Report
3.2.1-079	Consistent with the GALL-SLR Report
3.2.1-080	Not applicable to DNPS
3.2.1-081	Not used (addressed by 3.3.1-096a)
3.2.1-082	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-083	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-084	This item number is not used in the SRP-SLR or the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.2.1-085	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-086	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-087	Not used (addressed by 3.4.1-064)
3.2.1-088	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-089	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-090	Consistent with the GALL-SLR Report
3.2.1-091	Not applicable to DNPS
3.2.1-092	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-093	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-094	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-095	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-096	Not applicable to DNPS
3.2.1-097	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-098	Not applicable to DNPS
3.2.1-099	Not applicable to DNPS
3.2.1-100	Not applicable to DNPS
3.2.1-101	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.8)
3.2.1-102	Not applicable to DNPS
3.2.1-103	Not applicable to DNPS
3.2.1-104	Not applicable to DNPS
3.2.1-105	Not applicable to DNPS
3.2.1-106	Not applicable to DNPS
3.2.1-107	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.2)
3.2.1-108	Consistent with the GALL-SLR Report (see SE Section 3.2.2.2.4)
3.2.1-109	Not applicable to DNPS
3.2.1-110	Not applicable to DNPS
3.2.1-111	Not applicable to DNPS
3.2.1-112	Not applicable to DNPS
3.2.1-113	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.2.1-114	Consistent with the GALL-SLR Report
3.2.1-115	Not applicable to DNPS
3.2.1-116	Not applicable to DNPS
3.2.1-117	Not applicable to DNPS
3.2.1-118	Not applicable to DNPS
3.2.1-119	Consistent with the GALL-SLR Report
3.2.1-120	Consistent with the GALL-SLR Report
3.2.1-121	Not applicable to DNPS
3.2.1-122	Consistent with the GALL-SLR Report
3.2.1-123	Consistent with the GALL-SLR Report
3.2.1-124	Not applicable to DNPS
3.2.1-125	Not applicable to DNPS

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.2.1-126	Not applicable to DNPS
3.2.1-127	Not applicable to DNPS
3.2.1-128	Not applicable to DNPS
3.2.1-129	Not applicable to DNPS
3.2.1-130	Consistent with the GALL-SLR Report
3.2.1-131	Not applicable to DNPS
3.2.1-132	Not applicable to DNPS
3.2.1-133	Not applicable to DNPS
3.2.1-134	Not applicable to DNPS

The NRC staff's review of component groups, as described in SE Section 3.0.2.2, is summarized in the following three sections:

(1) SE Section 3.2.2.1 discusses AMR results for components that the applicant states are either not applicable to DNPS or are consistent with the GALL-SLR Report. Section 3.2.2.1.1 summarizes the staff's review of AMR items that are not applicable, or not used, and documents any RAIs issued and the staff's conclusions. Section 3.2.2.1.2 documents the review of components that required additional information or otherwise required further explanation.

(2) SE Section 3.2.2.2 discusses AMR results for which the GALL-SLR Report and SRP-SLR recommend further evaluation.

(3) SE Section 3.2.2.3 discusses AMR results for components that the applicant stated are not consistent with, or not addressed in, the GALL-SLR Report. These AMR results typically are identified by generic notes F through J, and plant-specific notes in the SLRA.

3.2.2.1 Aging Management Review Results Consistent with the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Tables 3.2.2-1 through 3.2.2-7 that the applicant determined to be consistent with the GALL-SLR Report. The staff audited and reviewed the information in the SLRA. The staff did not repeat its review of the matters described in the GALL-SLR Report; the staff verified that the material presented in the SLRA was applicable and that the applicant identified the appropriate GALL-SLR Report information for AMRs. For those AMR items that the staff found to be consistent with the GALL-SLR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions as documented in the GALL-SLR Report are considered to be the basis for acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-SLR Report" is documented in SE Table 3.2-1, and no separate write-up is required or provided.

3.2.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

SE Table 3.2-1 identifies the SLRA Table 3.2.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are neither used nor applicable to DNPS. The NRC staff reviewed the SLRA and UFSAR and confirmed that the applicant's SLRA does not have any AMR results that are applicable for these AMR items.

SE Table 3.2-1 identifies the SLRA Table 3.2.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not applicable because the associated AMR items are only applicable to PWRs while DNPS are BWR units. The NRC staff reviewed the SRP-SLR, confirmed that these AMR items only apply to PWRs, and finds that these AMR items are not applicable to DNPS.

SE Table 3.2-1 identifies the SLRA Table 3.2.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not used because they are addressed by other SLRA Table 1 AMR items. The NRC staff reviewed the SLRA and confirmed that aging effects will be addressed by other SLRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate AMR items acceptable.

3.2.2.1.2 Loss of Material Due to General, Pitting, Crevice Corrosion, Microbiologically Influenced Corrosion

SLRA Table 3.2.1, item 3.2.1-016, as amended by letter dated March 13, 2025 (ML25072A153), addresses loss of material due to general, pitting, crevice corrosion, and microbiologically influenced corrosion (MIC) for steel piping and piping components exposed to treated water. For the associated SLRA Table 2 AMR items that cite generic note E, the SLRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program to manage the aging effects of these AMR items. In SLRA Table 3.2.2-5 "Low Pressure Coolant Injection System," as amended by letter dated February 20, 2025, item 3.2.1-016 addresses loss of material for carbon steel piping and piping components exposed to a treated water (external) and treated water (internal) environment. These items cite plant-specific note 1 which states:

> The ECCS suction strainers and associated flanges will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.24) program as routine inspections are performed to detect loss of material and flow blockage.

Based on its review of the components associated with item 3.2.1-016, which cite generic note E in Table 3.2.2-5, the staff finds the applicant's proposal to use the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program acceptable because the associated periodic inspections will be capable of detecting loss of material for these components.

3.2.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-SLR Report

In SLRA Section 3.2.2.2, the applicant further evaluated aging management for the ESF components, as recommended by the GALL-SLR Report, and provides information about how it will manage the applicable aging effects. The NRC staff reviewed the applicant's evaluation of these component groups against the criteria contained in SRP-SLR Section 3.2.2.2. The following subsections document the staff's review.

3.2.2.2.1 Cumulative Fatigue Damage

SLRA Section 3.2.2.2.1 is associated with SLRA AMR item 3.2.1-001, as described in SLRA Table 3.2.1. The applicant indicated that the TLAA on cumulative fatigue damage in the components of the ESF is evaluated in accordance with 10 CFR 54.21(c) and is addressed in SLRA Section 4.3. The staff finds that the applicant's AMR results for the fatigue TLAA are consistent with SRP-SLR Section 3.2.2.2.1 and are, therefore, acceptable. The staff's evaluation of the fatigue TLAA for the components of the ESF is documented in SE Section 4.3.

3.2.2.2.2 Loss of Material Due to Pitting and Crevice Corrosion in Stainless Steel and Nickel Alloys

SLRA Section 3.2.2.2.2, as amended by letter dated February 20, 2025, associated with SLRA Table 3.2.1, AMR items 3.2.1-004, 3.2.1-048, and 3.2.1-107, addresses loss of material due to pitting and crevice corrosion for stainless-steel and nickel-alloy piping and piping components exposed externally to air or condensation, for stainless steel and nickel-alloy tanks exposed internally to air or condensation, and for insulated stainless steel or nickel-alloy piping, piping components, and tanks exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.2.2.2.2.

In its review of components associated with AMR items 3.2.1-004, 3.2.1-048, and 3.2.1-107, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of loss of material for these components and the proposed one-time inspections are capable of detecting loss of material.

SLRA Section 3.2.2.2.2, associated with SLRA Table 3.2.1, AMR items 3.2.1-099, 3.2.1-106, and 3.2.1-112, addresses loss of material due to pitting and crevice corrosion for stainless steel and nickel-alloy piping, piping components, and tanks exposed to air or condensation, stainless steel and nickel-alloy tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air or condensation, and stainless steel and nickel-alloy underground piping, piping components, and tanks. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.2 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such stainless steel or nickel-alloy component and environment combinations in the ESF systems.

Based on the One-Time Inspection program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.2.2.2.2 criteria. For those AMR items associated with SLRA Section 3.2.2.2.2, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions(s) will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.2.2.2.3 Loss of Material Due to General Corrosion and Flow Blockage Due to Fouling

In SLRA Section 3.2.2.2.3, associated with SLRA Table 3.2.1, AMR item 3.2.1-006 addresses loss of material and flow blockage in metallic drywell and suppression chamber spray nozzles and flow orifices exposed to uncontrolled air–indoor, and condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.2.2.2.3. In its review of components associated with AMR item 3.2.1-006, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable, as plant-specific OE has not identified loss of material in piping, piping components, or tanks exposed to air and condensation.

Additionally, the applicant's One-Time Inspection program is not applicable to structures or components with known age-related degradation mechanisms, or where degradation is occurring so slowly that it will not impact the intended function of the components during the subsequent period of extended operation. The One-Time Inspection program relies on established NDE techniques, including visual, ultrasonic, and surface techniques. Inspections and tests are performed by personnel qualified in accordance with site procedures and programs to perform the type of examination specified. Additionally, where an aging effect identified during an inspection does not meet acceptance criteria, or projected results of the inspections of a material, environment, and aging effect combination do not meet the acceptance criteria, a periodic inspection program is developed for the specific material, environment, and aging effect combination. The periodic inspection program is implemented at all units on site with same combination(s) of material, environment, and aging effect.

3.2.2.2.4 Cracking Due to Stress Corrosion Cracking in Stainless Steel Alloys

SLRA Section 3.2.2.2.4, associated with SLRA Table 3.2.1, AMR items 3.2.1-007 and 3.2.1-108, addresses cracking due to SCC for uninsulated and insulated stainless steel piping, piping components, and tanks exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.2.2.2.4.

In its review of components associated with AMR items 3.2.1-007 and 3.2.1-108, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed one-time inspections are capable of detecting cracking.

SLRA Section 3.2.2.2.4, associated with SLRA Table 3.2.1, AMR items 3.2.1-080 and 3.2.1-103, addresses cracking due to SCC for underground stainless steel piping, piping components, and tanks exposed to air, condensation (internal), raw water or wastewater; and for stainless steel tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air or condensation. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.4 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such stainless steel component and environment combinations in the ESF systems.

Based on the One-Time Inspection program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.2.2.2.4 criteria. For those AMR items associated with SLRA Section 3.2.2.2.4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions(s) will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.2.2.2.5 Quality Assurance for Aging Management of Nonsafety-Related Components

SE Section 3.0.4 documents the NRC staff's evaluation of the applicant's QA Program.

3.2.2.2.6 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.2.2.2.7 Loss of Material Due to Recurring Internal Corrosion

SLRA Section 3.2.2.2.7, associated with SLRA Table 3.2-1, item 3.2.1-066, addresses loss of material due to recurring internal corrosion in metallic piping, piping components, and tanks exposed to raw water and wastewater. The applicant stated that this item is not applicable because no metallic piping, piping components, or tanks exposed to raw water or wastewater are susceptible to loss of material due to recurring internal corrosion in the ESF Systems. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.7 and finds it is acceptable because, based on a review of the UFSAR and SLRA, there are no such metallic component and environment combinations in the ESF systems.

3.2.2.2.8 Cracking Due to Stress Corrosion Cracking in Aluminum Alloys

SLRA Section 3.2.2.2.8, associated with SLRA Table 3.2.1, AMR item 3.2.1-101, addresses cracking due to SCC for aluminum piping, piping components, and tanks exposed externally to air or condensation. For the associated SLRA Table 2 AMR item that cites generic note A, the SLRA credits the One-Time Inspection program to manage the aging effect. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.2.2.2.8.

In its review of components associated with AMR item 3.2.1-101 that cite generic note A, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed one-time inspections are capable of detecting cracking.

For the SLRA Table 2 items associated with AMR item 3.2.1-101 that cite generic note I, the SLRA stated that this item is not applicable because the component material is aluminum alloy 6061-T6, which is not susceptible to SCC. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.8 and finds it acceptable because Section 3.2.2.2.8 of the SRP-SLR Report identifies aluminum alloy 6061 in the T6 temper as not susceptible to SCC for piping, piping components, and tanks.

SLRA Section 3.2.2.2.8, associated with SRA Table 3.2.1, AMR item 3.2.1-109, addresses cracking due to SCC for insulated aluminum piping, piping components, and tanks exposed to air or condensation. For the SLRA Table 2 item associated with AMR item 3.2.1-109, the applicant cited generic note I and stated that this item is not applicable because the component material is aluminum alloy 6061-T6, which is not susceptible to SCC. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.8 and finds it acceptable because Section 3.2.2.2.8 of the SRP-SLR Report identifies aluminum alloy 6061 in the T6 temper as not susceptible to SCC for piping, piping components, and tanks.

SLRA Section 3.2.2.2.8, associated with SLRA Table 3.2.1, AMR items 3.2.1-100, 3.2.1-102, and 3.2.1-110, addresses cracking due to SCC for aluminum piping, piping components, and tanks exposed to air or condensation; aluminum tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air, condensation, soil, concrete, raw water, or wastewater; and underground aluminum piping, piping components and tanks. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.8 and finds it acceptable, because based on a review of the UFSAR and SLRA, there are no such aluminum component and environment combinations in the ESF systems.

Based on the One-Time Inspection program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.2.2.2.8 criteria. For those AMR items associated with SLRA Section 3.2.2.2.8, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.2.2.2.9 Loss of Material Due to General, Crevice, or Pitting Corrosion and Cracking Due to Stress Corrosion Cracking

SLRA Section 3.2.2.2.9, associated with SLRA Table 3.2.1, AMR items 3.2.1-055 and 3.2.1-091, addresses (1) loss of material due to general, crevice, or pitting corrosion in steel piping and piping components exposed to concrete (item 3.2.1-055) and (2) loss of material due to crevice or pitting corrosion and cracking due to SCC in stainless steel piping and piping components exposed to concrete (item 3.2.1-091). The applicant stated that "There are no steel piping or piping components exposed to concrete in the Engineered Safety Features systems at DNPS," and "There are no stainless steel piping or piping components exposed to concrete in the ESF systems at DNPS." The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.9 and finds it acceptable because there are no steel or stainless steel piping and piping components exposed to concrete in the ESF systems at DNPS.

For those AMR items associated with SLRA Section 3.2.2.2.9, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.2.2.2.10 Loss of Material Due to Pitting and Crevice Corrosion in Aluminum Alloys

SLRA Section 3.2.2.2.10, associated with SLRA Table 3.2.1, AMR items 3.2.1-042 and 3.2.1-119, addresses loss of material due to pitting and crevice corrosion for insulated or uninsulated aluminum piping, piping components, or tanks exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.2.2.2.10.

In its review of components associated with AMR items 3.2.1-042 and 3.2.1-119, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the One-Time Inspection program for AMR items 3.2.1-042 and 3.2.1-119 is acceptable because the plant-specific OE does not reveal a history of loss of material for these components, and the proposed one-time inspections are capable of detecting loss of material.

SLRA Section 3.2.2.2.10, associated with SLRA Table 3.2.1, AMR items 3.2.1-056, 3.2.1-105, 3.2.1-111, and 3.2.1-121, addresses loss of material due to pitting and crevice corrosion for aluminum piping, piping components, and tanks exposed internally to air or condensation; aluminum tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air or condensation; underground aluminum piping, piping components and tanks; and aluminum piping, piping components, and tanks exposed to raw water or wastewater. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.2.2.2.10 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such aluminum component and environment combinations in the ESF systems.

Based on the One-Time Inspection program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.2.2.2.10 criteria. For those AMR items associated with SLRA Section 3.2.2.2.10, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.2.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-SLR Report

This section documents the NRC staff's review of AMR results listed in SLRA Tables 3.2.2-1 through 3.2.2-7 that are either not consistent with, or not addressed in, the GALL-SLR Report and are usually denoted with generic notes F through J. To efficiently capture and identify multiple applicable AMR items in each subsection, and because these AMR items often are not associated with an SLRA Table 1 item, the subsections are organized by applicable AMR section and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-SLR Report, the staff reviewed the applicant's evaluation to determine whether the applicant has demonstrated that it will adequately manage the effects of aging in a way that maintains the intended function(s) consistent with the CLB for the subsequent period of extended operation. The following sections describe the staff's evaluation.

3.2.2.3.1 High Pressure Coolant Injection System – Summary of Aging Management Evaluation

<u>Copper Alloy with Greater than 15 Percent Zinc Heat Exchanger Tubes Exposed to Treated Water, Closed Cycle Cooling Water, and Raw Water</u>

SLRA Tables 3.2.2-3, "High Pressure Coolant Injection System," 3.3.2-1, "Closed Cycle Cooling Water System," and 3.3.2-21, "Station Blackout Diesel Generator System," state that loss of material due to selective leaching for copper alloy with greater than 15 percent zinc heat exchanger tubes exposed to treated water, closed cycle cooling water, and raw water is not applicable, and no AMP is proposed. The AMR items cite generic note I, SRP-SLR Report items 3.2.1-34 or 3.3.1-72, and plant-specific notes indicating that these components are fabricated from admiralty brass (inhibited brass). The staff finds the applicant's proposal acceptable, because based on its review of GALL-SLR Report Table IX.C, "Use of Terms for Materials," inhibited brass components are resistant to dezincification as a result of the addition of alloying elements such as tin, arsenic, antimony, or phosphorous.

3.2.2.3.2 Low Pressure Coolant Injection System – Summary of Aging Management Evaluation

<u>Stainless Steel Strainer Elements Exposed to Treated Water</u>

SLRA Table 3.2.2-5 states that flow blockage and loss of material for stainless steel strainer elements exposed to treated water will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP. For the associated AMR items that cite generic note H, the staff finds the applicant's proposal to manage flow blockage and loss of material with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP acceptable because this AMP will be capable of managing flow blockage and loss of material for stainless steel components exposed to raw water.

3.3 Aging Management of Auxiliary Systems

3.3.1 Summary of Technical Information in the Application

SLRA Section 3.3 provides AMR results for those components the applicant identified in SLRA Section 2.3.3, "Auxiliary Systems," as being subject to an AMR. SLRA Table 3.3.1, "Summary of Aging Management Evaluations for the Auxiliary Systems," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-SLR Report for the auxiliary systems components.

3.3.2 Staff Evaluation

Table 3.3-1, below, summarizes the NRC staff's evaluation of the component groups listed in SLRA Section 3.3 and addressed in the GALL-SLR Report.

Table 3.3-1 Staff Evaluation for Auxiliary Systems Components in the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-001	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.1)
3.3.1-002	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.1)
3.3.1-003	Not applicable to BWRs
3.3.1-003a	Not applicable to BWRs
3.3.1-004	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.3)
3.3.1-005	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-006	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.4)
3.3.1-007	Not applicable to BWRs
3.3.1-008	Not applicable to BWRs
3.3.1-009	Not applicable to BWRs
3.3.1-010	Not applicable to DNPS
3.3.1-011	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-012	Consistent with the GALL-SLR Report
3.3.1-013	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-014	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-015	Consistent with the GALL-SLR Report
3.3.1-016	Not applicable to DNPS
3.3.1-017	Not used (addressed by 3.3.1-027)
3.3.1-018	Not applicable to DNPS
3.3.1-019	Consistent with the GALL-SLR Report
3.3.1-020	Consistent with the GALL-SLR Report
3.3.1-021	Consistent with the GALL-SLR Report
3.3.1-022	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-023	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-024	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-025	Consistent with the GALL-SLR Report
3.3.1-026	Not used (addressed by 3.3.1-203)
3.3.1-027	Consistent with the GALL-SLR Report
3.3.1-028	Not applicable to BWRs
3.3.1-029	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-030	Not used (addressed by 3.3.1-195)
3.3.1-030a	Not applicable to DNPS
3.3.1-031	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-032	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-032a	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-033	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-034	Consistent with the GALL-SLR Report
3.3.1-035	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-036	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-037	Consistent with the GALL-SLR Report
3.3.1-038	Consistent with the GALL-SLR Report
3.3.1-039	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-040	Consistent with the GALL-SLR Report
3.3.1-041	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-042	Consistent with the GALL-SLR Report
3.3.1-043	Consistent with the GALL-SLR Report
3.3.1-044	Consistent with the GALL-SLR Report
3.3.1-045	Consistent with the GALL-SLR Report
3.3.1-046	Consistent with the GALL-SLR Report
3.3.1-047	Consistent with the GALL-SLR Report
3.3.1-048	Not applicable to DNPS
3.3.1-049	Consistent with the GALL-SLR Report
3.3.1-050	Consistent with the GALL-SLR Report
3.3.1-051	Not applicable to DNPS
3.3.1-052	Consistent with the GALL-SLR Report
3.3.1-053	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-054	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-055	Consistent with the GALL-SLR Report
3.3.1-056	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-057	Consistent with the GALL-SLR Report
3.3.1-058	Consistent with the GALL-SLR Report
3.3.1-059	Consistent with the GALL-SLR Report
3.3.1-060	Consistent with the GALL-SLR Report
3.3.1-061	This item number is not used in the SRP-SLR or the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-062	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-063	Consistent with the GALL-SLR Report
3.3.1-064	Consistent with the GALL-SLR Report
3.3.1-065	Consistent with the GALL-SLR Report
3.3.1-066	Consistent with the GALL-SLR Report
3.3.1-067	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-068	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-069	Not applicable to DNPS
3.3.1-070	Consistent with the GALL-SLR Report
3.3.1-071	Consistent with the GALL-SLR Report
3.3.1-072	Consistent with the GALL-SLR Report
3.3.1-073	Not used (addressed by 3.3.1-060)
3.3.1-074	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-075	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-076	Consistent with the GALL-SLR Report
3.3.1-077	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-078	Consistent with the GALL-SLR Report
3.3.1-079	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-080	Consistent with the GALL-SLR Report
3.3.1-081	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-082	Consistent with the GALL-SLR Report
3.3.1-083	Consistent with the GALL-SLR Report
3.3.1-084	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-085	Consistent with the GALL-SLR Report
3.3.1-086	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-087	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-088	Consistent with the GALL-SLR Report
3.3.1-089	Not used (addressed by 3.3.1-055)
3.3.1-090	Consistent with the GALL-SLR Report
3.3.1-091	Consistent with the GALL-SLR Report
3.3.1-092	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-093	Not applicable to DNPS
3.3.1-094	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.4)
3.3.1-094a	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.3)
3.3.1-095	Consistent with the GALL-SLR Report
3.3.1-096	Consistent with the GALL-SLR Report
3.3.1-096a	Consistent with the GALL-SLR Report
3.3.1-096b	Not used (addressed by 3.3.1-132)
3.3.1-097	Consistent with the GALL-SLR Report
3.3.1-098	Consistent with the GALL-SLR Report
3.3.1-099	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-100	Consistent with the GALL-SLR Report
3.3.1-101	Not applicable to DNPS
3.3.1-102	Consistent with the GALL-SLR Report
3.3.1-103	Consistent with the GALL-SLR Report
3.3.1-104	Not applicable to DNPS
3.3.1-105	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-106	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-107	Not applicable to DNPS
3.3.1-108	Not applicable to DNPS
3.3.1-109	Consistent with the GALL-SLR Report
3.3.1-109a	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-110	Not applicable to DNPS
3.3.1-111	Not used (addressed by 3.5.1-100)
3.3.1-112	Not used (addressed by 3.3.1-109)
3.3.1-113	Not applicable to DNPS
3.3.1-114	Consistent with the GALL-SLR Report
3.3.1-115	Not applicable to DNPS
3.3.1-116	Consistent with the GALL-SLR Report
3.3.1-117	Consistent with the GALL-SLR Report
3.3.1-118	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-119	Consistent with the GALL-SLR Report
3.3.1-120	Not applicable to DNPS
3.3.1-121	Consistent with the GALL-SLR Report
3.3.1-122	Not applicable to DNPS
3.3.1-123	Not applicable to DNPS
3.3.1-124	Consistent with the GALL-SLR Report
3.3.1-125	Consistent with the GALL-SLR Report
3.3.1-126	Not applicable to DNPS
3.3.1-127	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.7)
3.3.1-128	Not applicable to DNPS
3.3.1-129	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-130	Consistent with the GALL-SLR Report
3.3.1-131	Not used (addressed by 3.3.1-130)
3.3.1-132	Consistent with the GALL-SLR Report
3.3.1-133	Not applicable to DNPS
3.3.1-134	Not used (addressed by applicable AMR item numbers that include Open-Cycle Cooling Water System (SLRA B.2.1.11) as the AMP)
3.3.1-135	Not applicable to DNPS
3.3.1-136	Not applicable to DNPS
3.3.1-137	Consistent with the GALL-SLR Report
3.3.1-138	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-139	Consistent with the GALL-SLR Report
3.3.1-140	Consistent with the GALL-SLR Report
3.3.1-141	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-142	Consistent with the GALL-SLR Report
3.3.1-143	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-144	Not used (addressed by 3.3.1-186)
3.3.1-145	Consistent with the GALL-SLR Report
3.3.1-146	Not applicable to DNPS
3.3.1-147	Not applicable to DNPS
3.3.1-148	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-149	Not applicable to DNPS
3.3.1-150	Not applicable to DNPS
3.3.1-151	Not used (addressed by 3.3.1-161 and 3.3.1-096a)
3.3.1-152	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-153	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-154	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-155	Not applicable to DNPS
3.3.1-156	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-157	Not used (addressed by 3.3.1-058, 3.3.1-078, 3.3.1-080, 3.3.1-132)
3.3.1-158	Not applicable to DNPS
3.3.1-159	Not applicable to DNPS
3.3.1-160	Consistent with the GALL-SLR Report
3.3.1-161	Consistent with the GALL-SLR Report
3.3.1-162	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-163	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-164	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-165	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-166	Not applicable to DNPS
3.3.1-167	Not applicable to DNPS
3.3.1-168	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-169	Not applicable to DNPS
3.3.1-170	Not applicable to DNPS
3.3.1-171	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-172	Not applicable to DNPS
3.3.1-173	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-174	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-175	Not applicable to DNPS
3.3.1-176	Not applicable to DNPS
3.3.1-177	Not applicable to DNPS
3.3.1-178	Not applicable to DNPS
3.3.1-179	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-180	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-181	Not applicable to DNPS
3.3.1-182	Not used (addressed by 3.3.1-064)
3.3.1-183	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-184	Not applicable to DNPS
3.3.1-185	Not applicable to DNPS
3.3.1-186	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.8)
3.3.1-187	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-188	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-189	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.8)
3.3.1-190	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-191	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-192	Not applicable to DNPS
3.3.1-193	Consistent with the GALL-SLR Report
3.3.1-194	Consistent with the GALL-SLR Report
3.3.1-195	Consistent with the GALL-SLR Report
3.3.1-196	Not applicable to DNPS
3.3.1-197	Not applicable to DNPS
3.3.1-198	Not applicable to DNPS
3.3.1-199	Consistent with the GALL-SLR Report
3.3.1-200	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-201	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-202	Not applicable to DNPS
3.3.1-203	Consistent with the GALL-SLR Report
3.3.1-204	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-205	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.3)
3.3.1-206	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-207	Not used (addressed by 3.3.1-042)
3.3.1-208	Not used (addressed by 3.3.1-195)
3.3.1-209	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-210	Not applicable to DNPS
3.3.1-211	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-212	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-213	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-214	Not applicable to DNPS
3.3.1-215	Not applicable to DNPS
3.3.1-216	Not applicable to DNPS
3.3.1-217	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-218	Not applicable to DNPS
3.3.1-219	Not applicable to DNPS
3.3.1-220	This item number is not used in the SRP-SLR or the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-221	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-222	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.4)
3.3.1-223	Not applicable to DNPS
3.3.1-224	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-225	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-226	Consistent with the GALL-SLR Report
3.3.1-227	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.10)
3.3.1-228	Not applicable to DNPS
3.3.1-229	Not applicable to DNPS
3.3.1-230	Not applicable to DNPS
3.3.1-231	Not applicable to DNPS
3.3.1-232	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.4)
3.3.1-233	Not applicable to DNPS
3.3.1-234	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.10)
3.3.1-235	Consistent with the GALL-SLR Report
3.3.1-236	Not applicable to DNPS
3.3.1-237	Not applicable to DNPS
3.3.1-238	Not applicable to DNPS
3.3.1-239	Not applicable to DNPS
3.3.1-240	Not applicable to DNPS
3.3.1-241	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.4)
3.3.1-242	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.10)
3.3.1-243	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-244	Consistent with the GALL-SLR Report
3.3.1-245	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.10)
3.3.1-246	Not applicable to DNPS
3.3.1-247	Consistent with the GALL-SLR Report (see SE Section 3.3.2.2.10)
3.3.1-248	Not applicable to DNPS
3.3.1-249	Consistent with the GALL-SLR Report
3.3.1-250	Not applicable to DNPS
3.3.1-251	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-252	Not applicable to DNPS
3.3.1-253	Consistent with the GALL-SLR Report
3.3.1-254	Consistent with the GALL-SLR Report
3.3.1-255	Consistent with the GALL-SLR Report
3.3.1-256	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-257	Consistent with the GALL-SLR Report
3.3.1-258	Not Used (addressed by 3.3.1-091 and 3.3.1-095)
3.3.1-259	Consistent with the GALL-SLR Report
3.3.1-260	Consistent with the GALL-SLR Report
3.3.1-261	Not applicable to DNPS

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.3.1-262	Not applicable to DNPS
3.3.1-263	Consistent with the GALL-SLR Report
3.3.1-264	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.3.1-265	Not applicable to DNPS
3.3.1-266	Not applicable to DNPS
3.3.1-267	Consistent with the GALL-SLR Report
3.3.1-268	Consistent with the GALL-SLR Report
3.3.1-269	Consistent with the GALL-SLR Report

The NRC staff's review of component groups, as described in SE Section 3.0.2.2, is summarized in the following three sections:

(1) SE Section 3.3.2.1 discusses AMR results for components that the applicant states are either not applicable to DNPS or are consistent with the GALL-SLR Report. Section 3.3.2.1.1 summarizes the staff's review of AMR items that are not applicable, or not used, and documents any RAIs issued and the staff's conclusions. SE Sections 3.3.2.1.2 to 3.3.2.1.6 document the review of components that required additional information or otherwise required further explanation.

(2) SE Section 3.3.2.2 discusses AMR results for which the GALL-SLR Report and SRP-SLR recommend further evaluation.

(3) SE Section 3.3.2.3 discusses AMR results for components that the applicant stated are not consistent with, or not addressed in, the GALL-SLR Report. These AMR results typically are identified by generic notes F through J, and plant-specific notes in the SLRA.

3.3.2.1 Results Consistent with the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Tables 3.3.2-1 through 3.3.2-22 that the applicant determined to be consistent with the GALL-SLR Report. The staff audited and reviewed the information in the SLRA. The staff did not repeat its review of the matters described in the GALL-SLR Report; the staff verified that the material presented in the SLRA was applicable and that the applicant identified the appropriate GALL-SLR Report information for AMRs. For those AMR items that the staff found to be consistent with the GALL-SLR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions as documented in the GALL-SLR Report are considered to be the basis for acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-SLR Report" is documented in SE Table 3.3-1, and no separate write-up is required or provided.

3.3.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

SE Table 3.3-1 identifies the SLRA Table 3.3.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are neither used nor applicable to DNPS. The NRC staff reviewed the SLRA and UFSAR and confirmed that the applicant's SLRA does not have any AMR results that are applicable for these AMR items.

SE Table 3.3-1 identifies the SLRA Table 3.3.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not applicable because the associated AMR items are only applicable to PWRs while DNPS are BWR units. The NRC staff reviewed the SRP-SLR, confirmed that these AMR items only apply to PWRs, and finds that these AMR items are not applicable to DNPS.

SE Table 3.3-1 identifies the SLRA Table 3.3.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not used because they are addressed by other SLRA Table 1 AMR items. The NRC staff reviewed the SLRA and confirmed that aging effects will be addressed by other SLRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate AMR items acceptable.

3.3.2.1.2 Hardening or Loss of Strength Due to Polymeric Degradation; Loss of Material Due to Peeling, Delamination, or Wear; Cracking or Blistering Due to Exposure to Ultraviolet Light, Ozone, Radiation, or Chemical Attack; Flow Blockage Due to Fouling

SLRA Table 3.3.1, AMR item 3.3.1-263 addresses:

- hardening or loss of strength due to polymeric degradation
- loss of material due to peeling, delamination, or wear
- cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack
- flow blockage due to fouling for polymeric piping, piping components, ducting, ducting components, and seals exposed to air, condensation, raw water, raw water (potable), treated water, wastewater, an underground environment, concrete, and soil

For the associated SLRA Table 2 AMR items that cite generic note E, the SLRA credits:

- Buried and Underground Piping and Tanks program for polymeric piping and piping components exposed to soil in the fire protection system
- Open-Cycle Cooling Water System program for carbon fiber reinforced polymer (CFRP) piping and piping components exposed to raw water in the open-cycle cooling water system
- Fire Water System program for polymeric piping and piping components exposed to raw water in the fire protection system

The staff's evaluation with respect to managing the effects of aging using these three AMPs is as follows.

Buried and Underground Piping and Tanks. As amended by letter dated February 20, 2025, plant-specific note 5, associated with these AMR items, states (in part):

> "[t]he polymeric piping in the Fire Protection System is polyurethane based cured-in-place-polymer-pipe liner. While polyurethane is susceptible to chemical attack from certain chemicals (e.g., concentrated acids, oils, acetone and certain other solvents, turpentine, etc.), it is generally resistant to chemical species expected in a soil environment. Further, as a liner, the potential exposure of the polyurethane to the soil environment is limited.

Based on its review of components associated with AMR item 3.3.1-263 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage hardening, loss of strength, and loss of material using the Buried and Underground Piping and Tanks program acceptable for the following reasons:

(1) Although the applicant elected to manage hardening and loss of strength, GALL-SLR Report guidance indicates that these aging effects are primarily applicable to elastomeric components.

(2) Managing loss of material for buried polymeric piping is consistent with GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks."

(3) Cracking and blistering are not aging effects requiring management due to the lack of environmental stressors in a buried environment (i.e., ultraviolet light, ozone, radiation), lack of concentrated chemical species in a soil environment, and use of the polyurethane as a liner (i.e., polyurethane is not in direct contact with soil).

(4) Flow blockage is not an applicable aging effect requiring management for the external surfaces of buried piping.

Open Cycle Cooling Water System. Based on its review of components associated with AMR item 3.3.1-263 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage hardening or loss of strength, and loss of material for CFRP piping and piping components exposed internally to raw water using the Open-Cycle Cooling Water System program acceptable for the following reasons:

(1) Managing hardening or loss of strength and loss of material for CFRP piping and piping components is consistent with GALL-SLR Report AMP XI.M20, "Open-Cycle Cooling Water System."

(2) Cracking and blistering are not aging effects requiring management due to the lack of environmental stressors in a raw water environment (i.e., ultraviolet light, ozone, radiation) and due to the chemical resistance of the CFRP resin (as confirmed via the applicant's response to Part No. 2 to RCI B.2.1.11 (ML25100A134)).

(3) As confirmed by the applicant's response to Part No. 1 to RCI B.2.1.11, the CFRP wrap is applied over existing piping, such that the internal surface of the wrap is not in direct contact with the raw water environment and therefore, flow in these lines does not affect the intended function of spatial interaction.

Fire Water System. Based on its review of components associated with AMR item 3.3.1-263 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage hardening, loss of strength, loss of material, and flow blockage using the Fire Water System program acceptable for the following reasons:

(1) As noted above, although the applicant elected to manage hardening and loss of strength, the GALL-SLR Report guidance indicates that these aging effects are primarily applicable to elastomeric components.

(2) The tests and inspections required by the Fire Water System program are capable of detecting flow blockage and loss of material prior to a loss of intended function.

(3) Cracking and blistering are not expected because the piping is buried, therefore, it is not exposed to ultraviolet light, ozone, or radiation.

(4) As confirmed in the applicant's response to RCI 3.3.2-1, the Fire Protection System raw water environment does not contain aggressive chemicals that may cause cracking or blistering.

(5) The applicant confirmed in their response to RCI 3.3.2-1 that there is no plant-specific OE for the polyurethane based cured-in-place-polymer-pipe liner exposed internally to raw water in the Fire Protection System due to age-related degradation.

3.3.2.1.3 Cracking due to Stress Corrosion Cracking

SLRA Table 3.3.1, AMR item 3.3.1-132 addresses, in part, cracking due to SCC for insulated copper alloy (>15% Zn) valve bodies exposed to air and condensation. For the SLRA Table 2 AMR items that cite generic note E, the SLRA credits the One-Time Inspection program to manage the cracking of insulated copper alloy (>15% zinc) valve bodies exposed to condensation in the control room ventilation system and SBO diesel generator ventilation system. Based on its review of components associated with AMR item 3.3.1-132 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the One-Time Inspection program acceptable because a review of plant OE did not identify any cracking of copper alloy with >15% zinc components, which meets the recommendation of the SRP-SLR.

3.3.2.1.4 Loss of Material Due to General, Pitting, Crevice Corrosion, and Microbiologically Influenced Corrosion

SLRA Table 3.3.1, AMR item 3.3.1-139 addresses loss of material due to general, pitting, crevice corrosion, and MIC for internally coated carbon steel and cast-iron components exposed to wastewater. For the SLRA Table 2 AMR items that cite generic note E, the SLRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (GALL-SLR Report AMP XI.M38) program to manage the aging effect for internally coated carbon steel drywell equipment drain sump heat exchanger tube side components, and also for internally coated carbon steel reactor building equipment drain tank heat exchanger tube side components. The AMR items cite plant-specific note 1, which states:

> "[t]he Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. The internally coated Drywell Equipment Drain Sump and reactor building Equipment Drain Tank heat exchangers meet the six criteria in GALL-SLR AMP XI.M42, Element 4, to use the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program in lieu of the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program.

Based on its review of components associated with AMR item 3.3.1-139 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (GALL-SLR Report AMP XI.M38) program acceptable because the applicant has demonstrated that these components meet the six criteria in GALL-SLR AMP XI.M42, Element 4 that allow for the substitution of the GALL-SLR AMP XI.M38 program by demonstrating the following:

- As confirmed by the applicant's response to RCI B.2.1.28-1, loss of coating or lining integrity cannot result in downstream effects such as reduction in flow, drop in pressure, or reduction of heat transfer for in-scope components.

- The components' only CLB-intended function is leakage boundary.
- As confirmed by the applicant's response to RCI B.2.1.28-2, the internal wastewater environment does not contain chemical compounds that could cause accelerated corrosion of the base material if coating/lining degradation resulted in exposure of the base metal.
- As confirmed by the applicant's response to RCI B.2.1.28-3, the internal wastewater environment would not promote MIC of the base metal.
- As confirmed by the applicant's response to RCI B.2.1.28-4, the coated/lined components are not located in the vicinity of uncoated components that could cause a galvanic couple to exist.
- As confirmed by the applicant's response to RCI B.2.1.28-5, the design for the component did not credit the coating/lining (e.g., the corrosion allowance was not zero).

3.3.2.1.5 Loss of Material Due to General, Pitting, and Crevice Corrosion

SLRA Table 3.3.1, item 3.3-1, 111, addresses the aging effect of loss of material due to general, pitting, and crevice corrosion for structural steel exposed to air–indoor uncontrolled environment. The applicant claims that this item is not applicable. The staff determined that this AMR item is not used because staff's search of DNPS UFSAR Section 9.1.1.2 and SLRA Table 3.3.1-111 confirmed that the DNPS new fuel storage vault is a reinforced concrete Class I structure, and there is no structural steel exposed to air–indoor uncontrolled environment in new fuel storage of the Auxiliary System. However, the staff finds in SLRA Table 3.5.2-11 that equipment storage racks (new fuel storage racks) are made of aluminum and the aging effect of loss of material due to corrosion for aluminum storage racks is managed by the Structures Monitoring program and addressed under AMR item 3.5.1-100.

3.3.2.1.6 Loss of Material due to Pitting, Crevice Corrosion, Microbiologically Influenced Corrosion: Flow Blockage due to Fouling

SLRA Table 3.3.1, AMR item 3.3.1-40 addresses loss of material from stainless steel bolting exposed to raw water. For the SLRA Table 2 AMR items that cite generic note E, the SLRA credits the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program to manage the aging effect for stainless steel bolting and concrete anchors in the crib houses. The AMR item cites plant-specific note 1, which states, "The RG 1.127, (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination."

Based on its review of components associated with AMR item 3.3.1-40 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the RG 1.127 (B.2.1.35) AMP acceptable because the RG 1.127 (B.2.1.35) AMP scope includes inspection of steel bolting and concrete anchors exposed to raw water in the crib houses for loss of materials.

3.3.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-SLR Report

In SLRA Section 3.3.2.2, the applicant further evaluates aging management for the auxiliary systems components, as recommended by the GALL-SLR Report, and provides information concerning how it will manage the applicable aging effects. The NRC staff reviewed the applicant's evaluation of these component groups against the criteria contained in SRP-SLR Section 3.3.2.2. The following subsections document the staff's review.

3.3.2.2.1 Cumulative Fatigue Damage

SLRA Section 3.3.2.2.1, associated with SLRA Table 3.3.1, AMR item 3.3.1-002, states that the TLAA on cumulative fatigue damage in the components of the auxiliary systems is evaluated in accordance with 10 CFR 54.21(c)(1) and is addressed in SLRA Section 4.3. In addition, the applicant explained that the fatigue TLAA on the reactor building overhead crane is discussed in SLRA Section 4.7.1.

The staff finds that the applicant's AMR results for the fatigue TLAA are consistent with SRP-SLR Section 3.3.2.2.1 and are, therefore, acceptable. The staff's evaluation of the fatigue TLAA for the components of the auxiliary systems is documented in SE Section 4.3. In addition, the staff's evaluation of the fatigue TLAA for the reactor building overhead crane is documented in SE Section 4.7.1.

3.3.2.2.2 Cracking Due to SCC and Cyclic Loading

SLRA Section 3.3.2.2.2, associated with SLRA Table 3.3.1 items 3.3.1-003 and 3.3.1-003a, applies to SCC and cyclic loading that could occur in stainless steel PWR nonregenerative heat exchanger tubing exposed to treated borated water greater than 140°F in the chemical and volume control system. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria of SRP-SLR Section 3.3.2.2.2 and finds it acceptable because the item is only applicable to PWRs and DNPS is a BWR.

3.3.2.2.3 Cracking Due to SCC in Stainless Steel Alloys

SLRA Section 3.3.2.2.3, associated with SLRA Table 3.3.1, AMR items 3.3.1-004, 3.3.1-094a, and 3.3.1-205, addresses cracking due to SCC for stainless steel piping, piping components, and tanks, both insulated and uninsulated, and stainless steel ducting and ducting components exposed to air or condensation. For the associated SLRA Table 2 AMR items that cite generic notes A or C, the SLRA credits the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.3.2.2.3.

In its review of components associated with AMR items 3.3.1-004, 3.3.1-094a, and 3.3.1-205 that cite generic notes A or C, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed one-time inspections are capable of detecting cracking.

For the SLRA Table 2 items associated with AMR item 3.3.1-004 that cite generic note E, the SLRA credits the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program to manage the aging effect for stainless steel crane/hoist platform components exposed to uncontrolled indoor air in the cranes, hoists, and refueling equipment system. Based on its review of components associated with AMR item 3.3.1-004 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program acceptable because the proposed periodic inspections are capable of detecting cracking.

SLRA Section 3.3.2.2.3, associated with SLRA Table 3.3.1, AMR items 3.3.1-146 and 3.3.1-231, addresses cracking due to SCC for stainless steel underground piping, piping components, and tanks, and for stainless steel tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air or condensation. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.3.2.2.3 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such stainless steel component and environment combinations in the auxiliary systems.

Based on the programs identified, the staff concludes that the applicant's programs meet SRP-SLR Section 3.3.2.2.3 criteria. For those AMR items associated with SLRA Section 3.3.2.2.3, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.2.2.4 Loss of Material Due to Pitting and Crevice Corrosion in Stainless Steel and Nickel Alloys

SLRA Section 3.3.2.2.4, associated with SLRA Table 3.3.1, AMR items 3.3.1-006, 3.3.1-094, 3.3.1-222, 3.3.1-232, and 3.3.1-241, addresses loss of material due to pitting and crevice corrosion for insulated and uninsulated stainless steel and nickel-alloy piping, piping components, and tanks exposed to air or condensation, stainless steel and nickel-alloy heat exchanger components exposed to air or condensation, and stainless steel ducting or ducting components exposed to air or condensation. For the associated SLRA Table 2 AMR items that cite generic notes A or C, the SLRA credits the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.3.2.2.4. In its review of components associated with AMR items 3.3.1-006, 3.3.1-094, 3.3.1-222, 3.3.1-232, and 3.3.1-241 that cite generic notes A or C, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of loss of material for these components, and the proposed one-time inspections are capable of detecting loss of material.

For the SLRA Table 2 items associated with AMR item 3.3.1-006 that cite generic note E, the SLRA credits the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program to manage the aging effect for stainless steel crane/hoist platform components exposed to uncontrolled indoor air in the cranes, hoists, and refueling equipment system. Based on its review of components associated with AMR item 3.3.1-006 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program acceptable because the proposed periodic inspections are capable of detecting loss of material.

SLRA Section 3.3.2.2.4, associated with SLRA Table 3.3.1, AMR items 3.3.1-228 and 3.3.1-246, addresses loss of material due to pitting and crevice corrosion for stainless steel and nickel-alloy tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air or condensation, and for stainless steel and nickel alloy underground piping, piping components, and tanks. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.3.2.2.4 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such stainless steel or nickel alloy component and environment combinations in the auxiliary systems.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.3.2.2.4 criteria. For those AMR items associated with SLRA Section 3.3.2.2.4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.2.2.5 Quality Assurance for Aging Management of Nonsafety-Related Components

SE Section 3.0.4 documents the NRC staff's evaluation of the applicant's QA Program.

3.3.2.2.6 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.3.2.2.7 Loss of Material Due to Recurring Internal Corrosion

SLRA Section 3.3.2.2.7, associated with SLRA Table 3.3.,1 AMR item 3.3.1-127, addresses recurring internal corrosion for metallic piping, piping components, and tanks exposed to raw water, raw water (potable), treated water or wastewater in auxiliary systems, which will be managed by the Open Cycle Cooling Water System program. The staff noted that the applicant identified recurring internal corrosion OE in the 10-year period between 2013 and 2023. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.3.2.2.7, item 3.3.1-127. In its review of components associated with AMR item 3.3.1-127, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Open Cycle Cooling Water System program is acceptable because it includes appropriate types of inspections, sample selection methodology, trending, performance monitoring, and use of the corrective action program to identify loss of material prior to the loss of intended function.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.3.2.2.7 criteria. For those AMR items associated with SLRA Section 3.3.2.2.7 the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.2.2.8 Cracking Due to Stress Corrosion Cracking in Aluminum Alloys

SLRA Section 3.3.2.2.8, associated with SLRA Table 3.3.1, AMR items 3.3.1-186, 3.3.1-189, and 3.3.1-254, addresses cracking due to SCC for aluminum tanks within the scope of GALL-SLR Report AMP XI.M29 exposed to air, condensation, soil, concrete, raw water, or wastewater; aluminum piping, piping components, and tanks exposed to air, condensation, raw water, potable raw water, and wastewater; and aluminum heat exchanger components exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.3.2.2.8.

In its review of components associated with AMR items 3.3.1-186, 3.3.1-189, and 3.3.1-254, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed one-time inspections are capable of detecting cracking.

SLRA Section 3.3.2.2.8, associated with SLRA Table 3.3.1, AMR item 3.3.1-233, addresses cracking due to SCC for insulated aluminum piping, piping components, and tanks, exposed to air or condensation. For the SLRA Table 2 item associated with AMR item 3.3.1-233, the applicant cited generic note I and stated that this item is not applicable because the component material is aluminum alloy 6061-T6, which is not susceptible to SCC. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.3.2.2.8 and finds it acceptable because Section 3.3.2.2.8 of the SRP-SLR Report identifies aluminum alloy 6061 in the T6 temper as not susceptible to SCC for piping, piping components, and tanks.

SLRA Section 3.3.2.2.8, associated with SLRA Table 3.3.1, AMR item 3.3.1-192, addresses cracking due to SCC for underground aluminum piping, piping components, and tanks. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.3.2.2.8 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no underground aluminum piping, piping components, or tanks in the auxiliary systems.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.3.2.2.8 criteria. For those AMR items associated with SLRA Section 3.3.2.2.8, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.2.2.9 Loss of Material Due to General, Crevice, or Pitting Corrosion, and Cracking Due to Stress Corrosion Cracking

SLRA Section 3.3.2.2.9, associated with SLRA Table 3.3.1, AMR items 3.3.1-112 and 3.3.1-202, addresses (1) loss of material due to general, crevice, or pitting corrosion in steel piping and piping components exposed to concrete (item 3.3.1-112) and (2) loss of material due to crevice or pitting corrosion and cracking due to SCC in stainless steel piping and piping components exposed to concrete (item 3.3.1-202). The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.3.2.2.9. The applicant stated that AMR item 3.3.1-112 is not used and that "Open Cycle Cooling Water System carbon steel piping in concrete is potentially exposed to groundwater and loss of material is assumed. This aging effect is addressed in AMR item 3.3.1-109." SLRA Table 3.3.1, AMR item 3.3.1-109, states that loss of material of steel piping and piping components exposed to concrete in the open cycle cooling water system will be managed by the Buried and Underground Piping and Tanks program. In addition, the applicant stated that "There are no stainless steel piping or piping components exposed to concrete in Auxiliary Systems at DNPS." The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.3.2.2.9 and finds it acceptable because, consistent with GALL-SLR, loss of material of steel piping and piping components exposed to concrete and potentially exposed to ground water in the open cycle cooling water system will be managed by the Buried and Underground Piping and Tanks program, and there are no stainless steel piping and piping components exposed to concrete in auxiliary systems at DNPS.

For those AMR items associated with SLRA Section 3.3.2.2.9, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.2.2.10 Loss of Material Due to Pitting and Crevice Corrosion in Aluminum Alloys

SLRA Section 3.3.2.2.10, associated with SLRA Table 3.3.1, AMR items 3.3.1-227, 3.3.1-234, 3.3.1-242, 3.3.1-245, and 3.3.1-247, addresses loss of material due to pitting and crevice corrosion for aluminum piping, piping components, heat exchanger components, and tanks, including tanks within the scope of GALL-SLR Report AMP XI.M29, exposed to air or condensation; insulated aluminum piping, piping components, and tanks exposed to air or condensation; and aluminum piping, piping components, and tanks exposed to raw water or wastewater, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.3.2.2.10.

In its review of components associated with AMR items 3.3.1-227, 3.3.1-234, 3.3.1-242, 3.3.1-245, and 3.3.1-247, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of loss of material due to pitting or crevice corrosion for these components, and the proposed one-time inspections are capable of detecting loss of material.

SLRA Section 3.3.2.2.10, associated with SLRA Table 3.3.1, AMR items 3.3.1-223 and 3.3.1-240, addresses loss of material due to pitting or crevice corrosion for aluminum underground piping, piping components, and tanks, and for aluminum heat exchanger components exposed to wastewater. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.3.2.2.10 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such aluminum component and environment combinations in the auxiliary systems.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.3.2.2.10 criteria. For those AMR items associated with SLRA Section 3.3.2.2.10, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.3.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-SLR Report

This section documents the NRC staff's review of AMR results listed in SLRA Tables 3.3.2-1 through 3.3.2-22 that are either not consistent with, or not addressed in, the GALL-SLR Report and are usually denoted with generic notes F through J. To efficiently capture and identify multiple applicable AMR items in each subsection, and because these AMR items often are not associated with an SLRA Table 1 item, the subsections are organized by applicable AMR section and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-SLR Report, the staff reviewed the applicant's evaluation to determine whether the applicant has demonstrated that it will adequately manage the effects of aging in a way that maintains the intended function(s) consistent with the CLB for the subsequent period of extended operation. The following sections document the staff's evaluation.

3.3.2.3.1 Fire Protection System – Summary of Aging Management Evaluation

Gypsum Fire Barriers (Penetration Seals and Fire Stops) Exposed to Indoor Uncontrolled Air

As amended by letter dated February 20, 2025, SLRA Table 3.3.2-8 states that cracking and delamination, loss of material, change in material properties, and separation of gypsum fire barriers (penetration seals and fire stops) exposed to indoor uncontrolled air will be managed by the Fire Protection program. The AMR item cites generic note F and plant-specific note 1, which states:

> The Fire Protection (B.2.1.15) program will be used to manage the aging effect(s) applicable to this component type, material, and environment combination.

The staff reviewed the associated item in the SLRA and considered whether the aging effects proposed by the applicant constitute all the applicable aging effects for this component, material, and environment description. The staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination based on its review of Section 6, "Fire Barriers," of EPRI 3002013084, "Long-Term Operations: Subsequent License Renewal Aging Affects for Structures and Structural Components (Structural Tools)," issued November 2018, which states loss of material, cracking/delamination, change in material properties, and separation may be applicable aging effects for fire stops.

The staff finds the applicant's proposal to manage the effects of aging acceptable because the periodic visual inspections required by the Fire Protection program are capable of detecting the applicable aging effects before a loss of intended function for the component, material, and environment noted above.

3.3.2.3.2 Closed Cycle Cooling Water System – Summary of Aging Management Evaluation

Copper Alloy with Greater than 15 Percent Zinc Heat Exchanger Tubes Exposed to Treated Water, Closed Cycle Cooling Water, and Raw Water

The staff's evaluation of copper alloy with greater than 15 percent zinc heat exchanger tubes exposed to treated water, closed cycle cooling water, and raw water, which will not be managed for loss of material due to selective leaching by the Selective Leaching program and are associated with generic note I, is documented in SE Section 3.2.2.3.1.

3.3.2.3.3 Standby Liquid Control System – Summary of Aging Management Evaluation

Glass Piping Elements Exposed to Sodium Pentaborate Solution (Internal).

SLRA Table 3.3.2-20, "Standby Liquid Control System," states that there are no aging effects applicable to glass piping elements in sodium pentaborate solution. The AMR item cites generic note G. The AMR item also cites plant-specific note 1, which explains that the aging effects were evaluated based on the SLC system chemistry as a treated water environment. The water for the sodium pentaborate solution is controlled and monitored by the Water Chemistry program. The staff reviewed the associated items in the SLRA to confirm no aging effects are applicable for this component, material, and environment combination. The GALL-SLR Report identifies no aging effects for glass in any environment, including GALL item VII.J.AP-52 for glass piping elements in treated borated water in auxiliary systems. According to NUREG/CR-6001, "Aging Assessment of BWR Standy Liquid Control Systems," sodium pentaborate solutions in SLC systems are made from boric acid and borax, with a resulting pH value near neutral and a maximum temperature of about 86°F (30°C). EPRI report 1010639, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4," identifies no OE with glass failure due to aging, and it identifies aggressive environments as caustic environments and hydrofluoric and phosphoric acids at high-temperature. This assessment of glass chemical resistance is consistent with other sources, such as C. P. Dillon, "Corrosion Control in the Chemical Process Industries," Second Edition, Materials Technology Institute, 1994. The staff finds the applicant's proposal acceptable based on its review of the sodium pentaborate environment, chemical resistance of glass, and OE with glass in nuclear plant systems.

3.3.2.3.4 Control Rod Drive System – Aging Management Evaluation

<u>PVC Piping and Piping Components Exposed Internally to Treated Water</u>

SLRA Table 3.3.2-3 identifies no aging effects/mechanisms and no aging management programs for PVC piping and piping components exposed internally to treated water. The AMR item cited is 3.3.1-253 (VII.G.A-787b), which manages (1) loss of material due to wear and (2) flow blockage due to fouling for PVC piping and piping components exposed to treated water. The AMR item cites generic note I and plant-specific note 1, which states:

> The Control Rod Drive System internal environment is condensate grade treated water that is free of particulate which could cause wear. The PVC piping is subject to infrequent low-pressure flow. Due to the flow conditions and quality of the water, this piping is not susceptible to loss of material due to wear.

The staff reviewed the associated item in the SLRA to confirm that loss of material due to wear and flow blockage due to fouling are not applicable for this component, material, and environment combination. NUREG-2221, "Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG-2191 and NUREG-2192" (ML17362A126) states, in Table 2-6 for VII.G.A-787b, "Loss of material due to wear can occur due to potential abrasive particles in the raw water and wastewater environments and flow velocity changes (for all water environments) where the configuration of the piping system causes perturbations in flow velocity," and "The staff concluded that there is reasonable assurance that there would not be enough fouling products from raw water (potable) or treated water sources to result in flow blockage due to fouling." Therefore, because the flow is infrequent and low pressure and the environment is treated water, loss of material due to wear and flow blockage due to fouling is not expected to occur and the staff finds the applicant's proposal acceptable.

3.3.2.3.5 Condensate Storage – Aging Management Evaluation

<u>Aluminum Alloy Tanks (Condensate Storage) Exposed Internally to Treated Water</u>

SLRA Table 3.4.2-1 states that cracking due to stress corrosion cracking (SCC) for aluminum alloy tanks (condensate storage) exposed internally to treated water is not applicable and no AMP is proposed. The AMR item cited is 3.3.1-185 (VII.G.A-623) and the AMR item cites generic note I. The AMR item cites plant-specific note 3, which states, "The treated water in the condensate storage tank is below the thresholds for chlorides, fluorides, and sulfides that would make the 5154 aluminum alloys susceptible to SCC."

The staff reviewed the associated item in the SLRA to confirm that these aging effects are not applicable for this component, material and environment combination. Section 3.4.2.2.7 of NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," (ML17188A158) states, "If the environment to which an aluminum alloy is exposed is not aggressive, such as dry gas or treated water, then cracking due to SCC will not occur and it is not an aging effect requiring management."

Therefore, because the environment is treated water, cracking due to SCC is not expected to occur and the staff finds the applicant's proposal acceptable.

3.4 Aging Management of Steam and Power Conversion Systems

3.4.1 Summary of Technical Information in the Application

SLRA Section 3.4 provides AMR results for those components that the applicant identified in SLRA Section 2.3.4, "Steam and Power Conversion Systems," as being subject to an AMR. SLRA Table 3.4.1, "Summary of Aging Management Evaluations for the Steam and Power Conversion Systems," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-SLR Report for the steam and power conversion systems components.

3.4.2 Staff Evaluation

Table 3.4-1 summarizes the NRC staff's evaluation of the component groups listed in SLRA Section 3.4 and addressed in the GALL-SLR Report.

Table 3.4-1 Staff Evaluation for Steam and Power Conversion Systems Components in the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.4.1-001	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.1)
3.4.1-002	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.2)
3.4.1-003	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.3)
3.4.1-004	Not applicable to BWRs
3.4.1-005	Consistent with the GALL-SLR Report
3.4.1-006	Consistent with the GALL-SLR Report
3.4.1-007	Consistent with the GALL-SLR Report
3.4.1-008	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-009	Consistent with the GALL-SLR Report
3.4.1-010	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-011	Consistent with the GALL-SLR Report
3.4.1-012	Consistent with the GALL-SLR Report
3.4.1-013	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-014	Consistent with the GALL-SLR Report
3.4.1-015	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.4.1-016	Consistent with the GALL-SLR Report
3.4.1-017	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-018	Consistent with the GALL-SLR Report
3.4.1-019	Consistent with the GALL-SLR Report
3.4.1-020	Consistent with the GALL-SLR Report
3.4.1-021	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-022	Not applicable to DNPS
3.4.1-023	Not applicable to DNPS
3.4.1-024	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-025	Consistent with the GALL-SLR Report
3.4.1-026	Consistent with the GALL-SLR Report
3.4.1-027	Consistent with the GALL-SLR Report
3.4.1-028	Consistent with the GALL-SLR Report
3.4.1-029	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-030	Not applicable to DNPS
3.4.1-031	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-032	Not applicable to DNPS
3.4.1-033	Not applicable to DNPS
3.4.1-034	Consistent with the GALL-SLR Report
3.4.1-035	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.9)
3.4.1-036	Not applicable to DNPS
3.4.1-037	Consistent with the GALL-SLR Report
3.4.1-038	Not applicable to BWRs
3.4.1-039	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-040	Consistent with the GALL-SLR Report
3.4.1-041	Not applicable to BWRs
3.4.1-042	Not applicable to BWRs
3.4.1-043	Consistent with the GALL-SLR Report
3.4.1-044	Consistent with the GALL-SLR Report
3.4.1-045	Not applicable to DNPS
3.4.1-046	Not applicable to BWRs
3.4.1-047	Not applicable to DNPS
3.4.1-048	Not applicable to DNPS
3.4.1-049	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-050	Consistent with the GALL-SLR Report
3.4.1-050a	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-051	Not applicable to DNPS
3.4.1-052	Not applicable to DNPS
3.4.1-053	Not applicable to DNPS
3.4.1-054	Consistent with the GALL-SLR Report
3.4.1-055	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.4.1-056	Not applicable to DNPS
3.4.1-057	Not applicable to DNPS
3.4.1-058	Consistent with the GALL-SLR Report
3.4.1-059	Not applicable to DNPS
3.4.1-060	Consistent with the GALL-SLR Report
3.4.1-061	Consistent with the GALL-SLR Report
3.4.1-062	Consistent with the GALL-SLR Report
3.4.1-063	Consistent with the GALL-SLR Report
3.4.1-064	Consistent with the GALL-SLR Report
3.4.1-065	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-066	Not applicable to DNPS
3.4.1-067	Addressed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (SLRA B.2.1.24) program
3.4.1-068	Not applicable to DNPS
3.4.1-069	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-070	Not applicable to DNPS
3.4.1-071	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-072	Not applicable to DNPS
3.4.1-073	Consistent with the GALL-SLR Report
3.4.1-074	Not applicable to DNPS
3.4.1-075	Not applicable to DNPS
3.4.1-076	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-077	Not applicable to DNPS
3.4.1-078	Not applicable to DNPS
3.4.1-079	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-080	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-081	Consistent with the GALL-SLR Report
3.4.1-082	Not applicable to DNPS
3.4.1-083	Consistent with the GALL-SLR Report
3.4.1-084	Consistent with the GALL-SLR Report
3.4.1-085	Consistent with the GALL-SLR Report
3.4.1-086	Not applicable to DNPS
3.4.1-087	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-088	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-089	Not applicable to DNPS
3.4.1-090	Not applicable to DNPS
3.4.1-091	Not applicable to DNPS
3.4.1-092	Not applicable to DNPS
3.4.1-093	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-094	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.9)
3.4.1-095	Not applicable to DNPS

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.4.1-096	Consistent with the GALL-SLR Report
3.4.1-097	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.9)
3.4.1-098	Not applicable to DNPS
3.4.1-099	Not applicable to DNPS
3.4.1-100	Not applicable to DNPS
3.4.1-101	Not applicable to DNPS
3.4.1-102	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.7)
3.4.1-103	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.3)
3.4.1-104	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.2)
3.4.1-105	Not applicable to DNPS
3.4.1-106	Addressed by the One-Time Inspection (SLRA B.2.1.20) program
3.4.1-107	Not applicable to DNPS
3.4.1-108	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-109	Not used (addressed by 3.4.1-102)
3.4.1-110	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-111	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-112	Not applicable to DNPS
3.4.1-113	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-114	Not applicable to DNPS
3.4.1-115	Not applicable to DNPS
3.4.1-116	Not applicable to DNPS
3.4.1-117	Not used (addressed by 3.4.1-096)
3.4.1-118	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-119	Consistent with the GALL-SLR Report (see SE Section 3.4.2.2.9)
3.4.1-120	Not applicable to DNPS
3.4.1-121	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.4.1-122	Not applicable to DNPS
3.4.1-123	Not applicable to DNPS
3.4.1-124	Not applicable to DNPS
3.4.1-125	Not applicable to DNPS
3.4.1-126	Not applicable to DNPS
3.4.1-127	Not applicable to DNPS
3.4.1-128	Not applicable to DNPS
3.4.1-129	Not applicable to DNPS
3.4.1-130	Not applicable to DNPS
3.4.1-131	Not applicable to DNPS
3.4.1-132	Not applicable to DNPS
3.4.1-133	Not applicable to DNPS
3.4.1-134	Not applicable to DNPS

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.4.1-135	Addressed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (SLRA B.2.1.24) and Buried and Underground Piping and Tanks (SLRA B.2.1.27) programs

The NRC staff's review of component groups, as described in SE Section 3.0.2.2, is summarized in the following three sections:

(1) SE Section 3.4.2.1 discusses AMR results for components that the applicant states are either not applicable to DNPS, or are consistent with the GALL-SLR Report. Section 3.4.2.1.1 summarizes the staff's review of AMR items that are not applicable, or not used, and documents any RAIs issued and the staff's conclusions. SE Sections 3.4.2.1.2 to 3.4.2.1.4 document the review of components that required additional information or otherwise required further explanation.

(2) SE Section 3.4.2.2 discusses AMR results for which the GALL-SLR Report and SRP-SLR recommend further evaluation.

(3) SE Section 3.4.2.3 discusses AMR results for components that the applicant stated are not consistent with, or not addressed in, the GALL-SLR Report. These AMR results typically are identified by generic notes F through J, and plant-specific notes in the SLRA.

3.4.2.1 Aging Management Review Results Consistent with the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Tables 3.4.2-1 through 3.4.2-5 that the applicant determined to be consistent with the GALL-SLR Report. The staff audited and reviewed the information in the SLRA. The staff did not repeat its review of the matters described in the GALL-SLR Report; the staff verified that the material presented in the SLRA was applicable and that the applicant identified the appropriate GALL-SLR Report information for AMRs. For those AMR items that the staff found to be consistent with the GALL-SLR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions as documented in the GALL-SLR Report are considered to be the basis for acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-SLR Report" is documented in SE Table 3.4-1, and no separate write-up is required or provided.

3.4.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

SE Table 3.4-1 identifies the SLRA Table 3.4.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are neither used nor applicable to DNPS. The NRC staff reviewed the SLRA and UFSAR and confirmed that the applicant's SLRA does not have any AMR results that are applicable for these AMR items.

SE Table 3.4-1 identifies the SLRA Table 3.4.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not applicable because the associated AMR items are only applicable to PWRs while DNPS are BWR units. The NRC staff reviewed the SRP-SLR, confirmed that these AMR items only apply to PWRs, and finds that these AMR items are not applicable to DNPS.

SE Table 3.4-1 identifies the SLRA Table 3.4.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not used because they are addressed by other SLRA Table 1 AMR items. The NRC staff reviewed the SLRA and confirmed that aging effects will be addressed by other SLRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate AMR items acceptable.

3.4.2.1.2 Cracking due to Stress Corrosion Cracking

SLRA Table 3.4.1, AMR item 3.4.1-106 addresses cracking due to SCC for copper alloy (>15% Zn or >8% Al) piping and piping components exposed to air and condensation. For the associated SLRA Table 2 AMR items that cite generic note E, the SLRA credits the One-Time Inspection program to manage the cracking of copper alloy (>15% zinc) fire hydrants, flow devices, piping, piping components, spray nozzles, sprinkler heads, and valve bodies exposed to uncontrolled indoor air and outdoor air in the compressed air system, control room ventilation system, diesel generator and auxiliaries systems, fire protection system, low pressure coolant injection system, main generator and auxiliaries systems, nonsafety-related ventilation system, open cycle cooling water system, process sampling and radiation monitoring systems, SBO diesel generator ventilation system, safety-related ventilation system, and standby gas treatment system. Based on its review of components associated with AMR item 3.4.1-106 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the One-Time Inspection program acceptable because a review of plant OE did not identify any cracking of copper alloy with >15% zinc components, which meets the recommendation of the SRP-SLR.

3.4.2.1.3 Hardening or Loss of Strength Due to Polymeric Degradation; Loss of Material Due to Peeling, Delamination, or Wear; Cracking or Blistering Due to Exposure to Ultraviolet Light, Ozone, Radiation, Or Chemical Attack; Flow Blockage Due to Fouling

As amended by letter dated February 20, 2025, SLRA Table 3.4.1, AMR item 3.4.1-135 addresses:

- hardening or loss of strength due to polymeric degradation
- loss of material due to peeling, delamination, or wear
- cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack
- flow blockage due to fouling for polymeric piping, piping components, ducting, ducting components, and seals exposed to air, condensation, raw water, raw water (potable), treated water, wastewater, an underground environment, concrete, and soil

For the associated SLRA Table 2 AMR items that cite generic note E, the SLRA credits the Buried and Underground Piping and Tanks program to manage the aging effects for CFRP piping and piping components exposed to soil in the Condensate System. Plant-specific note 2 associated with these AMR items states the following (in part):

> [t]he CFRP piping resin is a modified bisphenol A based epoxy resin. Chemical resistant testing ("pickle jar testing") of the piping material has demonstrated its chemical resistance to species it could be potentially exposed to during its service life.

Based on its review of components associated with AMR item 3.4.1-135 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the Buried and Underground Piping and Tanks program acceptable for the following reasons:

(1) As confirmed by the applicant's response to RCI B.2.1.27-1, the CFRP wrap is applied over existing piping such that the internal surface of the wrap is not in direct contact with the treated water environment but is in direct contact with the soil environment. Therefore, the CFRP material will be visible during the direct visual inspections prescribed by this program (see Enhancement No. 2 to SLRA Section B.2.1.27, "Buried and Underground Piping and Tanks").

(2) Although the applicant elected to manage hardening and loss of strength, GALL-SLR Report guidance indicates that these aging effects are primarily applicable to elastomeric components.

(3) Managing loss of material for buried polymeric piping is consistent with GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks."

(4) Cracking and blistering are not aging effects requiring management due to the lack of environmental stressors in a buried environment (i.e., ultraviolet light, ozone, radiation) and chemical resistance of the CFRP resin (as described in the plant-specific note).

(5) Flow blockage is not an applicable aging effect requiring management for the external surfaces of buried piping.

3.4.2.1.4 Loss of Material Due to General, Pitting, Crevice Corrosion, and Microbiologically-Influenced Corrosion

As amended by letter dated March 13, 2025, SLRA Table 3.4.1, AMR item 3.4.1-067 addresses loss of material due to general, pitting, crevice corrosion, and MIC for internally coated carbon steel tanks exposed to lubricating oil. For the associated SLRA Table 2 AMR item that cites generic note E, the SLRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (GALL-SLR AMP XI.M38) program to manage the aging effect for internally coated carbon steel turbine oil reservoirs. The AMR items cite plant-specific note 1, which states:

> [t]he Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage the aging effects applicable to this component type, material, and environment combination. The internally coated turbine oil reservoir tank meets the six criteria in GALL-SLR AMP XI.M42, Element 4, to use the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program in lieu of the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program.

Based on its review of components associated with AMR item 3.4.1-067 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program acceptable because the applicant has demonstrated that these components meet the following criteria in GALL-SLR AMP XI.M42, Element 4 that allow for the substitution of the GALL-SLR AMP XI.M38 program by demonstrating the following:

- As confirmed by the applicant's response to RCI B.2.1.28-1, loss of coating or lining integrity cannot result in downstream effects such as reduction in flow, drop in pressure, or reduction of heat transfer for in-scope components.
- The component's only CLB intended function is leakage boundary.

- As confirmed by the applicant's response to RCI B.2.1.28-2, the internal environment does not contain chemical compounds that could cause accelerated corrosion of the base material if coating/lining degradation resulted in exposure of the base metal.
- As confirmed by the applicant's response to RCI B.2.1.28-3, the internal environment would not promote MIC of the base metal.
- As confirmed by the applicant's response to RCI B.2.1.28-5, the design for the component did not credit the coating/lining (e.g., the corrosion allowance was not zero).

The staff notes that the absence of an aqueous internal environment in the turbine oil reservoirs makes galvanic corrosion unlikely, and thus the following criteria in GALL-SLR AMP XI.M42, Element 4 is not applicable to the internally coated carbon steel turbine oil reservoirs. The coated/lined components are not located in the vicinity of uncoated components that could cause a galvanic couple to exist.

3.4.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-SLR Report

In SLRA Section 3.4.2.2, the applicant further evaluated aging management for the steam and power conversion systems components, as recommended by the GALL-SLR Report, and provides information concerning how it will manage the applicable aging effects. The NRC staff reviewed the applicant's evaluation of these component groups against the criteria contained in SRP-SLR Section 3.4.2.2. The following subsections document the staff's review.

3.4.2.2.1 Cumulative Fatigue Damage

SLRA Section 3.4.2.2.1 is associated with SLRA AMR item 3.4.1-001, as described in SLRA Table 3.4.1. The applicant explained that the TLAA on cumulative fatigue damage in the components of steam and power conversion system is evaluated in accordance with 10 CFR 54.21(c) and is addressed in SLRA Section 4.3. The staff finds that the applicant's AMR results for the fatigue TLAA are consistent with SRP-SLR Section 3.4.2.2.1 and are, therefore, acceptable. The staff's evaluation of the fatigue TLAA for the components of the steam and power conversion system is documented in SE Section 4.3.

3.4.2.2.2 Cracking Due to Stress Corrosion Cracking in Stainless Steel Alloys

SLRA Section 3.4.2.2.2, associated with SLRA Table 3.4.1, AMR items 3.4.1-002 and 3.4.1-104, addresses cracking due to SCC for uninsulated or insulated stainless steel piping, piping components, and tanks exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.4.2.2.2.

In its review of components associated with AMR items 3.4.1-002 and 3.4.1-104, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed one-time inspections are capable of detecting cracking.

SLRA Section 3.4.2.2.2, associated with SLRA Table 3.4.1, AMR items 3.4.1-074 and 3.4.1-100, addresses cracking due to SCC for underground stainless steel piping, piping components, and tanks, and stainless steel tanks within the scope of GALL-SLR Report AMP

XI.M29 exposed to air or condensation. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.4.2.2.2 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such stainless steel component and environment combinations in the steam and power conversion systems.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.4.2.2.2 criteria. For the AMR item associated with SLRA Section 3.4.2.2.2, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.2.2.3 Loss of Material Due to Pitting and Crevice Corrosion in Stainless Steel and Nickel Alloys

SLRA Section 3.4.2.2.3, associated with SLRA Table 3.4.1, AMR items 3.4.1-003 and 3.4.1-103, addresses loss of material due to pitting and crevice corrosion for uninsulated and insulated stainless steel and nickel-alloy piping, piping components, and tanks exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.4.2.2.3.

In its review of components associated with AMR items 3.4.1-003 and 3.4.1-103, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of loss of material due to pitting or crevice corrosion for these components, and the proposed one-time inspections are capable of detecting loss of material.

SLRA Section 3.4.2.2.3, associated with SLRA Table 3.4.1, AMR items 3.4.1-095 and 3.4.1-098, addresses loss of material due to pitting or crevice corrosion for stainless steel or nickel-alloy underground piping, piping components, and tanks, and for stainless steel and nickel-alloy tanks within the scope of GALL-SLR Report AMP X.M29 exposed to air or condensation. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.4.2.2.3 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such stainless steel or nickel-alloy component and environment combinations in the steam and power conversion systems.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.4.2.2.3 criteria. For those AMR items associated with SLRA Section 3.4.2.2.3, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

SE Section 3.0.4 documents the staff's evaluation of the applicant's QA Program.

3.4.2.2.5 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the staff's evaluation of the applicant's ongoing review of OE.

3.4.2.2.6 Loss of Material Due to Recurring Internal Corrosion

SLRA Section 3.4.2.2.6, associated with SLRA Table 3.4.1, AMR item 3.4.1-061, addresses loss of material due to recurring internal corrosion for metallic piping, piping components, and tanks exposed to raw water and wastewater in Steam and Power Conversion Systems, which will be managed by the Open Cycle Cooling Water System program. The staff noted that the applicant identified recurring internal corrosion OE in the 10-year period. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.4.2.2.6, item 3.3.1-061. In its review of components associated with AMR item 3.4.1-061, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Open Cycle Cooling Water System program is acceptable because it includes appropriate types of inspections, sample selection methodology, trending, performance monitoring, and use of the corrective action program to identify loss of material prior to the loss of intended function.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.4.2.2.6 criteria. For those AMR items associated with SLRA Section 3.4.2.2.6 the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.2.2.7 Cracking Due to Stress Corrosion Cracking in Aluminum Alloys

SLRA Section 3.4.2.2.7, as amended by letter dated February 20, 2025, associated with SLRA Table 3.4.1, AMR item 3.4.1-102, addresses cracking due to SCC for aluminum tanks within the scope of GALL-SLR Report AMP X.M29 exposed to air, condensation, soil, concrete, raw water, or wastewater, which will be managed by the One-Time Inspection program and Outdoor and Large Atmospheric Metallic Storage Tanks program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.4.2.2.7.

In its review of components associated with AMR item 3.4.1-102, the staff finds that the applicant has met the further evaluation criteria. The applicant's proposal to manage the effects of aging using the One-Time Inspection program for aluminum components exposed to air or condensation is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed one-time inspections are capable of detecting cracking. The applicant's proposal to manage the effects of aging using the Outdoor and Large Atmospheric Metallic Storage Tanks program for aluminum tanks exposed to concrete and soil is acceptable because the plant-specific OE does not reveal a history of cracking due to SCC for these components, and the proposed periodic inspections are capable of detecting cracking.

SLRA Section 3.4.2.2.7, as amended by letter dated February 20, 2025, associated with SLRA Table 3.4.1, AMR item 3.4.1-109, addresses cracking due to SCC for aluminum piping, piping components, and tanks exposed to air, condensation, raw water, and wastewater. The applicant stated that this item is not used for two reasons. First, the applicant stated that aluminum piping and piping components exposed to air and condensation are not susceptible to SCC. Generic note I is cited for these components in SLRA Table 3.4.2-1, and the staff finds this acceptable as discussed in the following paragraph. Second, aluminum tanks in the condensate system exposed to air and condensation are addressed by AMR item 3.4.1-102 using the One-Time Inspection program, and aluminum tanks in the condensate system exposed to concrete and soil are addressed by AMR item 3.4.1-102 using the Outdoor and Large Atmospheric Metallic Storage Tanks program. The staff finds this acceptable as discussed in the previous paragraph.

For the SLRA Table 2 items associated with AMR item 3.4.1-109 that cite generic note I, the applicant stated that this item is not applicable because the associated aluminum piping and piping component material is aluminum alloy 6061-T6, which is not susceptible to SCC. The staff evaluated the applicant’s claim against the criteria in SRP-SLR Section 3.4.2.2.7 and finds it acceptable because Section 3.4.2.2.7 of the SRP-SLR Report identifies aluminum alloy 6061 in the T6 temper as not susceptible to SCC for piping and piping components.

SLRA Section 3.4.2.2.7, associated with SLRA Table 3.4.1, AMR items 3.4.1-105 and 3.4.1-112, addresses cracking due to SCC for insulated aluminum piping, piping components, and tanks exposed to air or condensation, and for underground aluminum piping, piping components, and tanks. For the SLRA Table 2 items associated with AMR items 3.4.1-105 and 3.4.1-112 that cite generic note I, the SLRA stated that these items are not applicable because for all associated components the material is aluminum alloy 6061-T6, which is not susceptible to SCC. The staff evaluated the applicant’s claim against the criteria in SRP-SLR Section 3.4.2.2.7 and finds it acceptable because Section 3.4.2.2.7 of the SRP-SLR Report identifies aluminum alloy 6061 in the T6 temper as not susceptible to SCC for piping and piping components.

Based on the programs identified, the staff concludes that the applicant’s programs meet SRP-SLR Section 3.4.2.2.7 criteria. For those AMR items associated with SLRA Section 3.4.2.2.7, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.2.2.8 Loss of Material Due to General, Crevice, or Pitting Corrosion and Cracking Due to Stress Corrosion Cracking

SLRA Section 3.4.2.2.8, associated with SLRA Table 3.4.1, AMR items 3.4.1-051 and 3.4.1-082, addresses (1) loss of material due to general, crevice, or pitting corrosion in steel piping and piping components exposed to concrete (item 3.4.1-051) and (2) loss of material due to crevice or pitting corrosion and cracking due to stress corrosion cracking in stainless steel piping and piping components exposed to concrete (item 3.4.1-082). The staff reviewed the applicant’s proposal against the criteria in SRP-SLR Section 3.4.2.2.8. The applicant stated that AMR item 3.4.1-051 is not applicable and that “Condensate System piping embedded in concrete is potentially exposed to groundwater and loss of material is assumed. This aging effect is addressed in AMR item 3.4.1-050.” The discussion of AMR item 3.4.1-050 in SLRA Table 3.4.1 states that loss of material of steel piping and piping components exposed to concrete in the condensate system will be managed by the Buried and Underground Piping and Tanks program. In addition, the applicant stated that AMR item 3.4.1-082 is not applicable and that “There are no stainless steel piping or piping components exposed to concrete in the Steam and Power Conversion Systems at DNPS.” The staff evaluated the applicant’s claim against the criteria in SRP-SLR Section 3.4.2.2.8 and finds it acceptable because, consistent with GALL-SLR, loss of material of steel piping and piping components exposed to concrete and potentially exposed to ground water in the condensate system will be managed by the Buried and Underground Piping and Tanks program, and there are no stainless steel piping and piping components exposed to concrete in in the steam and power conversion systems at DNPS.

For those AMR items associated with SLRA Section 3.4.2.2.8, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.2.2.9 Loss of Material Due to Pitting and Crevice Corrosion in Aluminum Alloys

SLRA Section 3.4.2.2.9, associated with SLRA Table 3.4.1, AMR items 3.4.1-035, 3.4.1-094, 3.4.1-097, and 3.4.1-119, addresses loss of material due to pitting and crevice corrosion for uninsulated and insulated aluminum piping, piping components, and tanks exposed to air or condensation, underground aluminum piping, piping components, and tanks, and aluminum tanks within the scope of GALL-SLR Report AMP X.M29 exposed to air or condensation, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.4.2.2.9.

In its review of components associated with AMR items 3.4.1-035, 3.4.1-094, 3.4.1-097, and 3.4.1-119, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the plant-specific OE does not reveal a history of loss of material due to pitting or crevice corrosion for these components, and the proposed one-time inspections are capable of detecting loss of material.

SLRA Section 3.4.2.2.9, associated with SLRA Table 3.4.1, AMR item 3.4.1-120, addresses loss of material due to pitting and crevice corrosion for aluminum piping, piping components, and tanks exposed to raw water or wastewater. The applicant stated that these items are not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.4.2.2.9 and finds it acceptable because, based on a review of the UFSAR and SLRA, there are no such aluminum component and environment combinations in the steam and power conversion systems.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.4.2.2.9 criteria. For those AMR items associated with SLRA Section 3.4.2.2.9, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.4.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-SLR Report

This section documents the NRC staff's review of AMR results listed in SLRA Tables 3.4.2-1 through 3.4.2-5 that are either not consistent with, or not addressed in, the GALL-SLR Report and are usually denoted with generic notes F through J. To efficiently capture and identify multiple applicable AMR items in each subsection, and because these AMR items often are not associated with an SLRA Table 1 item, the subsection is organized by applicable AMR section and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-SLR Report, the staff reviewed the applicant's evaluation to determine whether the applicant has demonstrated that it will adequately manage the effects of aging in a way that maintains the intended function(s) consistent with the CLB for the subsequent period of extended operation. The following section describes the staff's evaluation.

3.4.2.3.1 Main Turbine and Auxiliaries System – Summary of Aging Management Evaluation

Carbon Steel Tanks with Internal Linings Exposed to Condensation

SLRA Table 3.4.2-5 states that loss of material for carbon steel turbine oil reservoir tanks exposed internally to condensation will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP. The associated AMR item cites generic note G because this environment is not in the GALL-SLR Report for this component and material combination. The staff reviewed the associated items in the SLRA and considered whether the aging effects proposed by the applicant constitute all the applicable aging effects for this component, material, and environment description. Based on its review of the GALL-SLR for carbon steel tanks that are exposed internally to condensation, use of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP to manage loss of material is consistent with the parameters monitored and inspected in the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP and therefore, the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination and use of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP is acceptable.

3.5 Aging Management of Containments, Structures, and Component Supports

3.5.1 Summary of Technical Information in the Application

SLRA Section 3.5 provides AMR results for those components the applicant identified in SLRA Section 2.4, "Scoping and Screening Results: Structures," as being subject to an AMR. SLRA Table 3.5.1, "Summary of Aging Management Programs for Structures and Component Supports," is a summary comparison of the applicant's AMR results with those provided in the GALL-SLR Report for the structures and component supports.

3.5.2 Staff Evaluation

Error! Reference source not found. summarizes the NRC staff's evaluation of the component groups listed in SLRA Section 3.5 and addressed in the GALL-SLR Report.

Table 3.5-1 Staff Evaluation for Containments, Structures, and Component Supports Components in the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.5.1-001	Not applicable to DNPS
3.5.1-002	Not applicable to DNPS
3.5.1-003	Not applicable to DNPS
3.5.1-004	Not applicable to DNPS
3.5.1-005	Not applicable to DNPS
3.5.1-006	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.3.2)

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.5.1-007	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.3.3)
3.5.1-008	Not applicable to DNPS
3.5.1-009	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.5)
3.5.1-010	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.6)
3.5.1-011	Not applicable to DNPS
3.5.1-012	Not applicable to DNPS
3.5.1-013	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.5.1-014	Not applicable to DNPS
3.5.1-015	This item number is not used in the SRP-SLR or the GALL-SLR Report
3.5.1-016	Not applicable to DNPS
3.5.1-017	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.5.1-018	Not applicable to DNPS
3.5.1-019	Not applicable to DNPS
3.5.1-020	Not applicable to DNPS
3.5.1-021	Not applicable to DNPS
3.5.1-022	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.5.1-023	Not applicable to DNPS
3.5.1-024	Not applicable to DNPS
3.5.1-025	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.5.1-026	Consistent with the GALL-SLR Report
3.5.1-027	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.5)
3.5.1-028	Consistent with the GALL-SLR Report
3.5.1-029	Consistent with the GALL-SLR Report
3.5.1-030	Consistent with the GALL-SLR Report
3.5.1-031	Consistent with the GALL-SLR Report
3.5.1-032	Not applicable to DNPS
3.5.1-033	Consistent with the GALL-SLR Report
3.5.1-034	Consistent with the GALL-SLR Report
3.5.1-035	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.3.1)
3.5.1-036	Not used (addressed by 3.5.1-006, 3.5.1-001, and 3.5.1-035)
3.5.1-037	Consistent with the GALL-SLR Report
3.5.1-038	Not applicable to DNPS
3.5.1-039	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.1.6)
3.5.1-040	Not applicable to DNPS
3.5.1-041	Consistent with the GALL-SLR Report
3.5.1-042	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.1.1)
3.5.1-043	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.1.2)
3.5.1-044	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.1.3)
3.5.1-045	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.5.1-046	Not used (addressed by 3.5.1-044)
3.5.1-047	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.1.4)

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.5.1-048	Not applicable to DNPS
3.5.1-049	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.3.1)
3.5.1-050	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.3.2)
3.5.1-051	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.3.3)
3.5.1-052	Not applicable to DNPS
3.5.1-053	Not applicable to DNPS
3.5.1-054	Consistent with the GALL-SLR Report
3.5.1-055	Consistent with the GALL-SLR Report
3.5.1-056	Consistent with the GALL-SLR Report
3.5.1-057	Consistent with the GALL-SLR Report
3.5.1-058	Consistent with the GALL-SLR Report
3.5.1-059	Consistent with the GALL-SLR Report
3.5.1-060	Consistent with the GALL-SLR Report
3.5.1-061	Consistent with the GALL-SLR Report
3.5.1-062	Consistent with the GALL-SLR Report
3.5.1-063	Consistent with the GALL-SLR Report
3.5.1-064	Consistent with the GALL-SLR Report
3.5.1-065	Consistent with the GALL-SLR Report
3.5.1-066	Consistent with the GALL-SLR Report
3.5.1-067	Consistent with the GALL-SLR Report
3.5.1-068	Consistent with the GALL-SLR Report
3.5.1-069	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.5.1-070	Consistent with the GALL-SLR Report
3.5.1-071	Consistent with the GALL-SLR Report
3.5.1-072	Consistent with the GALL-SLR Report
3.5.1-073	Not used (addressed by 3.5.1-034)
3.5.1-074	Not applicable to DNPS
3.5.1-075	Consistent with the GALL-SLR Report
3.5.1-076	Consistent with the GALL-SLR Report
3.5.1-077	Consistent with the GALL-SLR Report
3.5.1-078	Consistent with the GALL-SLR Report
3.5.1-079	Consistent with the GALL-SLR Report
3.5.1-080	Consistent with the GALL-SLR Report
3.5.1-081	Consistent with the GALL-SLR Report
3.5.1-082	Consistent with the GALL-SLR Report
3.5.1-083	Consistent with the GALL-SLR Report
3.5.1-084	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.5.1-085	Consistent with the GALL-SLR Report
3.5.1-086	Not applicable to DNPS
3.5.1-087	Consistent with the GALL-SLR Report
3.5.1-088	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.5.1-089	Not applicable to BWRs
3.5.1-090	Consistent with the GALL-SLR Report
3.5.1-091	Consistent with the GALL-SLR Report
3.5.1-092	Consistent with the GALL-SLR Report
3.5.1-093	Consistent with the GALL-SLR Report
3.5.1-094	Consistent with the GALL-SLR Report
3.5.1-095	Consistent with the GALL-SLR Report
3.5.1-096	Not used (addressed by 3.5.1-054)
3.5.1-097	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.6)
3.5.1-098	Not applicable to DNPS
3.5.1-099	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.4)
3.5.1-100	Consistent with the GALL-SLR Report (see SE Section 3.5.2.2.2.4)

The NRC staff's review of component groups, as described in SE Section 3.0.2.2, is summarized in the following three sections:

(1) SE Section 3.5.2.1 discusses AMR results for components that the applicant states are either not applicable to DNPS or are consistent with the GALL-SLR Report. Section 3.5.2.1.1 summarizes the staff's review of AMR items that are not applicable or not used and documents any RAIs issued and the staff's conclusions. SE Section 3.5.2.1.2 documents the review of components that required additional information or otherwise required further explanation.

(2) SE Section 3.5.2.2 discusses AMR results for which the GALL-SLR Report and SRP-SLR recommend further evaluation.

(3) SE Section 3.5.2.3 discusses AMR results for components that the applicant stated are not consistent with, or not addressed in, the GALL-SLR Report. These AMR results typically are identified by generic notes F through J, and plant-specific notes in the SLRA.

3.5.2.1 Aging Management Review Results Consistent with the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Tables 3.5.2-1 through 3.5.2-16 that the applicant determined to be consistent with the GALL-SLR Report. The staff audited and reviewed the information in the SLRA. The staff did not repeat its review of the matters described in the GALL-SLR Report; the staff verified that the material presented in the SLRA was applicable and that the applicant identified the appropriate GALL-SLR Report information for AMRs. For those AMR items that the staff found to be consistent with the GALL-SLR Report and for which no additional evaluation or RAI applies, the staff's review and conclusions as documented in the GALL-SLR Report are considered to be the basis for acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-SLR Report" is documented in SE Table 3.5-1, and no separate write-up is required or provided.

3.5.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

SE Table 3.5-1 identifies the SLRA Table 3.5.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are neither used nor applicable to

DNPS. The NRC staff reviewed the SLRA and UFSAR and confirmed that the applicant's SLRA does not have any AMR results that are applicable for these AMR items.

SE Table 3.5-1 identifies the SLRA Table 3.5.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not applicable because the associated AMR items are only applicable to PWRs while DNPS are BWR units. The NRC staff reviewed the SRP-SLR, confirmed that these AMR items only apply to PWRs, and finds that these AMR items are not applicable to DNPS.

SE Table 3.5-1 identifies the SLRA Table 3.5.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not used because they are addressed by other SLRA Table 1 AMR items. The NRC staff reviewed the SLRA and confirmed that aging effects will be addressed by other SLRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate AMR items acceptable.

3.5.2.1.2 Loss of Material Due to Pitting and Crevice Corrosion

SLRA Table 3.5.1, AMR item 3.5.1-090, addresses loss of material due to general (steel only), pitting and crevice corrosion for carbon steel structural bolting exposed to treated water associated with supports for platforms, pipe whip restraints, jet impingement shields, masonry walls, and other miscellaneous structures (support members, welds, bolted connections, support anchorage to building structure). For the SLRA Table 3.5.2-2 AMR item that cites generic note E, the SLRA credits the Water Chemistry (XI.M2) AMP (B.2.1.2), and the Structures Monitoring (B.2.1.33) AMP in lieu of the ASME Section XI, Subsection IWF AMP (XI.S3) recommended for the AMR item in SRP-SLR Table 3.5-1 and GALL-SLR to manage the effects of aging for loss of material.

This AMR item has a structural support function and cites plant-specific note 2, which states "The Structures Monitoring (B.2.1.33) [AMP] is substituted to manage loss of material of the carbon steel non-ASME IWF supports exposed to treated water." Based on its review of components associated with AMR items 3.5.1-090 for which the applicant cited generic note E, the staff finds the applicant's proposal to manage the effects of aging using the GALL-SLR recommended SLRA AMP B.2.1.2 "Water Chemistry," and SLRA AMP B.2.1.33 "Structures Monitoring" acceptable for the following reasons:

(1) The use of SLRA B.2.1.2 Water Chemistry AMP, which was found acceptable in the staff evaluation documented in SE Section 3.0.3.2.1, is consistent with SRP-SLR Table 3.5-1.

(2) The SLRA B.2.1.33 AMP, which was found acceptable in the staff evaluation documented in SE Section 3.0.3.2.18, is adequate to manage loss of material due to corrosion for non-ASME supports because the AMP includes periodic visual examinations performed every 5 years to monitor and detect loss of material before loss of intended function.

3.5.2.2 AMR Results for which Further Evaluation is Recommended by the GALL-SLR Report

In SLRA Section 3.5.2.2, the applicant further evaluated aging management for certain containments, structures, and component supports, as recommended by the GALL-SLR Report, and provided information concerning how it will manage the applicable aging effects. The NRC staff reviewed the applicant's evaluation of these component groups against the criteria contained in SRP-SLR Report Section 3.5.2.2. The following subsections document the staff's review.

3.5.2.2.1 PWR and BWR Containments

Cracking and Distortion Due to Increased Stress Levels from Settlement, Reduction of Foundation Strength, and Cracking Due to Differential Settlement and Erosion of Porous Concrete Sub-Foundations

SLRA Section 3.5.2.2.1.1, associated with SLRA Table 3.5-1, AMR items 3.5.1-001 and 3.5.1-002, addresses concrete cracking and distortion due to increased stress levels from settlement, and the reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete sub-foundations, respectively, for containment concrete elements exposed to soil or a flowing water environment. The applicant stated that these items are not applicable because DNPS is a Mark I steel containment that is enclosed by the reactor building and supported by the reactor building concrete foundation. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.5.2.2.1.1 and finds it acceptable for the following reasons:

(1) The foundation of the containment is integral with the reactor building foundation.

(2) UFSAR Section 2.5.4, along with the clarification provided in response to RAI 3.5.2.2.2.1-1 (ML25128A184), states that all footings for major structures have a foundation of sound rock, which prevents potential problems associated with settlement due to compaction or erosion.

(3) The SLRA states that the CLB does not credit a dewatering system to control building settlement.

Reduction of Strength and Modulus Due to Elevated Temperature

SLRA Section 3.5.2.2.1.2, associated with SLRA Table 3.5.1, AMR item 3.5.1-003, addresses the aging effect of reduction of strength and modulus of elasticity due to elevated temperature in concrete components (e.g., dome, wall, basemat, ring girders, buttresses, containment, concrete fill-in annulus) of containment structures exposed to air–indoor uncontrolled or air–outdoor environment. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.5.2.2.1.2 and finds it acceptable because DNPS has a Mark I steel containment.

Loss of Material Due to General, Pitting, and Crevice Corrosion

<u>Item 1</u>. SLRA Section 3.5.2.2.1.3 item 1, associated with SLRA Table 3.5-1, items 3.5.1-004, 3.5.1-005, and 3.5.1-035, addresses loss of material due to general, pitting, and crevice corrosion for inaccessible and accessible areas of containment penetration sleeves, drywell shell, drywell electrical and mechanical penetrations, torus mechanical penetrations, drywell head, drywell shell in sand pocket regions, and drywell embedded shell of carbon steel and dissimilar metal welds material exposed to an air–indoor uncontrolled environment which will be managed by the ASME Section XI, Subsection IWE, and 10 CFR Part 50, Appendix J AMPs. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.1.3 item 1.

The applicant stated that items 3.5.1-004 and 3.5.1-005 are not applicable to the DNPS Mark I steel containment. The staff review of the SRP-SLR and GALL-SLR confirmed that items 3.5.1-004 and 3.5.1-005 only apply to BWR Mark I concrete containments, BWR Mark II and Mark III containments, and PWR containments. Therefore, the staff finds the applicant's claim acceptable.

For AMR item 3.5.1-035, which the applicant claimed is applicable, the staff noted that a plant-specific program to manage this aging effect in inaccessible and accessible areas of the DNPS primary containments is not required based on the following:

(1) The containment design includes four accessible moisture barriers to prevent or minimize moisture intrusion into inaccessible areas and embedded areas of drywell shell and to the sand pocket and these moisture barriers are periodically monitored.

(2) There has been no significant drywell corrosion detected near the moisture barrier location.

(3) The drywell air gap design incorporates four drainage paths consisting of several drain lines for removing leakage into the drywell air gap.

(4) The ASME Section XI, Subsection IWE AMP monitors for blockage and leakage of the drywell air gap and sand pocket drain line outlets during each refueling outage when the refueling cavity is flooded.

(5) DNPS OE has not shown significant loss of thickness or corrosion of the containment drywell shell based on UT measurements.

(6) The continued monitoring, including UT examinations, of the containment shell in accordance with the ASME Section XI, Subsection IWE AMP and the leakage testing, in accordance with the 10 CFR Part 50, Appendix J program, provide reasonable assurance that loss of material due to corrosion of the drywell steel elements will be detected and corrected prior to loss of intended function.

In its review of components associated with item 3.5.1-035, the staff finds that the applicant has met the further evaluation criteria, and the applicant’s proposal to manage the effects of aging using the ASME Section XI, Subsection IWE Program and the 10 CFR Part 50, Appendix J Program is acceptable because:

(1) The drywell design features along with monitoring and preventive measures provide substantial defense against water entering the drywell air gap region and sand pocket region, thereby minimizing degradation of the inaccessible exterior side of the drywell.

(2) There has been no significant OE significant degradation of inaccessible drywell areas, nor of any significant corrosion in accessible areas.

(3) The continued monitoring (including volumetric examinations) using these programs provides reasonable assurance that any occurrence of abnormal conditions or degradation will be identified and corrected prior to loss of intended function.

Based on the programs identified, the staff concludes that the applicant’s programs meet SRP-SLR Section 3.5.2.2.1.3, item 1 criteria. For those AMR items associated with SLRA Section 3.5.2.2.1.3, item 1, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

<u>Item 2</u>. SLRA Section 3.5.2.2.1.3 item 2, associated with SLRA Table 3.5-1, AMR item 3.5.1-006, addresses loss of material due to general, pitting, and crevice corrosion for steel torus shell exposed to air - indoor uncontrolled or treated water, which will be managed by the ASME Section XI, Subsection IWE and the 10 CFR Part 50, Appendix J AMPs. The staff reviewed the applicant’s proposal against the criteria in SRP-SLR Section 3.5.2.2.1.2, item 2.

The SLRA states that the examinations conducted in accordance with ASME Section XI, Subsection IWE for the steel torus shell has not identified significant corrosion (i.e., only four indications of pits exceeding 0.06 inches and metal loss in underwater areas less than 0.03 inches which are below the 0.06-inch corrosion allowance). These observed pits and areas were evaluated, found to be within the acceptance criteria, and recoated. In its review of components associated with AMR item 3.5.1-006, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWE Program and the 10 CFR Part 50, Appendix J Program is acceptable because the programs have demonstrated that the aging effects are adequately managed consistent with the GALL-SLR Report recommendations, and past examinations have not identified significant corrosion degradation in the steel torus shell.

Based on the programs identified, the staff concludes that the applicant's programs meet SRP-SLR Section 3.5.2.2.1.3 item 2 criteria. For those AMR items associated with SLRA Section 3.5.2.2.1.3 item 2, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

Item 3. SLRA Section 3.5.2.2.1.3, item 3, associated with SLRA Table 3.5-1, AMR item 3.5.1-007, addresses loss of material for steel torus ring girders and steel downcomers, and submerged penetrations exposed to air–indoor uncontrolled or treated water which will be managed by the ASME Section XI, Subsection IWE AMP. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.1.3, item 3.

In its review of components associated with AMR item 3.5.1-007, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWE Program is acceptable because the proposed program will be consistent (with an unrelated exception) with the GALL-SLR Report recommendation to adequately manage the aging effects, and plant-specific OE has not identified significant corrosion degradation in the torus ring girders and downcomers.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.1.3 item 3 criteria. For those AMR items associated with SLRA Section 3.5.2.2.1.3 item 3, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature

SLRA Section 3.5.2.2.2.4, associated with SLRA Table 3.5.1, AMR item 3.5.1-052, addresses the aging effects of cracking due to SCC and loss of material due to pitting and crevice corrosion for stainless steel tank liners exposed to a standing water environment. The applicant stated that this AMR item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.5.2.2.2.4 and finds it acceptable because a search of applicant's SLRA and UFSAR confirmed that there are no stainless steel tank liners exposed to a standing water environment in the scope of subsequent license renewal.

SLRA Section 3.5.2.2.2.4, associated with SLRA Table 3.5.1, AMR items 3.5.1-099, addresses the aging effects of loss of material due to pitting and crevice corrosion and cracking due to SCC for the stainless steel component supports of the ASME Code piping and components exposed to air–indoor uncontrolled or air–outdoor environment, which will be managed by the ASME Section XI, Subsection IWF program. The applicant confirmed that there are no aluminum support members in-scope for SLR under this item number. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.2.4.

In its review of the stainless steel component supports for the ASME Code piping and components associated with AMR item 3.5-1, 099, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWF program is acceptable because (1) there has been no site OE on cracking or localized corrosion for stainless steel component supports associated with this line item and (2) the periodic visual inspections required by the ASME Section XI, Subsection IWF program are capable of detecting loss of material and cracking of the stainless steel component supports before a loss of intended functions in a manner that is consistent with the GALL-SLR Report recommendations.

SLRA Section 3.5.2.2.2.4, associated with SLRA Table 3.5.1, AMR item 3.5.1-100, addresses the aging effects of loss of material due to pitting and crevice corrosion and cracking due to SCC for:

- the aluminum and stainless steel support members; welds; bolted connections; and support anchorage to building structure, exposed to air–indoor uncontrolled or air-outdoor environment, which will be managed by the Structures Monitoring program
- the aluminum and stainless steel insulation jacketing-thermal (including clamps, bands, and fasteners) and the aluminum structural miscellaneous flood plates, the stainless steel bolting (containment closure) exposed to air-outdoor environment, and the stainless steel refueling bellows assemblies in the primary containment exposed to air–indoor, uncontrolled environment, which will be managed by the One-Time Inspection program

The staff reviewed the applicant's proposal, as amended by letter date April 28, 2025 (ML25118A278), against the criteria in SRP-SLR Section 3.5.2.2.2.4.

In its review of the aluminum and stainless steel supports, stainless steel support members, welds, bolted connections, support anchorage to building structure for the non-ASME Code piping and components associated with AMR item 3.5-1, 100, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Structures Monitoring program, is acceptable because:

(1) The periodic visual inspections required by the Structures Monitoring program are capable of detecting loss of material and cracking of the aluminum and stainless steel members, welds, bolted connections, and support anchorage to building structure.

(2) Any adverse inspection findings would be addressed in the corrective action program prior to loss of the component intended function(s).

In its review of the aluminum and stainless steel insulation jacketing-thermal (including clamps, bands, and fasteners) and the aluminum structural miscellaneous flood plates, the stainless steel bolting (containment closure), and the stainless steel refueling bellows assemblies in the primary containment associated with AMR item 3.5-1, 100, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the use of the One-Time Inspection program for detecting loss of material and cracking for the aluminum and stainless steel insulation jacketing-thermal (including clamps, bands, and fasteners) and the aluminum structural miscellaneous flood plates, the stainless steel bolting (containment closure), and the stainless steel refueling bellows assemblies in the primary containment will provide reasonable assurance that the effects of aging will be managed so that the intended function of the component will be maintained before a loss of intended functions in a manner that is consistent with the GALL-SLR Report recommendations.

Based on the programs identified, the staff concludes that the applicant's programs meet SRP-SLR Section 3.5.2.2.2.4 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.5.2.2.1.5 Cumulative Fatigue Damage

SLRA Section 3.5.2.2.1.5 associated with SLRA Table 3.5.1, AMR items 3.5.1-009, 3.5.1-027, and 3.5.1-040, addresses cumulative fatigue damage (when CLB fatigue analysis exists) and/or cracking due to cyclic loading (when CLB fatigue analysis does not exist) for Mark I primary containment pressure-retaining components of steel, stainless steel, and dissimilar metal weld material exposed to air–indoor uncontrolled or treated water. The components with CLB fatigue analyses include torus shell, vent lines, vent header, vent line bellows, and downcomers, SRV discharge piping and torus attached piping penetrations and ECCS suction header penetrations, and primary containment process penetration bellows. The drywell components that do not have existing CLB fatigue analyses because the design code (ASME Code, Section III, 1965 edition through 1965 summer addenda) did not require it, but for which a new fatigue waiver analysis was performed for the SLRA, include the drywell shell, drywell head, and drywell penetrations (personnel airlock, equipment hatches, electrical penetrations, and non-high-temperature mechanical penetrations, and penetration sleeves). The SLRA also states that the 16 high-temperature process piping penetrations of stainless steel listed in SLRA Tables 3.5.2.2.1.5-1 and 3.5.2.2.1.6-1 (i.e., portions of penetrations that are affected by process fluid to the extent that temperature exceeds the maximum containment temperature or 281°F or the temperature difference between adjacent points exceeds 100°F) do not have either a CLB fatigue analysis or a new fatigue waiver analysis. The staff reviewed the applicant's proposal against the criteria for SRP-SLR Section 3.5.2.2.1.5, as amended by SLR-ISG-2021-03-STRUCTURES (ML20181A381).

For components associated with AMR item 3.5.1-009, as amended by letter dated February 20, 2025, SLRA Section 3.5.2.2.1.5 states that the associated fatigue TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1). The SLRA further states that the evaluation of these TLAAs for fatigue of the DNPS torus shell, vent lines, vent header, vent line bellows, and downcomers, SRV discharge piping and torus attached piping penetrations and ECCS suction header penetrations, and primary containment process penetration bellows of steel, stainless steel, or dissimilar metal welds are addressed in SLRA Section 4.6. This is consistent with SRP-SLR Section 3.5.2.2.1.5, as amended by SLR-ISG-2021-03-STRUCTURES, and is, therefore, acceptable. The staff's evaluation regarding the TLAAs for fatigue of the above stated primary containment components is documented in SE Section 4.6.

For components associated with AMR item 3.5.1-040, for which CLB fatigue analysis does not exist, the applicant stated the item is not applicable because the item is applicable for BWR Mark II containments only. The staff evaluated the applicant's claim and finds it acceptable because review of the corresponding GALL-SLR AMR items (i.e., II.B2.1.CP-142 and

II.B2.2.CP-64) indicate that the item applies only to BWR Mark II steel or concrete containments, and DNPS Units 2 and 3 have BWR Mark I steel containments.

For specific components (i.e., stainless steel high-temperature process piping penetration components of penetrations listed in SLRA Table 3.5.2.2.1.5-1) associated with AMR item 3.5.1-027, as amended by letter dated March 13, 2025, for which a CLB fatigue analysis does not exist and a new fatigue waiver analysis does not exist, the applicant stated that the aging effects will be managed by the ASME Section XI, Subsection IWE, using the enhancement for performing supplemental surface examinations or enhanced visual (EVT-1) examinations.

For other containment pressure-retaining boundary components associated with AMR item 3.5.1-027 (i.e., drywell shell, drywell head, non-high-temperature Class MC drywell penetrations and penetration sleeves, and non-piping penetrations (CRD hatch, equipment hatch, personnel airlocks, electrical penetrations) for which CLB fatigue analyses do not exist, the applicant stated in the SLRA that the aging effect does not require management based on a fatigue waiver analysis performed for these components in accordance with paragraph NE-3222.4(d), of the ASME Code, Section III, Division 1 (1974 edition) that satisfied the six conditions specified in the ASME Code for a conservative and bounding number of applicable transient cycles for 80-years. The six conditions evaluated fatigue cycles through the end of the subsequent period of extended operation due to the following:

(1) atmospheric-to-operating pressure cycle

(2) normal operation pressure fluctuation

(3) temperature difference – startup and shutdown

(4) temperature difference – normal operation

(5) temperature difference – dissimilar materials

(6) mechanical loads

The staff finds the new fatigue waiver description acceptable because it adequately summarized and demonstrated how the six fatigue waiver criteria of the ASME Code were met and therefore provided the basis that the aging effect does not require management for the specified components consistent with the acceptance criteria in SRP-SLR Section 3.5.2.2.1.5, as amended by SLR-ISG-2021-03-STRUCTURES. The fatigue waiver analysis thus justifies the related exception taken in the SLRA B.2.3.29 “ASME Section XI, Subsection IWE” program that cracking due to cyclic loading does not require aging management for the drywell shell, non-high-temperature and non-piping drywell penetrations and penetration sleeves.

In its review of specific components associated with AMR item 3.5.1-027 (i.e., stainless steel high-temperature process piping penetration components of penetrations listed in SLRA Table 3.5.2.2.1.5-1), the staff finds that the applicant has met the further evaluation criteria, and the applicant’s proposal to manage the effects of aging using the ASME Section XI, Subsection IWE Program or 10 CFR 50, Appendix J Program is acceptable because:

(1) The examination methods proposed for detecting cracking (i.e., supplemental surface examinations or EVT-1) are consistent with those recommended in GALL-SLR AMP XI.S1, “ASME Section XI, Subsection IWE.”

(2) The SLRA proposed representative sample for the supplemental examinations are consistent with the 20 percent of the population recommended in the GALL-SLR.

(3) The SLRA ASME Section XI, Subsection IWE Program with enhancements (consistent with GALL-SLR Report AMP XI.S1) and the exception was determined to be adequate to manage applicable aging effects as documented in SE Section 3.0.3.2.16.

In its review of the other components associated with AMR item 3.5.1-027 (i.e., drywell shell, non-high-temperature and non-piping drywell penetrations, and penetration sleeves), the staff finds that the applicant has met the further evaluation criteria, and the applicant's justification that cracking due to cyclic loading aging effect does not require aging management is acceptable because the applicant performed a fatigue waiver analysis for these components in accordance with paragraph NE-3222.4(d) of the ASME Code, Section III, Division 1 (1974 edition) that satisfied the six conditions specified in the Code to conclude that a detailed fatigue analysis is not necessary and the aging effect does not require management.

Based on the programs identified and the fatigue waiver analyses performed, the staff concludes that the applicant's further evaluation meets SRP-SLR Section 3.5.2.2.1.5 criteria, as amended by SLR-ISG-2021-03-STRUCTURES. For those AMR items associated with SLRA Section 3.5.2.2.1.5, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.5.2.2.1.6 Cracking Due to Stress Corrosion Cracking

SLRA Section 3.5.2.2.1.6, associated with SLRA Table 3.5-1, AMR items 3.5.1-010, 3.5.1-038, and 3.5.1-039, as amended by letter dated February 20, 2025, addresses cracking due to SCC for stainless steel penetration sleeves, penetration bellows, vent line bellows and dissimilar metal welds of high-temperature containment drywell and torus penetrations exposed to air–indoor uncontrolled, which will be managed by the ASME Section XI, Subsection IWE and the 10 CFR Part 50, Appendix J AMPs. The 16 primary containment penetrations with stainless steel components subject to elevated temperatures during normal operation are identified in SLRA Table 3.5.2.2.1.6-1. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.1.6.

For components associated with AMR items 3.5.1-038, the applicant stated in SLRA Table 3.5-1 that this item is not applicable because the item is applicable only to BWR Mark III containments. The staff evaluated the applicant's claim and finds it acceptable because review of the corresponding GALL-SLR AMR items (i.e., II.B3.1.CP-24 and II.B3.2.CP-24) indicates that the item applies only to BWR Mark III steel or concrete containments, and DNPS has a BWR Mark I steel containment.

For components associated with AMR items 3.5.1-010 and 3.5.1-039, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWE and the 10 CFR Part 50, Appendix J AMPs is acceptable for the following reasons:

(1) The ASME Section XI, Subsection IWE program will be enhanced to conduct periodic supplemental surface examinations or EVT-1, which are methods recommended in the GALL-SLR Report for detecting cracking due to SCC to confirm the absence of SCC aging effects.

(2) The examination will be performed once every 10-years on a representative sample size of four per unit (i.e., 20 percent of population) of high-temperature penetrations with

stainless steel components or dissimilar metal welds) which is consistent with GALL-SLR recommendation for sampling-based inspections.

(3) Plant-specific OE (from ASME Code, Subsection IWE inspections and 10 CFR Part 50, Appendix J leak rate tests) have not identified cracking due to SCC associated with dissimilar metal welds or stainless steel bellows, and therefore, the 10-year interval for the supplemental examinations is adequate.

(4) Due to being at high temperatures, the sampled penetrations will also be leading indicators for cracking due to cyclic loading of susceptible drywell pressure-retaining boundary components.

(5) The proposed 10 CFR Part 50, Appendix J AMP and ASME Code, Subsection IWE program with enhancements, with one justified exception, is or will be consistent with the GALL-SLR Report recommendations to adequately manage this aging effect during the subsequent period of extended operation.

Based on the programs identified, the staff concludes that the applicant’s programs meet SRP-SLR Section 3.5.2.2.1.6 criteria. For those AMR items associated with SLRA Section 3.5.2.2.1.6, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.2.1.7 Loss of Material (Scaling, Spalling) and Cracking Due to Freeze-Thaw

SLRA Section 3.5.2.2.1.7, associated with SLRA Table 3.5.1, AMR item 3.5.1-011, addresses loss of material (spalling, scaling) and cracking due to freeze-thaw of inaccessible areas of containment concrete components exposed to air-outdoor or groundwater/soil environment. The-applicant stated that this item is not applicable. The staff evaluated the applicant’s claim against the criteria in SRP-SLR Section 3.5.2.2.1.7 and finds it acceptable because the DNPS containment is a Mark I steel containment that is completely enclosed within the reactor building; therefore, the environment for the aging effects does not exist for the containment structure concrete.

3.5.2.2.1.8 Cracking Due to Expansion from Reaction with Aggregates

SLRA Section 3.5.2.2.1.8, associated with SLRA Table 3.5.1, AMR item 3.5.1-012, addresses cracking due to expansion from reaction with aggregates in inaccessible areas of containment concrete components exposed to any environment. The applicant stated that this item is not applicable. The staff reviewed the applicant’s proposal against the criteria in SRP-SLR Section 3.5.2.2.1.8 and finds it acceptable because the basemat is part of the reactor building, and cracking due to expansion from reaction with aggregates for the basemat is addressed by the Structures Monitoring Program as described in Section 3.5.2.2.2.1.2 and AMR item number 3.5.1-043.

3.5.2.2.1.9 Increase in Porosity and Permeability Due to Leaching of Calcium Hydroxide and Carbonation

SLRA Section 3.5.2.2.1.9, associated with SLRA Table 3.5.1, AMR item 3.5.1-014, addresses increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation in inaccessible areas of containment concrete components exposed to flowing water environment. The applicant stated that this item is not applicable. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.1.9 and finds it acceptable because, based on review of Section 3.8.2 and Figures 6.2-1 and 6.2-2 of the UFSAR, the staff verified that the DNPS primary containment structure is a Mark I steel containment completely enclosed within the reactor building, and therefore the flowing water environment for the aging effect does not exist.

3.5.2.2.2 Safety-Related and Other Structures and Component Supports

In SLRA Section 3.5.2.2, the applicant further evaluated aging management, as recommended in the GALL-SLR Report, for the containments, structures, and component supports and provided information concerning how it will manage the applicable aging effects. The NRC staff reviewed the applicant's evaluation of component groups for which the GALL-SLR Report recommends further evaluation against the criteria contained in SRP-SLR Section 3.5.2.2. The following subsections document the staff's review.

3.5.2.2.2.1 Aging Management of Inaccessible Areas

For all items in this section, the staff noted that there are no structures categorized as Group 5 structures that are not enclosed by the Reactor Building at DNPS, which is evaluated as a Group 2 structure. The staff additionally noted that concrete tanks or concrete missile barriers categorized as Group 7 structures are not applicable to DNPS and concrete foundations for Group 8 structures within the scope of subsequent license renewal are evaluated in SLRA Table 3.5.2-16.

Item 1. SLRA Section 3.5.2.2.2.1, item 1, associated with SLRA Table 3.5.1, AMR item 3.5.1-042, as amended by letter dated March 13, 2025, and confirmed by response to RCI 3.5.2.2.2.1-1, addresses the aging effects of loss of material (spalling, scaling) and cracking due to freeze-thaw in inaccessible concrete areas and foundations of Groups 1–3, 5 and 7–9 structures exposed to air-outdoor or groundwater/soil environment, which will be managed by the Structures Monitoring program. The staff reviewed the applicant's proposal, against the criteria in SRP-SLR Section 3.5.2.2.2.1, item 1.

In its review of components associated with AMR item 3.5.1-042, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

(1) The concrete mix design provides for low permeability and adequate air entrainment of 3 to 5 percent, which is within the air content of 3 to 8 percent stated in SRP-LR Section 3.5.3.2.2.1, item 1 such that the concrete has good freeze-thaw resistance. Additionally, the applicant's evaluation demonstrated that the observed aging effects related to freeze-thaw in accessible areas have no impact on the intended function. Therefore, a plant-specific program or plant-specific enhancements to the Structures Monitoring program are not needed.

(2) The Structures Monitoring program inspects for evidence of the aging effect in the accessible concrete areas and requires that evaluation of inspection results includes consideration of the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

(3) The Structures Monitoring program will perform opportunistic inspections of normally inaccessible below-grade concrete when excavated for any other reasons.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.1, item 1 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.1, item 1, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 2. SLRA Section 3.5.2.2.2.1, item 2, associated with SLRA Table 3.5.1, AMR item 3.5.1-043, as amended by letter dated March 13, 2025, addresses the aging effect of cracking due to expansion from reaction with aggregates in inaccessible areas of all concrete structure groups except Group 6, exposed to any environment, which will be managed by the Structures Monitoring program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.2.1, item 2.

In its review of components associated with AMR item 3.5.1-043, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

(1) The applicant has no plant-specific OE related to cracking due to expansion from reaction of aggregates. Therefore, a plant-specific aging management program is not needed.

(2) The enhanced Structures Monitoring program is capable of identifying the cracking associated with aggregate reactions such as "craze," "mapping," or "patterned" cracking to determine the presence of alkali-silica gel in the accessible concrete areas, and requires that evaluation of inspection results includes consideration of the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

(3) The Structures Monitoring program will perform opportunistic inspections of normally inaccessible below-grade concrete when excavated for any other reasons.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.1, item 2 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.1, item 2, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 3. SLRA Section 3.5.2.2.2.1, item 3, associated with:

(1) SLRA Table 3.5.1, AMR item 3.5.1-044, addresses the aging effects of cracking and distortion due to increased stress levels from settlement in all concrete structure groups exposed to soil environment, which will be managed by the Structures Monitoring program.

(2) SLRA Table 3.5.1, AMR item 3.5.1-046, as amended by letter dated March 13, 2025, addresses the aging effects of reduction in foundation strength and cracking due to differential settlement and erosion of porous concrete sub-foundations in below-grade inaccessible concrete areas of Groups 1–3, 5–9 structures exposed to a water-flowing environment.

The applicant stated that AMR item 3.5.1-044 is not applicable to Groups 1–4, 6, and 9 structures at DNPS, which consist of all concrete structures except for the Switchyard Structures and Yard Structures. The staff reviewed the applicant's proposal, as amended by letter dated March 13, 2025, and response to RAI 3.5.2.2.2.1-1, against the criteria in SRP-SLR Section 3.5.2.2.2.1, item 3.

In its review of components associated with AMR item 3.5.1-044, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

(1) All concrete structures within the scope of the subsequent license renewal, excluding the switchyard structures and yard structures, are supported on rock and the settlement of these concrete structures is negligible, and do not require aging management. The settlement of the switchyard structures and yard structures is managed by the Structures Monitoring program.

The applicant stated that AMR item 3.5.1-046 is not used. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.2.1, item 3.

In its review of components associated with AMR item 3.5.1-046, the staff finds the applicant's claim acceptable because the aging effects of reduction in foundation strength and cracking due to differential settlement and erosion of porous concrete sub-foundations in below-grade inaccessible concrete areas of Groups 1–3 and 5–9 structures exposed to water-flowing environment are managed by the Structures Monitoring program and addressed under AMR item 3.5.1-044 as discussed above.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.1, item 3 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.1, item 3, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Item 4</u>. SLRA Section 3.5.2.2.2.1, item 4, associated with SLRA Table 3.5.1, AMR item 3.5.1-047, as amended by letter dated March 13, 2025, and confirmed by response to RCI 3.5.2.2.2.1-1, addresses the aging effects of increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation in inaccessible areas of concrete components for Groups 1–5 and 7–9 structures exposed to water-flowing environment, which will be managed by the Structures Monitoring program. The staff noted that this AMR item is not applicable to Group 4 structures because the primary containment structure is completely enclosed and sheltered within the reactor building and not subjected to a water-flowing environment. The staff reviewed the applicant's proposal, against the criteria in SRP-SLR Section 3.5.2.2.2.1, item 4.

In its review of components associated with item 3.5.1-047, the staff finds that the applicant has met the further evaluation criteria and its proposal to manage the effects of aging using the Structures Monitoring program is acceptable for the following reasons:

(1) The applicant's evaluation demonstrated that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function; therefore, a plant-specific aging management program is not needed.

(2) The Structures Monitoring program inspects for evidence of the aging effect in the accessible concrete areas and requires that evaluation of inspection results includes consideration of the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

(3) The Structures Monitoring program will perform opportunistic inspections of normally inaccessible below-grade concrete when excavated for any other reasons.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.1, item 4 criteria. For those items associated with SLRA Section 3.5.2.2.2.1, item 4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.2.2.2 Reduction of Strength and Modulus Due to Elevated Temperature

SLRA Section 3.5.2.2.2.2, associated with SLRA Table 3.5.1, AMR item 3.5.1-048, as amended by letter dated March 13, 2025, addresses the aging effect of reduction of strength and modulus due to elevated temperature in Groups 1–5 concrete structures exposed to air–indoor uncontrolled environment. The staff noted that there are no structures categorized as Group 5 structures that are not enclosed by the Reactor Building at DNPS, which is evaluated as a Group 2 structure. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.5.2.2.2.2.

In its review of SLRA Section 3.5.2.2.2.2, the staff noted that station areas that bound high-temperature considerations are the drywell general area and reactor shield wall piping penetration local area. The staff further noted that Technical Specifications Section 3.6.1.5 states that the drywell average air temperature during normal operation is maintained to limit the maximum temperature to 150°F. In addition, the staff noted that SLRA Section 3.5.2.2.1.2 states that the hot penetrating pipes did not result in concrete temperatures exceeding the threshold limit of 200°F for local areas due to the penetration details that provide significant air spaces between the pipes and the concrete. During the audit, the staff reviewed the applicant's evaluations documented in Technical Evaluation EC 643515, "Dresden Units 2 and 3, Concrete Temperature Elevation at Main Steam Line Penetrations," where local area temperatures for the piping penetrations in the drywell shield wall; the wall between the reactor building and the turbine building; and the reactor shield wall were calculated. The staff finds that the applicant calculated local area temperatures using the methodology described in ASTM C335/C335M and ASTM C168, and the applicant's evaluation verifies that the concrete temperature at the localized area of the penetrations does not exceed 200°F.

Thus, the temperatures of the concrete containment components are kept below the GALL-SLR Report recommended threshold limits of 150°F for general areas and 200°F for local areas. Therefore, the concrete containment components are not exposed to the temperatures required for this aging effect to occur and the staff finds the applicant's claim acceptable.

3.5.2.2.2.3 Aging Management of Inaccessible Areas for Group 6 Structures

<u>Item 1</u>. SLRA Section 3.5.2.2.2.3, item 1, associated with SLRA Table 3.5.1, AMR item 3.5.1-049, as amended by letter dated March 13, 2025, and confirmed by response to RCI 3.5.2.2.2.1-1, addresses the aging effects of loss of material (spalling, scaling) and cracking due to freeze-thaw in inaccessible concrete areas of water-control structures (Group 6)

exposed to air-outdoor or groundwater/soil environment, which will be managed by the Structures Monitoring program. The staff reviewed the applicant's proposal, against the criteria in SRP-SLR Section 3.5.2.2.2.3, item 1.

In its review of components associated with AMR item 3.5.1-049, the staff finds that the applicant has met further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Structures Monitoring program, is acceptable because:

(1) The concrete mix design provides for low permeability and adequate air entrainment of 3 to 5 percent, which is within the air content of 3 to 8 percent stated in SRP-LR Section 3.5.3.2.2.3, item 1 such that the concrete has good freeze-thaw resistance, and the applicant's evaluation demonstrated that the observed aging effects related to freeze-thaw in accessible areas have no impact on the intended function. Therefore, a plant-specific program or plant-specific enhancements to the Structures Monitoring program are not needed.

(2) The Structures Monitoring program inspects for evidence of the aging effect in the accessible concrete areas and requires that evaluation of inspection results includes consideration of the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

(3) The Structures Monitoring program will opportunistically confirm the absence of aging effects by examining normally inaccessible structural components when excavated for any other reasons.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.3, item 1 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.3, item 1, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 2. SLRA Section 3.5.2.2.2.3, item 2, associated with SLRA Table 3.5-1, AMR item 3.5.1-050, addresses the aging effect of cracking due to expansion from reaction with aggregates in inaccessible concrete areas of water-control structures (Group 6) exposed to any environment, which will be managed by the Structures Monitoring program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.2.3, item 2.

In its review of components associated with item 3.5.1-050, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

(1) The applicant has no plant-specific OE related to cracking due to expansion from reaction of aggregates; therefore, a plant-specific aging management program is not needed.

(2) The enhanced Structures Monitoring program is capable of identifying the cracking associated with aggregate reactions such as “craze,” “mapping” or “patterned” cracking to determine the presence of alkali-silica gel in the accessible concrete areas, and requires that evaluation of inspection results includes consideration of the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

(3) The Structures Monitoring program will perform opportunistic inspections of normally inaccessible below-grade concrete when excavated for any other reasons.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.3, item 2 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.3, item 2, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 3. SLRA Section 3.5.2.2.2.3, item 3, associated with SLRA Table 3.5.1, AMR item 3.5.1-051, addresses the aging effects of increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide and carbonation in inaccessible areas of concrete components for water-control structures (Group 6) exposed to a water-flowing environment, which will be managed by the Structures Monitoring program. The staff reviewed the applicant's proposal, as confirmed by response to RCI 3.5.2.2.2.1-1, against the criteria in SRP-SLR Section 3.5.2.2.2.3, item 3.

In its review of components associated with item 3.5.1-051, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the Structures Monitoring program, is acceptable for the following reasons:

(1) The applicant's evaluation demonstrated that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function; therefore, a plant-specific aging management program is not needed.

(2) The Structures Monitoring program inspects for evidence of the aging effect in the accessible concrete areas and requires that evaluation of inspection results includes consideration of the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

(3) The Structures Monitoring program will perform opportunistic inspections of normally inaccessible below-grade concrete when excavated for any other reasons.

Based on the program identified, the staff concludes that the applicant's program meets SRP-SLR Section 3.5.2.2.2.3, item 3 criteria. For those items associated with SLRA Section 3.5.2.2.2.3, item 3, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.2.2.4 Cracking Due to Stress Corrosion Cracking, and Loss of Material Due to Pitting and Crevice Corrosion

SLRA Section 3.5.2.2.2.4, associated with SLRA Table 3.5.1, AMR item 3.5.1-052, addresses the aging effects of cracking due to SCC and loss of material due to pitting and crevice corrosion for stainless steel tank liners exposed to standing water environment. The applicant stated that this AMR item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.5.2.2.2.4 and finds it acceptable because a search of applicant's SLRA and UFSAR confirmed that there are no stainless steel tank liners exposed to standing water environment in the scope of SLR.

SLRA Section 3.5.2.2.2.4, associated with SLRA Table 3.5.1, AMR items 3.5.1-099, addresses the aging effects of loss of material due to pitting and crevice corrosion and cracking due to SCC for the aluminum and stainless steel component supports of the ASME code piping and components exposed to air-indoor uncontrolled or air-outdoor environment, which will be managed by the ASME Section XI, Subsection IWF program. The applicant confirmed that there are no aluminum support members in scope for SLR under this item number. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.2.4.

In its review of the stainless steel component supports for the ASME code piping and components associated with AMR item 3.5-1, 099, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWF program is acceptable because: (a) there has been no site operating experience on cracking or localized corrosion for stainless steel component supports associated with this line item; and (b) the periodic visual inspections required by the ASME Section XI, Subsection IWF program are capable of detecting loss of material and cracking of the stainless steel component supports before a loss of intended functions in a manner that is consistent with the GALL-SLR Report recommendations.

SLRA Section 3.5.2.2.2.4, associated with SLRA Table 3.5.1, AMR item 3.5.1-100, as amended by letter dated April 28, 2025, addresses the aging effects of loss of material due to pitting and crevice corrosion and cracking due to SCC for (a) the aluminum and stainless steel support members; welds; bolted connections; and support anchorage to building structure, exposed to air-indoor uncontrolled or air-outdoor environment, which will be managed by the Structures Monitoring program; and (b) the aluminum and stainless steel insulation jacketing-thermal (including clamps, bands, and fasteners) and the aluminum structural miscellaneous flood plates, the stainless steel bolting (containment closure) exposed to air-outdoor environment, and the stainless steel refueling bellows assemblies in the primary containment exposed to air-indoor, uncontrolled environment, which will be managed by the One-Time Inspection program. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.5.2.2.2.4.

In its review of the aluminum and stainless steel support members; welds; bolted connections; support anchorage to building structure for the non-ASME code piping and components associated with AMR item 3.5-1, 100, the staff finds that the applicant has met the further evaluation criteria and the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because: (a) the periodic visual inspections required by the Structures Monitoring program are capable of detecting loss of material and cracking of the aluminum and stainless steel members; welds; bolted connections; and support anchorage to building structure; and (b) any adverse inspection findings would be addressed in the corrective action program prior to loss of the component intended function(s).

In its review of the aluminum and stainless steel insulation jacketing-thermal (including clamps, bands, and fasteners) and the aluminum structural miscellaneous flood plates, the stainless steel bolting (containment closure), and the stainless steel refueling bellows assemblies in the primary containment associated with AMR item number 3.5-1, 100, the staff finds that the applicant has met the further evaluation criteria, and the applicant's proposal to manage the effects of aging using the One-Time Inspection program is acceptable because the use of the One-Time Inspection program for detecting loss of material and cracking for the aluminum and stainless steel insulation jacketing-thermal (including clamps, bands, and fasteners) and the aluminum structural miscellaneous flood plates, the stainless steel bolting (containment closure), and the stainless steel refueling bellows assemblies in the primary containment will provide reasonable assurance that the effects of aging will be managed so that the intended function of the component will be maintained before a loss of intended functions in a manner that is consistent with the GALL-SLR Report recommendations.

Based on the programs identified, the staff concludes that the applicant's programs meet SRP-SLR Section 3.5.2.2.2.4 criteria. For those AMR items associated with SLRA Section 3.5.2.2.2.4, the staff concludes that the SLRA is consistent with the GALL-SLR Report and that the applicant has 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 subsequent period of extended operation as required by 10 CFR 54.21(a)(3).

3.5.2.2.2.5 Cumulative Fatigue Damage

SLRA Section 3.5.2.2.2.5 is associated with AMR item 3.5.1-053, as described in SLRA Table 3.5.1. The SLRA Section indicates that AMR item 3.5.1-053 is not applicable to DNPS because the plant does not have component support members, anchor bolts, or welds for Group B1.1, B1.2, and B1.3 supports that have a CLB fatigue analysis. The SLRA also indicates that the fatigue TLAA for the reactor vessel support skirt is separately addressed in relation to SLRA Item 3.1.1-004 as part of the RPV components (SLRA Section 4.3.2).

With respect to SLRA Item 3.5.1-053, the staff reviewed the UFSAR and did not identify a CLB fatigue analysis for the component supports other than the fatigue TLAA for the reactor vessel support skirt discussed above. The staff's evaluation of the fatigue TLAA for the reactor vessel components including the support skirt is documented in SE Section 4.3.2.

The staff finds that the applicant's AMR results for the fatigue TLAA on the component supports are acceptable because (1) the fatigue TLAA for the reactor vessel support skirt is separately addressed as part of the fatigue TLAA for the reactor vessel (SLRA Section 4.3.2) and (2) DNPS does not have other component supports for which AMR item 3.5.1-053 is applicable.

3.5.2.2.2.6 Reduction of Strength and Mechanical Properties of Concrete Due to Irradiation

SLRA Section 3.5.2.2.2.6, as amended by letters dated March 13, 2025, and April 28, 2025, associated with SLRA Table 3.5-1, AMR item 3.5-1, 097, addresses the applicant's further evaluation related to reduction of strength and loss of mechanical properties of the biological shield wall (BSW) non-structural concrete and the RPV pedestal structural concrete that are exposed to neutron and gamma radiation and radiation-induced heating in air–indoor uncontrolled environment. SLRA Section 3.5.2.2.2.6 also addresses the applicant's further evaluation of the RPV steel support structures consisting of the RPV support skirt and lateral stabilizers, the ring girder assembly below the skirt, and BSW steel structural components (including the steel liner), with their aging management evaluated through revised SLRA Tables 3.5.2-2 and 3.5.2-9 to include AMR items for loss of fracture toughness due to neutron irradiation embrittlement in air–indoor uncontrolled environment, which cite generic note H. Furthermore, SLRA Section 3.5.2.2.2.6 references or relates to information presented in SLRA Sections 2.3.1.2, 2.4.2, 2.4.9, 3.5.2.2.1.2, 4.2.1.1, B.3.1.2, B.2.1.19, B.2.1.30, and B.2.1.33.

Based on its evaluation, the applicant determined that a plant-specific program is not required to manage the aging effects of irradiation on the concrete and steel components of the BSW and RPV supports; the aging effects will be managed through periodic visual examinations required by the Structures Monitoring and the ASME Section XI, Subsection IWF AMPs. The staff reviewed the applicant's further evaluation for concrete components against the criteria in SRP-SLR Section 3.5.2.2.2.6, as amended by SLR-ISG-2021-03-STRUCTURES. For steel components, the staff reviewed the applicant's further evaluation against the guidance in NUREG-1509, consistent with SRP-SLR Appendix A.1 "Aging Management Review – Generic (Branch Technical Position RLSB-1)."

The applicant stated that the potential for reduction of strength, loss of mechanical properties, and cracking due to irradiation is a primary concern for the concrete forming the reactor shield wall around the RPV in the drywell. As indicated in UFSAR Figures 3.9-2 and 3.9-3, as well as the figure of geometric properties on page 188 of 575 in DNPS, Form N-1 Manufacturers Data Report for Nuclear Vessels (ML17130A464), the BSW concrete is approximately 24 inches thick and 47 ft tall above the top of its supporting RPV concrete pedestal. As noted in the UFSAR Section 12.3.2.2.1 and the SLRA, the BSW concrete is encapsulated by a double-walled shell formed by two ¾-inch steel plate cylinders interconnected with 12 vertically equally spaced wide flange columns, “capable of transmitting loads due to seismic and jet forces acting on” the BSW, where the steel plate at the outside face of the BSW is increased in thickness for extra shielding at the elevation of the core. The concrete within the BSW is unreinforced, non-structural concrete and serves only a shielding function for radiation and thermal effects. The RPV support concrete pedestal that supports the BSW consists of a 4-foot, 3-inch thick reinforced concrete circular wall resting on top of the finished drywell floor at elevation 502 feet, 4 inches.

SLRA Section 4.2.1.1, UFSAR Figure 3.9-1, and the figure of geometric properties on page 188 of 575 in DNPS, Form N-1 Manufacturers Data Report for Nuclear Vessels indicate that the active fuel core region of the RPV is about 13 ft high with its top at elevation 561 feet, 5¾ inches and bottom at elevation 548 feet, 4¼ inches at 67 effective full-power years (EFPY) based on vessel “0 inches” elevation at 530 feet, 8 inches, and that the seismic stabilizer from the RPV to the BSW and truss arrangements at elevations 575 feet, 2 inches and 575 feet, 9 inches, respectively. Therefore, the centerline (or midplane) and the bottom of the active fuel core region are approximately 29 feet, 7 inches and 20 feet, 7¼ inches, respectively, above the top of the RPV concrete pedestal at elevation 527 feet, 9 inches; and the top of the BSW is approximately 19 feet, 10 inches above the fuel core midplane. The applicant also provided elevations of the upper and lower edges of the extended beltline (neutron fluence $>1 \times 10^{17}$ n/cm^2, E >1 MeV, 67 EFPY), resulting in an axial length of the beltline region of 13 feet for both units, which is consistent with the active fuel core region height noted above.

The applicant also stated that a loss of (or reduction in) fracture toughness due to irradiation embrittlement of the RPV support steel is a potential aging effect considered. The RPV support steel includes the 1¼ inch thick cylindrical RPV steel skirt that is welded to the bottom of the RPV at elevation 535 feet, 2^5/$_8$ inches. As noted in UFSAR Figure 3.9-3, the RPV steel skirt is mounted on top of the steel ring girder that is supported by the RPV concrete pedestal. Stabilizers provide lateral support between the RPV and the BSW below the vessel flange and well above the active fuel core region, at elevation 575 feet, 9 inches, to limit horizontal vibration and help resist seismic and jet forces. The truss arrangements consist of pipes that laterally support the BSW with the drywell shear lug mechanism at elevation 575 feet, 2 inches.

The applicant determined that for the BSW concrete, with its encapsulating double walled steel shell and interconnecting steel elements (columns, welds), RPV reinforced concrete pedestal, RPV skirt support steel, and the seismic restraint and stabilizer structure, the effects of aging due to radiation are adequately managed and their intended function(s) will be maintained consistent with the CLB through the subsequent period of extended operation. The staff evaluated SLRA Section 3.5.2.2.2.6 to ensure that, consistent with 10 CFR 54.21(a)(3), there is reasonable assurance that the intended functions of the concrete and steel BSW and RPV support structures and components will be maintained through the subsequent period of extended operation.

<u>Evaluation of Neutron Fluence and Gamma Dose Estimation Methodology</u>

The applicant used the NRC-approved General Electric Discrete Ordinates Transfer methodology, described in NEDC-32983P-A, to calculate the peak neutron fluence for the concrete biological shield and steel support structures. NEDC-32983P-A is consistent with RG 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence.” The methodology was used to calculate the neutron fluence up to 67 EFPY. The application of the Discrete Ordinates Transfer methodology is discussed further in Section 4.2 of this SE. The NRC staff reviewed NEDC-32983P-A and determined that this methodology is applicable for the evaluation of the neutron fluence of the concrete biological shield. Use of this methodology will ensure a reasonable estimation of the neutron fluence of the concrete biological shield at the end of the subsequent period of extended operation.

The applicant reports a neutron fluence 9.84×10^{17} neutrons/cm^2 (E >0.1 MeV) for DNPS Unit 2 and 9.76×10^{17} neutrons/cm^2 (E >0.1 MeV) for DNPS Unit 3 at the inner surface (0T) of the RPV for each respective unit. This value is obtained using the NEDC-32983P-A methodology discussed above. This methodology includes consideration of all neutron energy levels of interest (E >0.1 MeV) for BSW concrete. The threshold for consideration for radiation-induced degradation of material properties for neutron fluence on concrete is 1×10^{19} neutrons/cm^2 (E >0.1 MeV). Given that the 0T neutron fluence is less than this threshold and the fluence at the surface of the concrete will be even lower due to attenuation through steel and spatial dispersion, the NRC staff finds that the threshold will not be exceeded for DNPS Units 2 and 3 through the end of the subsequent period of extended operation.

The BSW is separated from the RPV by a steel liner and an air gap. The steel liner is subject to consideration of radiation-induced degradation of material properties. The threshold for consideration for the RPV is 1×10^{17} neutrons/cm^2 (E >1 MeV). The applicant reports a bounding neutron fluence of 1.23×10^{17} neutrons/cm^2 (E >1 MeV) for both units. This value is consistent with NRC confirmatory calculations which involve modifying the peak RPV 0T with attenuation through the RPV steel and spatial dispersion across the air gap. While this value exceeds 1×10^{17} neutrons/cm^2, this threshold is applicable for the RPV. The degradation of material properties of the BSW steel liner must be considered if the radiation exposure level is greater than 1.0×10^{-4} displacements per atom (dpa), which is the exposure level above which there is a significant shift in nil-ductility transition temperature based on the upper bound curve in Figure 3-1 of NUREG-1509. The applicant converts the peak RPV 0T fluence of 5.61×10^{17} to a dpa using an empirical correlation (15 dpa = 10^{22} neutrons/cm^2) then uses equation (3) of RG 1.99 to account for attenuation across the RPV steel. This is an acceptable approach. The resulting 1T dpa is reported to be 1.93×10^{-4} dpa, which is greater than 1.0×10^{-4} dpa. Therefore, the applicant used this value for the transition temperature evaluation of the steel liner, which the staff evaluated in “BSW Structural Steel Evaluation” below. This value does not account for spatial dispersion across the air gap. Therefore, this value is conservative, and the NRC staff finds that 1.93×10^{-4} dpa is a reasonable estimation of the neutron damage accumulation in the BSW steel liner.

There are several RPV support structures above and below the active fuel that must also be considered. Specifically, these structures are the cylindrical skirt at the bottom of the RPV and lateral stabilizers at the top of the reactor shield wall. These structures are located 13 feet below the beltline region and 14 feet above the beltline region, respectively. The beltline region is defined as the axial length of the RPV which exceeds a neutron fluence of 1×10^{17} neutrons/cm^2 (E >1 MeV). The reported peak 0T neutron fluence is 5.61×10^{17} and 5.56×10^{17} neutrons/cm^2 (E >1 MeV) for DNPS Units 2 and 3, respectively. The spatial dispersion of the neutron fluence across 13 and 14 feet will ensure a reduction in the neutron fluence of over an order of magnitude, resulting in these structures having a neutron fluence below the threshold of 1×10^{17} neutrons/cm^2 (E >1 MeV). Therefore, the radiation-induced degradation of material properties of the described RPV support structures does not need to be considered, as evaluated by the staff in “RPV Support Steel Evaluation” below.

The applicant also evaluated if the gamma dose of the concrete biological shield exceeds the SRP-SLR threshold of 1×10^{10} rad. The SLRA states that the gamma dose calculations were computed using the Los Alamos National Laboratory code MCNP6. The NRC staff has determined that use of this code for gamma dose calculations is acceptable provided there are appropriate inputs in the model to ensure an accurate calculation of the gamma dose. The NRC staff reviewed the documents describing the MCNP6 model and inputs used to calculate the concrete gamma dose during an audit. The NRC staff determined that the model is representative of the physical design and that the inputs and uncertainties are acceptable and will result in a reasonable estimation of the peak gamma dose in the concrete biological shield.

The applicant reports a peak gamma dose on the inner surface of the concrete biological shield of $4.19. \times 10^{9}$ rad. The peak gamma dose is well below the threshold for consideration of radiation-induced degradation of material properties. The NRC staff did not identify any deficiencies in the MCNP6 model or calculations that could account for a 2.5 times difference in gamma dose such that the calculated gamma dose would exceed the 1×10^{10} rad threshold.

The NRC staff reviewed the neutron fluence and gamma dose evaluations for the concrete biological shield, steel liner, and RPV support structures. In summary, the methodologies used to calculate the neutron fluence and gamma dose were determined to be acceptable and the applicant provided reasonable estimations of the peak neutron fluence and gamma dose. The peak neutron fluence and gamma dose in the concrete biological shield do not exceed their respective thresholds. The neutron fluence threshold is exceeded in the steel liner; therefore, radiation-induced embrittlement must be considered and is evaluated under the section titled “BSW Structural Steel Evaluation” below. The NRC staff finds that spatial dispersion of the neutron fluence ensures that the neutron fluence threshold for the RPV support structures is not exceeded.

<u>Neutron Fluence BSW Concrete Irradiation Evaluation</u>

SRP-SLR Section 3.5.2.2.2.6, as amended by SLR-ISG-2021-03-STRUCTURES, states that the fluence threshold for strength reduction and degradation of material properties of concrete due to neutron irradiation is 1×10^{19} neutrons/cm^2 (E >0.1 MeV). The calculated peak neutron fluence along the fuel core midplane at the inner surface of the BSW concrete reported in the SLRA is 5.61×10^{17} and 5.56×10^{17} neutrons/cm^2 for DNPS Units 1 and 2, respectively. Further, because the top of RPV pedestal is located well below the active fuel core region, the neutron fluence on the reactor vessel pedestal concrete will attenuate and be below the SLRA reported peak value. The staff noted that the calculated neutron fluence is less than the threshold for reduction of strength and degradation of material properties. Also, because the neutron fluence is below the SRP-SLR Report threshold limit, potential effects from radiation-induced volumetric expansion of the aggregates is expected to be negligible. Therefore, the staff finds that a plant-specific program is not required to manage the aging effects of neutron irradiation on the BSW non-structural concrete and the RPV pedestal structural concrete during the subsequent period of extended operation.

<u>Gamma Dose BSW Concrete Irradiation Evaluation</u>

SRP-SLR Section 3.5.2.2.2.6, as amended by SLR-ISG-2021-03-STRUCTURES and letter dated March 13, 2025, states that the threshold for strength reduction and degradation of material properties of concrete due to gamma irradiation is a gamma dose of 1×10^{10} rads. From SLRA Section 3.5.2.2.2.6, the calculated peak gamma dose, using the above approach, at the inner surface of the BSW concrete across the fuel core midplane is 4.19×10^{9} rads. The calculated gamma dose is less than the threshold for reduction of strength and degradation of concrete material properties. The staff noted that the calculated neutron fluence is less than the threshold for reduction of strength and degradation of material properties. Also, because the neutron fluence is below the SRP-SLR Report threshold limit, potential effects from radiation-induced degradation of material properties is expected to be negligible. Therefore, the staff finds that a plant-specific program is not required to manage the aging effects of gamma irradiation on the BSW non-structural concrete and reactor vessel pedestal structural concrete during the subsequent period of extended operation.

Evaluation of the BSW Non-Structural Concrete Temperature Increase from Potential Gamma Heating Effecting

The staff's safety evaluation of reduction of strength and modulus due to elevated temperature for the BSW non-structural concrete is documented in Section 3.5.2.2.1.2 of this SE.

The staff reviewed SLRA Sections 2.4.9 and 3.5.2.2.2.6, as amended by letters dated March 13, 2025, and April 28, 2025, and noted that the BSW is filled with unreinforced, non-structural concrete. The staff finds that the BSW non-structural concrete temperature increase from gamma heating effecting is negligible because the calculated gamma dose is less than the threshold for reduction of strength and degradation of concrete material properties. Therefore, the staff concludes that a plant-specific AMP is not necessary to manage the aging effects of the BSW non-structural concrete due to a temperature increase from potential gamma heating effects during the subsequent period of extended operation, and that the Structures Monitoring AMP's periodic monitoring and inspections of the accessible areas on the BSW non-structural concrete, not to exceed 5 years, is adequate to monitor and manage the irradiation induced aging effects.

Conclusion for BSW Non-Structural Concrete and Reactor Vessel Pedestal Structural Concrete Evaluation

In its review of concrete components associated with AMR item 3.5.1-097, the staff finds that the applicant has met the further evaluation criteria provided in SRP-SLR Section 3.5.2.2.2.6, and the applicant's proposal to manage the effects of aging on the BSW non-structural concrete and RPV pedestal structural concrete using the Structures Monitoring AMP is acceptable because:

(1) For the BSW non-structural concrete and RPV pedestal structural concrete, the peak neutron fluence and gamma dose values will not exceed the SRP-SLR thresholds during the subsequent period of extended operation. Therefore, a plant-specific program is not necessary to manage the irradiation induced aging effects for the BSW non-structural concrete and RPV pedestal structural concretes.

(2) The Structures Monitoring AMP will monitor for indications of radiation-induced aging effects of reduction of strength, loss of mechanical properties, and cracking of concrete by conducting periodic visual inspections. These inspections will cover accessible BSW non-structural concrete and RPV pedestal structural concretes at an interval not exceeding 5 years, consistent with the GALL-SLR Report recommendations.

RPV Support Steel Evaluation

The applicant stated that the RPV support structures consist of a cylindrical steel skirt attached to the bottom of the RPV and lateral stabilizers at the top of the BSW. The applicant stated that the top of the RPV steel skirt is well below the active core region, more than 13 feet below the lower edge of the extended beltline region, and that the lateral stabilizers are well above the active core region, more than 14 feet above the upper edge of the extended beltline region. The applicant reported a bounding RPV inner diameter fluence of 5.61×10^{17} n/cm^2 (E >1 MeV) and stated that the top of the RPV steel skirt and the lateral stabilizers are sufficiently remote from the active core such that these RPV support structures are not subject to neutron radiation exposure above the 1×10^{17} n/cm^2 (E >1 MeV) steel embrittlement threshold. In SLRA Table 3.5.2-2, as amended by letters dated March 13, 2025, the applicant stated that these RPV support structures, between the RPV and BSW, are examined per the current ASME Section XI, IWF AMP that will confirm there is no visible evidence of a loss (or reduction) of fracture toughness due to irradiation embrittlement (e.g., cracking) during the subsequent period of extended operation. Plant-specific note 3 refers to SLRA Section 3.5.2.2.2.6 for the specific effect monitored, e.g., cracking. In SLRA Table 3.5.2-9, as amended by letter dated April 28, 2025, the applicant clarified that the ring girder assembly under the RPV skirt is inspected for loss of fracture toughness by the Structures Monitoring AMP, which cites plant-specific note 5 that refers to SLRA Section 3.5.2.2.2.6 for the specific effect monitored (e.g., cracking).

The NRC staff confirmed, based on information on the elevations of the upper and lower edges of the extended beltline region in SLRA Section 4.2.1.1 and audited drawings, that the top of RPV steel skirt is well below the extended beltline region and the lateral stabilizers well above the extended beltline region. Thus, the NRC staff finds that the RPV steel skirt and lateral stabilizers are not subject to a radiation exposure level above which embrittlement effects would need to be further evaluated. The NRC staff also finds by inference that the steel assembly below the RPV steel skirt to which the RPV steel skirt is attached (i.e., the ring girder assembly bolted to the concrete pedestal) is not subject to a radiation exposure level above which irradiation embrittlement effects would need to be further evaluated.

In SLRA Section 3.5.2.2.2.6, as amended by letter dated March 13, 2025, the applicant summarized the physical condition of the RPV steel skirt, lateral stabilizers, and the ring girder assembly. The applicant stated that minor surface corrosion with no loss of material was observed on the ring girder steel and bolting during the 2016 inspection for DNPS Unit 3, and that previous inspections have not revealed any significant aging issues. For the lateral stabilizers, which include the RPV to reactor shield wall stabilizers and the truss arrangements between reactor shield wall to drywell, the applicant stated that previous inspections have not revealed any significant aging issues. The applicant stated that moderate corrosion was noted during the 2019 inspection of the drywell shear lug mechanism, but no loss of material was detected, and that these components continue to be condition monitored to ensure age-related degradation is identified and addressed promptly. During the audit, the NRC staff confirmed that inspections from the associated AMPs are being performed for these RPV steel support components and that there were no inspection results that warrant further evaluation.

BSW Structural Steel Evaluation

In SLRA Section 3.5.2.2.2.6, as amended by letter dated March 13, 2025, the applicant stated that the BSW consists of a hollow cylinder of ordinary concrete circumscribing the RPV, with the inside and outside surfaces of the 2-foot-thick concrete wall formed with steel plates (i.e., steel liners). The applicant stated that the interior spaces of the reactor shield wall (i.e., the BSW) are filled with unreinforced, non-structural concrete, and that the cylinder is continuously supported from the bottom by the same concrete and steel pedestal that supports the RPV.

The guidance in NUREG-1509 recommends that prior to the evaluation for potential radiation embrittlement, the physical condition of components with RPV support intended function be assessed. In SLRA Section 3.5.2.2.2.6, as amended by letter dated March 13, 2025, the applicant summarized the physical condition of the BSW structural steel. The applicant stated that subsequent inspections of the DNPS Unit 3 BSW have not identified any additional indications of cracking after the detection of two cracks in 2002 (and their repair in 2004) in the vertical seam/joint of the steel liner plates of the BSW. The applicant stated that the physical condition of the BSW structural steel is monitored by the Structures Monitoring AMP, which performs periodic inspections of all levels of the drywell. The applicant stated that all structural elements of the BSW continue to be inspected and have been noted as acceptable and capable of performing their intended function. During the audit, the NRC staff confirmed inspections from the associated AMPs are being performed for the BSW and that there were no inspection results that warrant further evaluation.

In SLRA Section 3.5.2.2.2.6, as amended by letter dated March 13, 2025, the applicant evaluated the BSW structural steel for radiation embrittlement, using the guidance in NUREG-1509 for the transition temperature approach. The applicant stated that the transition temperature evaluation demonstrates that the potential effects of irradiation on steel elements of the BSW are not significant. The applicant also stated that while the integrity of the BSW is assured, inspection of accessible portions of the steel liners per the current Structures Monitoring AMP will also confirm there is no visible evidence of a loss (or reduction) of fracture toughness due to irradiation embrittlement (e.g., cracking) during the subsequent period of extended operation. In SLRA Table 3.5.2-9, as amended by letter dated March 13, 2025, the applicant clarified that “loss of fracture toughness” is managed by the ASME Section XI, IWF and Structures Monitoring AMPs for the truss arrangements between the BSW and the drywell and cited plant-specific notes 5 and 7 that refer to SLRA Section 3.5.2.2.2.6 for the specific effect monitored, e.g., cracking. The applicant also clarified in SLRA Table 3.5.2-9 that “loss of fracture toughness” is managed by the Structures Monitoring AMP for the BSW steel liner and added plant-specific note 5 that refers to SLRA Section 3.5.2.2.2.6 for the specific effect monitored (e.g., cracking).

The applicant stated that the RPV outer diameter fluence equating to 1.93×10^{-4} dpa is a conservative fluence estimate at the limiting location on the inner surface of the BSW. The NRC staff evaluated this conservative fluence value above in the section titled “Evaluation of Neutron Fluence and Gamma Dose Estimation Methodology.” The applicant stated that because plant-specific initial nil-ductility temperature (NDT) values for the ASTM A36 steel liners of the BSW are not available, the recommended initial NDT value of 39°F (which includes a 1.3 standard deviation) for ASTM A36 from NUREG-1509 was used in its transition temperature evaluation. From Figure 3-1 of NUREG-1509, the applicant calculated an upper bound NDT shift of 22.5°F at 1.93×10^{-4} dpa, and with margin values determined from the guidance in NUREG-1509 (which cites Appendix R of ASME Code, Section XI), calculated a permissible lowest service temperature of 91.5°F. The NRC staff audited average temperature data in the annulus region between the RPV and BSW to confirm that the temperature of the BSW inner steel liner is much greater than 91.5°F.

Based on the discussion above, the NRC staff finds the applicant’s transition temperature evaluation of the BSW steel liner acceptable because the NDT of the ASTM A36 steel liners of the BSW, accounting for the effect of irradiation embrittlement determined from a conservative fluence estimate at the limiting location on the inner surface of the BSW, is less than the associated lowest service temperature at that location with more than adequate margin.

Conclusion for Irradiation Evaluation of RPV Support Steel and BSW Structural Steel

In its review of the RPV support steel and BSW structural steel components related to loss of fracture toughness due to irradiation, the staff finds that the applicant has met the applicable further evaluation criteria, because:

(1) The applicant adequately justified that irradiation embrittlement of the RPV support steel through the subsequent period of extended operation is not a concern because of the low radiation exposure levels of the RPV support steel.

(2) The applicant adequately demonstrated that reduction of fracture toughness of the BSW structural steel through the subsequent period of extended operation is acceptable through a transition temperature evaluation.

(3) The applicant will monitor for and manage loss or reduction of fracture toughness (e.g., cracking) of the RPV support steel and BSW structural steel through the ASME Section XI, IWF and the Structures Monitoring AMPs.

Conclusion

The Structures Monitoring and the ASME Section XI, Subsection IWF AMPs were identified by the applicant to manage the effects of aging due to irradiation. Specifically, these AMPs are credited to manage reduction of strength, loss of mechanical properties, and cracking of the BSW non-structural concrete and RPV pedestal structural concrete, as well as loss of or reduction in fracture toughness of the RPV support steel skirt, lateral stabilizers, the ring girder below the skirt, and the BSW structural steel. The staff finds that the applicant has adequately evaluated that no plant-specific program or enhancements to the existing AMPs are needed to manage radiation-related aging effects on the DNPS BSW non-structural concrete and RPV pedestal structural concretes, RPV support structures consisting of the RPV support steel skirt and lateral stabilizers, the ring girder assembly below the skirt, and BSW structural steel. The staff’s safety evaluations of the Structures Monitoring and the ASME Section XI, Subsection IWF AMPs are documented in Sections 3.0.3.2.18 and 3.0.3.2.17 of this SE, respectively.

Therefore, the staff concludes that the applicant's AMPs meets SRP-SLR Section 3.5.2.2.2.6 criteria and are consistent with the applicable recommendations in NUREG-1509. For those AMR items associated with SLRA Sections 3.5.2.2.2.6, the staff concludes that the aging effects of these SCs are managed consistent with the GALL-SLR Report recommendations and that the applicant has demonstrated that the applicable effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-SLR Report

This section documents the NRC staff’s review of AMR results listed in SLRA Tables 3.5.2-1 through 3.5.2-16 that are either not consistent with, or not addressed in, the GALL-SLR Report and are usually denoted with generic notes F through J. To efficiently capture and identify multiple applicable AMR items in each subsection and because these AMR items often are not associated with an SLRA Table 1 item, the subsections are organized by applicable AMR section and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-SLR Report, the staff reviewed the applicant's evaluation to determine whether the applicant has demonstrated that it will adequately manage the effects of aging in a way that maintains the intended function(s) consistent with the CLB for the subsequent period of extended operation. The following sections describe the staff's evaluations.

3.5.2.3.1 Component Supports – Summary of Aging Management Evaluation

Steel Reactor Vessel (RV) Supports and Bolting Exposed to Air – Indoor Uncontrolled

SLRA Section 3.5.2.2.2.6, associated with SLRA Tables 3.5.2-2 and 3.5.2-9, as amended by letter dated March 13, 2025, states that the loss of fracture toughness aging effect for ASME Class 1 Supports (includes steel RPV support members, welds and bolting; stabilizers (RV to reactor shield)); and steel stabilizers (truss arrangements between reactor shield wall to drywell) of carbon steel, low-alloy steel and stainless steel exposed to air–indoor uncontrolled environment will be managed by the ASME Section XI, Subsection IWF AMP. The AMR item cites generic note H, for which the applicant has identified loss of fracture toughness due to irradiation embrittlement as an additional aging effect. The AMR items cite plant-specific notes 3, 6, and 7 in SLRA Table 3.5.2-2:

> Plant-specific note 3 states, "The ASME Section XI, Subsection IWF (B.2.1.30) AMP is used to manage loss of fracture toughness for the reactor vessel skirt and reactor vessel to reactor shield stabilizer. See further evaluation 3.5.2.2.2.6 for evaluation of irradiation effects that might lead to a loss of fracture toughness."
>
> Plant-specific note 6 states, "The stabilizers (truss arrangements between reactor shield wall to drywell) are inspected per an augmented ASME Section XI, Subsection IWF Program."
>
> Plant-specific note 7 states, "The ASME Section XI, Subsection IWF (B.2.1.30) AMP is used to manage loss of fracture toughness. See further evaluation 3.5.2.2.2.6 for evaluation of irradiation effects that might lead to a loss of fracture toughness."

The plant-specific further evaluation in SLRA Section 3.5.2.2.2.6 and the staff evaluation in SE Section 3.5.2.2.2.6 concluded that the 67 EFPY fast neutron fluence (E >1MeV) for the reactor vessel support components listed above, which are located well below or above the RPV beltline region, is estimated to remain below the 1×10^{17} n/cm^2 (E >1 MeV) threshold from 10 CFR Part 50, Appendix H for loss of fracture toughness of steel due to irradiation embrittlement. Because the integrity of the RPV supports (including welds and bolting) is assured, with fluence below the threshold limit for irradiation embrittlement considering 67 EFPY of fluence, the evaluation justifies the continued adequacy of the current visual examination (VT-3) of the RPV structural steel supports as part of the SLRA B.2.1.30 ASME Section XI, Subsection IWF Program to confirm the absence of, or identify, any visible evidence of loss of fracture toughness (e.g., cracking). The staff finds the applicant's proposal to manage the loss of fracture toughness due to irradiation embrittlement of the RPV support components using the ASME Section XI, Subsection IWF AMP acceptable as follows:

(1) The staff evaluation in SE Section 3.5.2.2.2.6 of the applicant's plant-specific fluence evaluation, being less than the embrittlement threshold limit, concluded that a plant-specific program is not necessary to manage the aging effect.

(2) Loss of fracture toughness is included as an aging effect managed within the program.

(3) Previous visual inspections of the RPV support components under the IWF program has not identified significant degradation issues.

(4) The VT-3 visual examinations of RPV support steel for irradiation embrittlement on a 10-year frequency of the ASME Section XI, Subsection IWF AMP (evaluated in SE Section 3.0.3.2.17) are adequate to confirm the absence of, or monitor, for cracking as potential symptom of loss of fracture toughness through the subsequent period of extended operation.

3.5.2.3.2 Primary Containment – Summary of Aging Management Evaluation

Steel Components Exposed to Air – Indoor Uncontrolled Environment

SLRA Section 3.5.2.2.2.6, associated with SLRA Table 3.5.2-9, as amended by letters dated March 13, 2025 and April 28, 2025, states that the aging effect of loss of fracture toughness for the carbon steel stabilizers (truss arrangements between reactor shield wall to drywell), liner, liner anchors, integral attachments (reactor pedestal and reactor shield wall) and ring girder assemblies (under the RPV skirt) exposed to air–indoor uncontrolled environment will be managed by the Structures Monitoring program. The AMR items cite generic note H, for which the applicant has identified loss of fracture toughness due to irradiation embrittlement as an additional aging effect. The AMR items cite plant-specific note 5, which states:

> The Structures Monitoring (B.2.1.33) AMP is used to manage loss of fracture toughness. See further evaluation 3.5.2.2.2.6 for Reactor Shield Wall Structural Steel Irradiation evaluation.

The plant-specific evaluation in SLRA Section 3.5.2.2.2.6, subsections "RPV Support Steel Evaluation" and "Reactor Shield Wall Structural Steel Evaluation," in which the applied relied on the NUREG-1509 approach and the corresponding staff's evaluation in SE Section 3.5.2.2.2.6 concluded that the potential effects of irradiation on the steel elements of the stabilizers, reactor pedestal, reactor shield wall, and ring girder assemblies, are not significant because they are not subject to a radiation exposure level above which embrittlement effects would need to be further evaluated.

The staff finds the applicant's proposal to manage the effects of aging using the Structures Monitoring program acceptable because:

(1) The staff's evaluation in SE Section 3.5.2.2.2.6 of the applicant's plant-specific irradiation evaluation concluded that a plant-specific program is not necessary to manage the aging effect.

(2) The periodic visual inspections required by the Structures Monitoring are capable of detecting loss of fracture toughness for the carbon steel stabilizers, liner, liner anchors, integral attachments, and ring girder assemblies.

(3) The condition of the accessible liner plates will be used as leading indicators of the condition of the remaining reactor shield wall structural components.

(4) Any adverse inspection findings would be addressed in the corrective action program prior to loss of the component intended function(s).

3.6 Aging Management of Electrical and Instrumentation and Controls

3.6.1 Summary of Technical Information in the Application

SLRA Section 3.6, "Aging Management of Electrical and Instrumentation and Controls," provides AMR results for those components the applicant identified in SLRA Section 2.5, "Scoping and Screening Results: Electrical," as being subject to an AMR. SLRA Table 3.6.1, "Summary of Aging Management Programs for the Electrical Components," is a summary comparison of the applicant's AMR results with those provided in the GALL-SLR Report for electrical components.

3.6.2 Staff Evaluation

Table 3.6-1 summarizes the NRC staff's evaluation of the component groups listed in SLRA Section 3.6 and addressed in the GALL-SLR Report.

Table 3.6-1 Staff Evaluation for Electrical Components in the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.6.1-001	Consistent with the GALL-SLR Report (see SE Section 3.6.2.2.1)
3.6.1-002	Not applicable to DNPS
3.6.1-003	Not applicable to DNPS
3.6.1-004	Not applicable to DNPS
3.6.1-005	Not applicable to DNPS
3.6.1-006	Not applicable to DNPS
3.6.1-007	Not applicable to DNPS
3.6.1-008	Consistent with the GALL-SLR Report
3.6.1-009	Consistent with the GALL-SLR Report
3.6.1-010	Consistent with the GALL-SLR Report
3.6.1-011	Consistent with the GALL-SLR Report
3.6.1-012	Consistent with the GALL-SLR Report
3.6.1-013	Consistent with the GALL-SLR Report
3.6.1-014	Consistent with the GALL-SLR Report
3.6.1-015	Consistent with the GALL-SLR Report
3.6.1-016	Not applicable to DNPS
3.6.1-017	Not applicable to DNPS
3.6.1-018	Not applicable to DNPS
3.6.1-019	Consistent with the GALL-SLR Report
3.6.1-020	Not applicable to BWRs
3.6.1-021	Not applicable to DNPS
3.6.1-022	Not applicable to DNPS
3.6.1-023	Consistent with the GALL-SLR Report
3.6.1-024	Consistent with the GALL-SLR Report

Component Group (SRP-SLR Item No.)	Staff Evaluation
3.6.1-025	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.6.1-026	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.6.1-027	Not applicable to DNPS
3.6.1-028	This item number is not used in the SRP-SLR nor the GALL-SLR Report
3.6.1-029	Not applicable to DNPS
3.6.1-030	Not applicable to DNPS
3.6.1-031	Not applicable to DNPS
3.6.1-032	Not applicable to DNPS

The NRC staff's review of component groups, as described in SE Section 3.0.2.2, is summarized in the following three sections:

(1) SE Section 3.6.2.1 discusses AMR results for components that the applicant states are either not applicable to DNPS or are consistent with the GALL-SLR Report. Section 3.6.2.1.1 summarizes the staff's review of AMR items that are not applicable or used and documents any RAIs issued and the staff's conclusions. SE Sections 3.6.2.1.2 and 3.6.2.1.3 document the review of components that required additional information or otherwise required further explanation.

(2) SE Section 3.6.2.2 discusses AMR results for which the GALL-SLR Report and SRP-SLR recommend further evaluation.

(3) SE Section 3.6.2.3 discusses AMR results for components that the applicant stated are not consistent with, or not addressed in, the GALL-SLR Report. These AMR results typically are identified by generic notes F through J, and plant-specific notes in the SLRA.

3.6.2.1 Aging Management Review Results Consistent with the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Table 3.6.2-1 that the applicant determined to be consistent with the GALL-SLR Report. The staff audited and reviewed the information in the SLRA. The staff did not repeat its review of the matters described in the GALL-SLR Report; the staff verified that the material presented in the SLRA was applicable and that the applicant identified the appropriate GALL-SLR Report information for AMRs. For those AMR items that the staff found to be consistent with the GALL-SLR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions as documented in the GALL-SLR Report are considered to be the basis for acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-SLR Report" is documented in SE Table 3.6-1, and no separate write-up is required or provided.

3.6.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

SE Table 3.6-1 identifies the SLRA Table 3.6.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are neither used nor applicable to DNPS. The NRC staff reviewed the SLRA and UFSAR and confirmed that the applicant's SLRA does not have any AMR results that are applicable for these AMR items.

SE Table 3.6-1 identifies the SLRA Table 3.6.1 AMR items for which the applicant claims that the corresponding AMR items in the GALL-SLR Report are not applicable because the associated AMR items are only applicable to PWRs while DNPS are BWR units. The NRC staff reviewed the SRP-SLR, confirmed that these AMR items only apply to PWRs, and finds that these AMR items are not applicable to DNPS.

3.6.2.1.2 Increased Electrical Resistance

SLRA Table 3.6.1, AMR item 3.6.1-016 addresses managing increased electrical resistance of connections due to chemical contamination, corrosion, and oxidation for fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air–indoor uncontrolled. The applicant stated that this item is not applicable. The staff evaluated the applicant’s claim and finds it acceptable for the following reasons:

- In-scope fuse holders in the reactor building are in closed enclosures that protect them from external sources of moisture and chemical contamination and are in an area where there are no high relative humidity, weather variations, significant temperature variations, and uncontrolled chemicals.
- The applicant’s walkdown confirmed these in-scope fuse holders had no evidence of moisture intrusion, chemical contamination, oxidation, or corrosion.

SLRA Table 3.6.1, AMR item 3.6.1-017 addresses managing increased electrical resistance of connections due to fatigue from ohmic heating, thermal cycling, electrical transients for fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air–indoor controlled or uncontrolled. The applicant stated that this item is not applicable. The staff evaluated the applicant’s claim and finds it acceptable for the following reasons:

- The in-scope fuse holders provide power to low current SCRAM solenoids that are energized during normal operation and do not experience ohmic heating and thermal cycling.
- Electrical transients are mitigated by fast action of circuit protective devices at high currents.

SLRA Table 3.6.1, AMR item 3.6.1-018 addresses managing increased electrical resistance of connections due to fatigue caused by frequent fuse removal/manipulation or vibration for fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air–indoor controlled or uncontrolled. The applicant stated that this item is not applicable. The staff evaluated the applicant’s claim and finds it acceptable for the following reasons: the in-scope fuse holders are not subject to frequent manipulation and are in electrical panels that are mounted with no attached sources of vibrations.

3.6.2.1.3 Reduced Electrical Insulation Resistance

SLRA Table 3.6.1, AMR item 3.6.1-022, as amended by letter dated February 20, addresses managing reduced electrical insulation resistance due to thermal/thermoxidative degradation of organics, radiolysis, and photolysis (ultraviolet [UV] sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion for fuse holders (not part of active equipment): insulation material composed of electrical insulation material: bakelite; phenolic melamine or ceramic; molded polycarbonate, and other, exposed to air–indoor controlled or uncontrolled. The applicant stated that this item is not applicable. The staff evaluated the applicant’s claim and finds it acceptable because the environment in the panels where the in-scope fuse holders are installed does not experience high temperatures, high radiation levels, or moisture during normal conditions to cause these aging effects.

3.6.2.2 Aging Management Review Results for which Further Evaluation is Recommended by the GALL-SLR Report

In SLRA Section 3.6.2.2, the applicant further evaluates aging management for certain electrical, instrumentation, and controls system components as recommended by the GALL-SLR Report. The applicant also provides information concerning how it will manage the applicable aging effects. The staff reviewed the applicant's evaluation of these component groups against the criteria contained in SRP-SLR Section 3.6.2.2. The following subsections document the staff's review.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

SLRA Section 3.6.2.2.1 notes that TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1) and that the evaluation of this TLAA, environmental qualification of electric equipment, is addressed in SLRA Section 4.4. This is consistent with SRP-SLR Section 3.6.2.2.1 and is, therefore, acceptable. The staff's evaluation regarding the TLAA for environmental qualification of electric equipment is documented in SE Section 4.4.

3.6.2.2.2 Reduced Insulation Resistance due to Age Degradation of Cable Bus Arrangements Caused by Intrusion of Moisture, Dust, Industrial Pollution, Rain, Ice, Photolysis, Ohmic Heating, and Loss of Strength of Support Structures and Louvers of Cable Bus Arrangements Due to General Corrosion and Exposure to Air-Outdoor

SLRA Section 3.6.2.2.2, associated with SLRA Table 3.6.1, items 3.6.1-029, 3.6.1-030, and 3.6.1-031, addresses reduced insulation resistance due to age degradation of cable bus arrangements caused by intrusion of moisture, dust, industrial pollution, rain, ice, photolysis, ohmic heating, and loss of strength of support structures and louvers of cable bus arrangements due to general corrosion and exposure to air - outdoor.

SLRA Section 3.6.2.2.2, associated with SLRA Table 3.6.1, AMR item 3.6.1-029, addresses reduced electrical insulation resistance due to degradation caused by thermal/thermoxidative degradation of organics and photolysis (UV sensitive materials only) of organics moisture/debris intrusion and ohmic heating for cable bus: electrical insulation; insulators–exposed to air–indoor controlled or uncontrolled, air–outdoor. The applicant stated that this item is not applicable. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.6.2.2.2, associated with item 3.6-1, 029, and finds it acceptable because there are no cable bus, electrical insulation and insulators exposed to air–indoor controlled, air–indoor uncontrolled or air – outdoor in electrical commodities at the DNPS.

SLRA Section 3.6.2.2.2, associated with SLRA Table 3.6.1, AMR item 3.6.1-030, addresses loss of material due to general, pitting, crevice corrosion for cable bus: external surface of enclosure assemblies composed of steel, exposed to air–indoor uncontrolled or air–outdoor. The applicant stated that this item is not applicable. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.6.2.2.2, associated with item 3.6-1, 030, and finds it acceptable because there are no cable bus enclosures made of steel exposed to air–indoor uncontrolled or air–outdoor in electrical commodities at the DNPS.

SLRA Section 3.6.2.2.2, associated with SLRA Table 3.6.1, AMR item 3.6.1-031, addresses loss of material due to general, pitting, crevice corrosion for cable bus external surface of enclosure assemblies composed of galvanized steel; aluminum exposed to air–outdoor. The applicant stated that this item is not applicable. The staff reviewed the applicant's proposal against the criteria in SRP-SLR Section 3.6.2.2.2, associated with item 3.6-1, 031, and finds it acceptable because there is no cable bus, external surface enclosure assemblies composed of galvanized steel or aluminum exposed to air–outdoor in electrical commodities at the DNPS.

3.6.2.2.3 Loss of Material Due to Wind-Induced Abrasion, Loss of Conductor Strength due to Corrosion, and Increased Resistance of Connection Due to Oxidation or Loss of Preload for Transmission Conductors, Switchyard Bus, and Connections

SLRA Section 3.6.2.2.3, associated with SLRA Table 3.6.1, items 3.6.1-004, 3.6.1-005, 3.6.1-006, and 3.6.1-007, addresses loss of material due to wind-induced abrasion, loss of conductor strength due to corrosion, and increased resistance of connection due to oxidation or loss of preload for transmission conductors, transmission connectors, as well as switchyard buses and connections. The criteria in SRP-SLR Section 3.6.2.2.3 state that the GALL-SLR Report recommends further evaluation of a plant-specific AMP to ensure that the aging effects are adequately managed.

SLRA Section 3.6.2.2.3, associated with SLRA Table 3.6.1, AMR item 3.6.1-004, addresses loss of conductor strength due to corrosion for transmission conductors composed of aluminum; steel exposed to air - outdoor. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.6.2.2.3 and Appendix A.1, "Aging Management Review – Generic (Branch Technical Position RLSB-1)," and finds it acceptable because:

(1) DNPS is located in an area with no heavy industry nearby, so industrial airborne particle concentrations are comparatively low, which minimizes the corrosion rate.

(2) The test methodology, design, physical construction, and environment of the DNPS in-scope transmission conductors are bounded by the Ontario Hydroelectric study on aged aluminum conductor steel reinforced (ACSR) cables.

(3) The staff's review of DNPS OE identified no issues with transmission conductor corrosion or unique aging effects for transmission conductors.

SLRA Section 3.6.2.2.3, associated with SLRA Table 3.6.1, AMR item 3.6.1-005, addresses increased electrical resistance of connection due to oxidation or loss of preload for transmission connectors composed of aluminum; steel exposed to air–outdoor. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.6.2.2.3 and Appendix A.1 and finds it acceptable because:

(1) DNPS employs good bolting practices.

(2) DNPS transmission connectors are designed and installed using stainless steel bolting material including lock washers that provide vibration absorption and prevent loss of preload.

(3) The staff's review of DNPS OE has shown that oxidation and loss of preload are not applicable aging mechanisms for transmission connectors.

SLRA Section 3.6.2.2.3, associated with SLRA Table 3.6.1, AMR item 3.6.1-006, addresses loss of material due to wind-induced abrasion; increased resistance of connection due to oxidation or loss of preload for switchyard bus and connections composed of aluminum; copper; bronze; stainless steel; galvanized steel exposed to air - outdoor. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.6.2.2.3 and Appendix A.1 and finds the applicant's claim acceptable for switchyard buses because:

(1) DNPS is located inland (northeast quarter of the Morris Illinois quadrangle). The DNPS switchyard buses are connected to flexible conductors that typically do not vibrate and are supported by insulators and static structural components.

(2) The switchyard buses are mounted rigidly.

(3) The staff's review of DNPS OE identified no issues with wind-induced abrasion or fatigue for switchyard buses at DNPS.

The staff also finds the applicant's claim acceptable for switchyard bus connections because:

(1) DNPS employs good bolting practices.

(2) The connections are of non-corrosive material (aluminum connections and stainless-steel washers) and are torqued at the time of installation to avoid loss of preload.

(3) The switchyard bus bolted connections are designed and installed using stainless steel bolting material including lock washers that provide vibration absorption and prevent loss of preload.

(4) The staff's review of DNPS OE identified no issues with oxidation or loss of preload for switchyard bus connections at DNPS.

SLRA Section 3.6.2.2.3, associated with SLRA Table 3.6.1, AMR item 3.6.1-007, addresses loss of material due to wind-induced abrasion for transmission conductors composed of aluminum; steel exposed to air–outdoor. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim against the criteria in SRP-SLR Section 3.6.2.2.3 and Appendix A.1 and finds it acceptable because sway was considered in the design and installation of transmission conductors, and experience has shown that transmission conductors do not normally swing significantly and when they do swing due to significant wind, they do not continue to swing very long once the wind subsides. DNPS OE has shown that loss of material due to wind-induced abrasion for transmission conductors is not an aging mechanism. Furthermore, the physical location of DNPS, the typical weather/wind observed at the site, and the material (soil not sand, which is the material typically associated with abrasion) around the site indicate that the conditions for abrasion that could damage the aluminum transmission conductors is unlikely.

3.6.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

SE Section 3.0.4 documents the NRC staff's evaluation of the applicant's QA Program.

3.6.2.2.5 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.6.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-SLR Report

The following subsections document the NRC staff's review of AMR results listed in SLRA Table 3.6.2-1 that are either not consistent with, or not addressed in, the GALL-SLR Report and are usually denoted with generic notes F through J. To efficiently capture and identify multiple applicable AMR items in each subsection, and because these AMR items often are not associated with a Table 3.6.1 item, the subsection is organized by applicable AMR section and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-SLR Report, the staff reviewed the applicant's evaluation to determine whether the applicant has demonstrated that it will adequately manage the effects of aging in a way that maintains the intended function(s) consistent with the CLB for the subsequent period of extended operation. The following sections document the staff's evaluation.

3.6.2.3.1 Electrical Commodities – Summary of Aging Management Evaluation

<u>Various Metallic Materials for Fuse Holders (Not Part of Active Equipment) Exposed to Air–Indoor, Controlled, or Uncontrolled</u>

SLRA Table 3.6.2-1, AMR items 3.6.1-016, 3.6.1-017, and 3.6.1-018, associated with SLRA Section 3.6.2.3.1, as amended by letter dated February 20, 2025 (Enclosure A), note that increased electrical resistance of connections due to (1) chemical contamination, corrosion, and oxidation; (2) fatigue from ohmic heating, thermal cycling, electrical transients; and (3) fatigue caused by frequent fuse removal/manipulation or vibration for fuse holders (not part of active equipment) composed of various metallic materials exposed to air–indoor, controlled, or uncontrolled are not applicable and no AMP is proposed. The AMR items cite generic note I. The AMR items cite plant-specific note 6, which states, "The evaluation in Section 3.6.2.3.1 determined that no AMP is required for fuse holders."

The staff reviewed the associated Table 2 items in the SLRA to confirm that these aging effects are not applicable for this component, material and environment combination. The staff finds the applicant's proposal acceptable based on consistency with the guidance provided in Table 3.6-1 of SRP-SLR, which states that no AMP is required for those applicants who can demonstrate that their fuse holders (not part of active equipment) are in an environment that does not subject them to environmental aging mechanisms and effects due to chemical contamination, corrosion, and oxidation; fatigue due to ohmic heating, thermal cycling, electrical transients; and fatigue caused by frequent fuse removal/manipulation or vibration. Accordingly, based on its review of SLRA Section 3.6.2.3.1, the staff finds that the applicant has demonstrated that metallic portions of the in-scope fuse holders (not part of active equipment) are not prone to these aging effects. Furthermore, during the audit, the staff's independent search of plant-specific OE did not reveal any evidence that age-related degradation was occurring on the metallic parts of in-scope fuse holders (not part of active equipment).

<u>Various Insulation Material: Bakelite; Phenolic Melamine or Ceramic; Molded Polycarbonate, and Other for Fuse Holders (Not Part of Active Equipment) Exposed to Air – Indoor, Controlled, or Uncontrolled</u>

SLRA Table 3.6.2-1, AMR item 3.6.1-022, associated with SLRA Section 3.6.2.3.1, as amended by letter dated February 20, 2025, notes that reduced electrical insulation resistance due to thermal/thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion for various insulation material: bakelite; phenolic melamine or ceramic; molded polycarbonate, and other for fuse holders (not part of active equipment) exposed to air–indoor, controlled, or uncontrolled are not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 6, which states, "The evaluation in Section 3.6.2.3.1 determined that no AMP is required for fuse holders."

The staff reviewed the associated items in the SLRA to confirm that these aging effects are not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable based on consistency with the guidance provided in Table 3.6-1 of SRP-SLR, which states that no AMP is required for those applicants who can demonstrate that their fuse holders (not part of active equipment) are in an environment that does not subject them to environmental aging mechanisms and effects due to chemical contamination, corrosion, and oxidation; fatigue due to ohmic heating, thermal cycling, electrical transients; or fatigue caused by frequent fuse removal/manipulation or vibration. Accordingly, based on its review of SLRA Section 3.6.2.3.1, the staff finds that the applicant has demonstrated that their fuse holders (not part of active equipment) are in an environment that does not subject them to environmental aging mechanisms. Furthermore, during the audit, the staff's independent search of plant-specific OE did not reveal any evidence that age-related degradation was occurring on the insulation materials of the in-scope fuse holders (not part of active equipment).

<u>High-Voltage Electrical Insulators Composed of Porcelain; Malleable Iron; Aluminum; Galvanized Steel; Cement Exposed to Air – Outdoor</u>.

SLRA Table 3.6.2-1, AMR item 3.6.1-002 notes that loss of material on metallic connectors due to mechanical wear or corrosion caused by movement of transmission conductors due to significant wind for high-voltage electrical insulators composed of porcelain; malleable iron; aluminum; galvanized steel; cement, toughened glass; polymers; silicone rubber; fiber glass, aluminum alloy exposed to air–outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 1, which states:

> The evaluation in Section 3.6.2.3.2 determined that no aging effects requiring management are applicable to the High-Voltage Insulators at DRE. Therefore, no AMP is required for High-Voltage Insulators.

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable because sway was considered in the design and installation of high-voltage electrical insulators, and experience has shown that the transmission conductors do not normally swing, and that when they do swing due to substantial wind, they do not continue to swing for very long once the wind subsides. Additionally, DNPS OE has shown that mechanical wear caused by movement of transmission conductors due to significant wind for high-voltage electrical insulators is not an applicable aging mechanism.

SLRA Table 3.6.2-1, AMR item 3.6.1-003 notes that reduced electrical insulation resistance due to presence of cracks, foreign debris, salt, dust, cooling tower plume or industrial effluent contamination; peeling of silicone rubber sleeves for polymer insulators; or degradation of glazing on porcelain insulators for high-voltage electrical insulators composed of porcelain; malleable iron; aluminum; galvanized steel; cement, toughened glass; polymers; silicone rubber;

fiberglass, aluminum alloy exposed to air–outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 1, which states:

> The evaluation in Section 3.6.2.3.2 determined that no aging effects requiring management are applicable to the High-Voltage Insulators at DRE. Therefore, no AMP is required for High-Voltage Insulators.

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material and environment combination. The staff finds the applicant's proposal acceptable because excessive high-voltage electrical insulator surface contamination is not expected to occur due to the glazed insulator surface of high-voltage insulators aiding in contamination being washed away by rain, the DNPS substation being located away from the seacoast in a rural area with low industrial airborne particle concentrations due to no heavy industry nearby and supporting OE. Furthermore, based on its review of the applicant's plant-specific OE associated with porcelain components of high-voltage electrical insulators at DNPS, the staff did not identify any instances of porcelain cracking due to cement growth or object strikes.

Transmission Conductors Composed of Aluminum; Steel Exposed to Air–Outdoor

SLRA Table 3.6.2-1, AMR item 3.6.1-004 notes that loss of conductor strength due to corrosion for transmission conductors composed of aluminum; steel exposed to air–outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 4, which states, "The evaluation in Section 3.6.2.2.3 determined that no AMP is required for aluminum, steel transmission conductors."

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material and environment combination. The staff finds the applicant's proposal acceptable because:

(1) DNPS is located in an area with no heavy industry nearby, so industrial airborne particle concentrations are comparatively low, which minimizes the corrosion rate.

(2) The test methodology, design, physical construction, and environment of the DNPS in-scope transmission conductors are bounded by the Ontario Hydroelectric study on aged ACSR cables.

(3) The staff's review of DNPS OE identified no issues with transmission conductor corrosion or unique aging effects for transmission conductors.

Transmission Connectors Composed of Aluminum; Steel Exposed to Air - Outdoor

SLRA Table 3.6.2-1, AMR item 3.6.1-005 notes that increased electrical resistance of connection due to oxidation or loss of preload for transmission connectors composed of aluminum; steel exposed to air – outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 5, which states, "The evaluation in Section 3.6.2.2.3 determined that no AMP is required for Transmission Connectors."

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable because:

(1) DNPS employs good bolting practices.

(2) DNPS transmission connectors are designed and installed using stainless steel bolting material including lock washers that provide vibration absorption and prevent loss of preload.

(3) The staff's review of DNPS OE has shown that oxidation and loss of preload are not applicable aging mechanisms for transmission connectors.

<u>Transmission Conductors Composed of Aluminum; Steel Exposed to Air - Outdoor</u>

SLRA Table 3.6.2-1, AMR item 3.6.1-007 notes that loss of material due to wind-induced abrasion for transmission conductors composed of aluminum; steel exposed to air–outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 4, which states, "The evaluation in Section 3.6.2.2.3 determined that no AMP is required for aluminum, steel transmission conductors."

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable because sway was considered in the design and installation of transmission conductors, experience has shown that transmission conductors do not normally swing significantly, and when they do swing due to substantial wind, they do not continue to swing very long once the wind subsides. Additionally, DNPS OE has shown that loss of material due to wind-induced abrasion for transmission conductors is not an applicable aging mechanism. Furthermore, the physical location of DNPS, the typical weather/wind observed at the site, and the material (soil is not sand, which is typically associated with abrasion) around the site indicate that the conditions for abrasion that could damage the aluminum transmission conductors is unlikely.

<u>Transmission Conductors Composed of Aluminum Exposed to Air - Outdoor</u>

SLRA, Table 3.6.2-1, as amended by letter dated February 20, 2025, AMR item 3.6.1-021, notes that loss of conductor strength due to corrosion for transmission conductors composed of aluminum exposed to air–outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 3, which states, "The evaluation in Section 3.6.2.2.3 determined that no AMP is required for ACSR transmission conductors."

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable because aluminum conductor aluminum alloy reinforced and all aluminum conductors are not subject to the aging effect of loss of conductor strength due to corrosion.

<u>Switchyard Bus and Connections Composed of Aluminum; Copper; Bronze; Stainless Steel; Galvanized Steel Exposed to Air - Outdoor</u>

SLRA Table 3.6.2-1, AMR item 3.6.1-006 notes that loss of material due to wind-induced abrasion; increased resistance of connection due to oxidation or loss of preload for switchyard bus and connections composed of aluminum; copper; bronze; stainless steel; galvanized steel exposed to air–outdoor is not applicable and no AMP is proposed. The AMR item cites generic note I. The AMR item cites plant-specific note 2, which states, "The evaluation in Section 3.6.2.2.3 determined that no AMP is required for switchyard bus and connections."

The staff reviewed the associated items in the SLRA to confirm that this aging effect is not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable because:

(1) DNPS is located inland (northeast quarter of the Morris Illinois quadrangle). The DNPS switchyard buses are connected to flexible conductors that typically do not vibrate and are supported by insulators and static, structural components.

(2) The switchyard buses are rigidly mounted.

(3) The staff's review of DNPS OE identified no issues with wind-induced abrasion and fatigue for switchyard buses at DNPS.

The staff also finds the applicant's proposal acceptable because:

(1) DNPS employs good bolting practices.

(2) The connections are of non-corrosive material (aluminum connections and stainless steel washers) and are torqued at the time of installation to avoid loss of preload.

(3) The switchyard bus bolted connections are designed and installed using stainless steel bolting material including lock washers that provide vibration absorption and prevent loss of preload.

(4) The staff's review of DNPS OE identified no issues with oxidation or loss of preload for switchyard bus connections at DNPS.

3.7 Conclusion for Aging Management Review Results

The NRC staff reviewed SLRA Section 3, "Aging Management Review Results," and SLRA Appendix B, "Aging Management Programs," as amended. Based on its audit and its review of the applicant's AMRs results and AMPs, the staff concludes that the applicant has demonstrated that it will adequately manage the applicable aging effects in a way that maintains intended functions consistent with the CLB for the subsequent period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the applicant's applicable UFSAR supplement program summaries and concludes that, as required by 10 CFR 54.21(d), the UFSAR supplement contain a summary description of the programs and activities for managing the effects of aging for the period of subsequent extended operation at DNPS.

With regard to these matters, the NRC staff concludes that actions have been identified and have been or will be taken such that there is reasonable assurance that the activities authorized by subsequent renewed operating license for DNPS, if issued, will continue to be conducted in accordance with the CLB, and that any changes made to the CLB to comply with 10 CFR Part 54 are in accordance with the Atomic Energy Act of 1954, as amended, and the NRC's regulations.

SECTION 4 TIME-LIMITED AGING ANALYSES

4.1 Identification of Time-Limited Aging Analyses

This section of the safety evaluation (SE) provides the U.S, Nuclear Regulatory Commission (NRC) staff's evaluation of the applicant's basis and methodology for identifying those time-limited aging analyses (TLAAs) and plant-specific exemptions, granted pursuant to 10 CFR 50.12, "Specific Exemptions," that are based on TLAAs.

The regulation in 10 CFR 54.3, "Definitions," defines TLAAs.

The regulation in 10 CFR 54.21(c)(1) requires an applicant for license renewal provide a list of TLAAs as defined in 10 CFR 54.3 and for each analysis demonstrate that:

(1) The analyses remain valid for the period of extended operation.

(2) The analyses have been projected to the end of the period of extended operation.

(3) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

In addition, in accordance with 10 CFR 54.21(c)(2), an applicant for license renewal must provide a list of plant-specific exemptions granted under 10 CFR 50.12, "Specific exemptions," that are based on TLAAs. For any such exemptions, the applicant also 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 Application

SLRA Section 4.1 describes the process used by the applicant to identify the TLAAs within its CLB and design basis documentation.

The applicant stated that exemptions pursuant to 10 CFR 50.12 currently in effect for DNPS were reviewed to determine if they are based upon a TLAA and if there were no exemptions to 10 CFR 50.12 identified (that are currently in effect) that are based upon or are associated with a TLAA.

4.1.2 Staff Evaluation

The NRC staff reviewed SLRA Section 4.1 in accordance with the guidance provided in SRP-SLR Section 4.1, "Identification of Time-Limiting Aging Analyses and Exemptions.," which includes NRC staff review procedures, acceptance criteria, and a list of potential TLAAs.

The SLRA states that the applicant searched the CLB and design basis documentation to identify potential TLAAs. The documentation that was searched included the UFSAR, technical specifications and bases, docketed licensing correspondence, initial license renewal application (LRA), NRC SERs, design bases documents, General Electric and General Electric Hitachi (GEH) design analyses and reports, Bechtel design analyses and reports, Chicago Bridge and Iron design analyses and reports, structural integrity associates design analyses and reports, component record list, environmental qualification binders, engineering specifications, engineering change requests, corrective action program reports, 10 CFR 50.12 exemption requests, and inservice inspection relief requests.

During the audit, the NRC staff confirmed that the applicant performed a search of its CLB and design basis documentation to identify potential TLAAs. The NRC staff noted that the applicant used a list of specific key words during its search to identify potential TLAAs. The NRC staff noted that the applicant's list of key words was reasonable and appropriate in identifying potential TLAAs because they were tailored to focus on age related degradation and targeted time-dependent assessments and calculations. During its audit, the NRC staff confirmed that the applicant performed further detailed reviews of the design calculations if an analysis was deemed a potential candidate for a TLAA during the applicant's search with specific key words. The NRC staff also confirmed that each potential TLAA identified during the applicant's search was reviewed by the applicant against the six criteria of 10 CFR 54.3(a) and that those potential TLAAs that met all six criteria were identified as TLAAs that require evaluation for the period of extended operation.

During its audit, the NRC staff confirmed that the applicant performed a search of docketed licensing correspondence, the operating license and the UFSAR to identify exemptions granted pursuant to 10 CFR 50.12 that are currently in effect. The NRC staff also confirmed that the applicant reviewed these exemptions to determine whether the exemption was based on a TLAA, and that no 10 CFR 50.12 exemptions that are currently in effect involve a TLAA as defined in 10 CFR 54.3.

During its review, the NRC staff performed an independent search of the UFSAR and a sample of docketed licensing correspondence and NRC SERs to identify potential TLAAs that were not identified by the applicant in its SLRA. Based on this independent search, the NRC staff did not identify TLAAs or any active exemptions granted pursuant to 10 CFR 50.12 and based on a TLAA, as defined in 10 CFR 54.3, that were not identified in the SLRA.

4.1.3 Conclusion

Based on its review and independent search, the NRC staff concludes that the systematic approach taken by the applicant to search its CLB and design basis documentation to identify the analyses that meet all six criteria of a TLAA, is acceptable, in accordance with 10 CFR 54.21(c)(1). In addition, based on its review and independent search, the NRC staff concludes that the systematic approach taken by the applicant to search its CLB for exemptions that were based on a TLAA is acceptable, and no TLAAs were required to be identified in accordance with 10 CFR 54.21(c)(2).

4.2 Reactor Pressure Vessel and Internals Neutron Embrittlement Analyses

4.2.1 Reactor Pressure Vessel and Internals Neutron Fluence Analyses

In SLRA Section 4.2, the applicant provided their approach to meeting the requirements of 10 CFR 50.60, "Acceptance criteria for fracture prevention measures for light-water nuclear power reactors for normal operation", Appendix G to Part 50, "Fracture toughness requirements", and Appendix H to Part 50, "Reactor vessel material surveillance program requirements". Their approach accounts for the effects of neutron fluence and aging mechanisms on both the reactor pressure vessel (RPV) as well as the reactor pressure vessel (RPV) internal components.

SLRA Section 4.2 provides the applicant’s analyses of following areas:

- Reactor Pressure Vessel Neutron Fluence Analyses (Section 4.2.1.1)
- Reactor Pressure Vessel Internals Neutron Fluence Analyses (Section 4.2.1.2)

4.2.1.1 Summary of Technical Information in the Application

SLRA Section 4.2.1.1 and 4.2.1.2 describe the applicant’s neutron embrittlement TLAAs for the effects of neutron fluence on the RPV and RPV internals, respectively, projected over the 80-year subsequent period of extended operation. The applicant stated that it dispositioned these TLAAs in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analyses have been projected to the end of the subsequent period of extended operation.

4.2.1.2 Staff Evaluation

The NRC staff reviewed the applicant’s TLAAs for RPV and RPV internals neutron fluence and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii) consistent with the review procedures in SRP-SLR Section 4.2.3.1.1.

The applicant used the NRC-approved GEH Discrete Ordinates Transfer (DORT) methodology, based on the methodology in Licensing Topical Report (LTR) NEDC-32983P-A (ML072480125, non-publicly available) to develop the 80-year fluence projections and associated RPV embrittlement analyses. The applicant stated that these projections accounted for an Extended Power Uprate (EPU) and a 10 percent multiplier in the fluence projections to bound potential variations in cycle-to-cycle core loadings, fuel designs, etc.

The NRC staff reviewed the applicant’s use of historical reactor exposure data to update fluence projections from 60 years to 80 years to cover the subsequent period of extended operation. For Unit 2, the applicant projected 66.03 effective full power years (EFPY) in 80 years assuming the Unit operates at 100 percent capacity starting in operating cycle 28 until December 2049. For Unit 3, the applicant projected 66.89 EFPY in 80 years assuming the unit operates at 100 percent capacity starting in operating cycle 27 until January 2051. The applicant selected 67 EFPY as a conservative value to use for projecting the 80-year fluence values. The fluence projections serve as an input to the RPV neutron embrittlement analyses for beltline components, including analyses of upper-shelf energy (USE), adjusted reference temperature (ART), pressure-temperature (P-T) limits, circumferential and axial weld failure probability, and RPV re-flood thermal shock as described in Sections 4.2.2 through 4.2.7 of the SLRA.

The NRC staff reviewed the applicant’s use of the NRC-approved GEH DORT methodology, based on the methodology in Licensing Topical Report (LTR) NEDC-32983P-A as the basis for projecting the neutron fluence for these components to the end of the subsequent period of extended operation. In addition, the applicant stated that the methods and assumptions for projecting RPV neutron fluence for the beltline region are consistent with NRC RG 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence.”

The NRC staff reviewed the projections developed in DNPS’s 2005 license amendment request for updated P-T limit curves as approved in Amendments 217 and 209 and the 80-year projection updates based on these initial calculations to confirm the work was done consistent with the methods described in RG 1.190. The NRC staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that the analyses for the neutron fluence for the RPV and RPV internals have been projected to the end of the subsequent period of extended operation.

4.2.1.3 UFSAR Supplement

SLRA Sections A.4.2.1, A.4.2.2, and A.4.2.3 provide the UFSAR supplements summarizing the neutron fluence analyses for the RPV and RPV internals. The NRC staff reviewed SLRA Sections A.4.2.1, A.4.2.2, and A.4.2.3 consistent with the review procedures in SRP-SLR Section 4.2.3.1.1.

Based on its review, the NRC staff finds that the updated safety analysis report supplements meet the acceptance criteria in SRP-SLR Section 4.2.2.1.1 and are, therefore, acceptable. Additionally, the NRC staff finds that the applicant provided an adequate summary description of its actions to address the reactor vessel neutron fluence, as required by 10 CFR 54.21(d).

4.2.1.4 Conclusion

The NRC staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the analyses for the RPV and RPV internals neutron fluence have been projected to the end of the subsequent period of extended operation. The analyses performed by the applicant meet the acceptance criteria in SRP-SLR Section 4.2.2.1.1 as updated calculations, projected through 80 years or 67 EFPY, are provided to address the fluence effects during the subsequent period of extended operation. The evaluation was performed in accordance with methodology that has been approved or reviewed by the NRC. As a result, the applicant’s neutron fluence analyses provide adequate inputs to be used in further reviews to meet the requirements of 10 CFR 50.60, Appendix G to Part 50, and Appendix H to 10 CFR Part 50. The NRC staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.2 Reactor Pressure Vessel Upper-Shelf Energy Analyses

4.2.2.1 Summary of Technical Information in the Application

SLRA Section 4.2.2 describes the applicant’s TLAA for material embrittlement due to neutron fluence and its effect on fracture toughness. The applicant dispositioned the TLAA for the RPV in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analyses have been projected to the end of the subsequent period of extended operation.

4.2.2.2 Staff Evaluation

The NRC staff reviewed the applicant’s TLAA for material embrittlement due to neutron fluence and its effect on fracture toughness and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii), consistent with the review procedures in SRP-SLR Section 4.2.3.1.1.2.

During its audit and review, the NRC staff assessed the material property values (e.g., weight percent copper) for the RPV materials in SLRA Tables 4.2.2-3, 4.2.2-4, 4.2.2-5, 4.2.2-6, and 4.2.2-7 to confirm (1) the values were consistent with the CLB, (2) revisions to the CLB values are justified and appropriate, or (3) these values are justified and appropriate if the RPV materials were not previously addressed in the CLB. Based on its review and audit, the NRC staff verified that the material property values for the RPV materials contained in LRA Tables 4.2.2-1 through 4.2.2-7, were based on information from certified material test reports and fabrications records or consistent with the applicant’s CLB.

The NRC staff noted that the applicant used the Equivalent Margin Analysis (EMA) method to determine its CLB for the Charpy USE in DNPS because the units were designed and fabricated prior to current Appendix G of Section XI of the ASME Code requirements, so it is not possible to establish unirradiated USE values for beltline materials for the reactors. An EMA for the RPV materials at DNPS was necessary to demonstrate compliance with Appendix G to 10 CFR Part 50 for the subsequent period of extended operation.

The NRC staff noted that LRA Tables 4.2.2-1 through and 4.2.2-7 provide the EMA results and material-specific assessments for DNPS. The applicant used comparisons to surveillance materials found in BWRVIP-135, Rev. 4, to known chemistry (e.g., %Cu) in the limiting beltline plates and welds in the reactors to determine a predicted % decrease in USE for the limiting materials. The applicant applied RG 1.99 Rev. 2, Figure 2, to determine percent decrease in USE based on fluence and chemistry. The NRC staff reviewed the EMAs for the limiting RPV beltline plate materials using the methods approved in Appendix B of BWRVIP-74-A (ML031710354). Based on its review and audit, the NRC staff confirmed the following:

- The applicant performed an assessment consistent with the EMA methodology in BWRVIP-74-A
- The NRC staff confirmed that the DNPS results for 67 EFPY are within the 54 EFPY limits prescribed in BWRVIP-74-A
- The results of the limiting EMAs performed by the applicant for 67 EFPY meet the generic acceptance criteria for BWR EMAs and the RPV material-specific percent-drop in USE values that were previously approved by the NRC staff in BWRVIP-74-A.

Therefore, the NRC staff finds the applicant’s EMAs for 67 EFPY acceptable because the component-specific assessment for limiting RPV materials at DNPS are bounded by the generic EMAs approved for BWR plate materials in BWRVIP-74-A.

For the RPV materials without initial USE values, the NRC staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), through the use of EMAs, that these materials have margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code. Additionally, the TLAA meets the acceptance criteria in SRP-LR Section 4.2.2.1.1.2 because the USE analyses for these materials were evaluated consistent with, and shown to be bounded by, the results in the generic EMAs for domestic BWRs in BWRVIP-74-A when considering neutron fluence values for 80 years (i.e., 67 EFPY) for DNPS. Furthermore, the NRC staff finds that the applicant has demonstrated that the requirement in 10 CFR Part 50, Appendix G, for those RPV materials without initial USE values through an EMA will provide margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code.

4.2.2.3 UFSAR Supplement

SLRA Section A.4.2.4 provides the UFSAR supplement summarizing the USE analysis of RPV materials. The NRC staff reviewed SLRA Section A.4.2.4 consistent with the review procedures in SRP-SLR Section 4.2.3.1.1.2.

Based on its review, the NRC staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.2.2.1.1.2 and is, therefore, acceptable. Additionally, the NRC staff finds that the applicant provided an adequate summary description of its actions to address USE reduction in RPV materials due to neutron embrittlement, as required by 10 CFR 54.21(d).

4.2.2.4 Conclusion

Based on its review, the NRC staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the analyses for the USE of the RPV materials have been projected to the end of the subsequent period of extended operation. The NRC staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.3 Reactor Pressure Vessel Adjusted Reference Temperature Analyses

4.2.3.1 Summary of Technical Information in the Application

SLRA Section 4.2.3 describes the applicant's TLAA for its ART analyses related to the RPV materials. The ART of the limiting beltline material is used to adjust the beltline P-T limit curves to account for neutron irradiation effects. The applicant dispositioned the TLAA for the change in ART related to its RPV materials in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analysis has been projected to the end of the subsequent period of extended operation.

4.2.3.2 Staff Evaluation

The NRC staff reviewed the applicant's TLAA for its ART analyses related to the RPV materials and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii), consistent with the review procedures in SRP-SLR Section 4.7.3.1.2.

During its audit and review, the NRC staff assessed the material property values (e.g., initial RTNDT, weight percent copper, weight percent nickel) for the RPV materials in SLRA Tables 4.2.3-1, 4.2.3-2, 4.2.3-3, 4.2.3-4, to confirm (1) the values were consistent with the CLB, (2) revisions to the CLB values are justified and appropriate, or (3) determine if these values are justified and appropriate if the RPV materials were not previously addressed in the CLB. Based on its review and audit, the NRC staff verified that the material property values for the RPV materials contained in LRA Tables 4.2.3-1, 4.2.3-2, 4.2.3-3, 4.2.3-4, was based on information from certified material test reports and fabrication records or consistent with the applicant's CLB, except as noted below.

The NRC staff noted that SLRA Table 4.2.3-4 discuss the applicant's adjustment for ART for Heat No. A0610-1 (i.e., representative material for DNPS) when considering surveillance data. During its audit, the NRC staff verified the applicant's assessment of surveillance data contained in BWRVIP-135, Revision 4, was performed in accordance with RG 1.99, Revision 2, and as such, the NRC staff finds that the ART values at 67 EFPY identified by the applicant at the time of the LRA are appropriate for this representative material per BWRVIP-86, Rev. 1-A; however, since this material is not a heat-to-heat match for the target vessel materials at DNPS, the NRC staff noted that consistent with the NRC-approved BWRVIP Integrated Surveillance Program, the surveillance data will only be used for assessment of embrittlement trend correlations.

Based on its review, the NRC staff finds the material property values for the reactor pressure vessel materials in LRA Tables 4.2.3-1, 4.2.3-2, 4.2.3-3, 4.2.3-4 acceptable and appropriate for use in determining ART values at the 1/4 T (T = the wall thickness of the RPV beltline region) location through the end of the subsequent period of extended operation. Additionally, based on this confirmation, the NRC staff finds that the applicant applied the appropriate margin values consistent with RG 1.99, Revision 2, for each RPV material for the purpose of addressing ART.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that the ART analysis related to the RPV materials has been projected to the end of the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.2 because the ART analyses were reevaluated consistent with RG 1.99, Revision 2, when considering the neutron fluence values for 80 years (i.e., 67 EFPY). The staff noted that ART values for the RPV materials are used to adjust the PT limit curves to account for irradiation effects, which are evaluated in SE Section 4.2.4.

4.2.3.3 UFSAR Supplement

SLRA Section A.4.2.5 provides the UFSAR supplement summarizing the TLAA associated with the change in ART for the RPV materials due to neutron embrittlement. The staff reviewed SLRA Section A.4.2.5 consistent with the review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the change in ART for RPV materials due to neutron embrittlement, as required by 10 CFR 54.21(d).

4.2.3.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the analysis for the change in ART for RPV materials due to neutron embrittlement has been projected to the end of the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.4 Reactor Pressure Vessel Pressure-Temperature (p-T) Limits

4.2.4.1 Summary of Technical Information in the Application

SLRA Section 4.2.4 describes the applicant’s TLAA for analysis of the fracture toughness of the RPV to set P-T limits for operation. The applicant dispositioned the TLAA for the RPV in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of neutron embrittlement on the intended functions will be adequately managed by periodic 10 CFR 50.90 license amendment requests to update the technical specifications to amend the P-T limits as necessary for the subsequent period of extended operation.

4.2.4.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the P-T limits and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.2.3.1.4.3. SRP-SLR Section 4.2.3.1.4.3 states that updated P-T limits must be available prior to entering the period of extended operation and provides options for adequate aging management programs within the scope of 10 CFR 54.21(c)(1)(iii).

SLRA Section 4.2.4 states that the applicant will update the P-T limits located in the TSs during the subsequent period of extended operation prior to 54 EFPY, as currently required by TSs or by the pressure temperature limit report (PTLR) process and the plant's administrative section of the TSs (if a PTLR report has been approved at that time). The staff noted that the current revision of the P-T limits is applicable through 54 EFPY for DNPS, which was approved by the staff by letter dated October 17, 2005 (ML052570761).

Based on its review, and pursuant to 10 CFR 54.21(c)(1)(iii), the staff finds that the applicant has demonstrated that the effects of neutron embrittlement on the intended functions of the RPV will be adequately managed through the 10 CFR 50.90 process prior to the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.2.2.1.4.3 because proposed revisions to the P-T limits will be submitted, as necessary, in accordance with 10 CFR 50.90, which are not within the scope of this subsequent license renewal.

4.2.4.3 UFSAR Supplement

SLRA Section A.4.2.6 provides the UFSAR supplement summarizing the RPV P-T limits TLAA. The staff reviewed SLRA Section A.4.2.6 consistent with the review procedures in SRP-SLR Section 4.2.3.1.4.3.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.2.2.1.4.3 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to maintain operational limits due to neutron embrittlement, as required by 10 CFR 54.21(d).

4.2.4.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of neutron embrittlement on the intended functions of the RPV will be adequately managed by periodic 10 CFR 50.90 license amendment requests to update the TSs to amend the P-T limits, as necessary, for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.5 Reactor Pressure Vessel Circumferential Weld Failure Probability Analyses

4.2.5.1 Summary of Technical Information in the Application

SLRA Section 4.2.5 describes the applicant’s TLAA for the RPV circumferential weld failure probability analyses. The applicant dispositioned the TLAA for the RPV circumferential welds in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of loss of fracture toughness due to neutron irradiation on the intended functions of the RPV circumferential welds will be adequately managed by the 10 CFR 50.55a alternative process for the subsequent period of extended operation. Specifically, the applicant stated that relief from inspection of circumferential welds will be requested through a reapplication under the 10 CFR 50.55a process.

4.2.5.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the RPV circumferential welds and the corresponding disposition of the TLAA in accordance with 10 CFR Section 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.2.3.1.5.

The applicant used BWRVIP-329-A “BWR Vessel and Internals Project, Updated Probabilistic Fracture Mechanics Analyses for BWR RPV Welds to Address Extended Operations” (ML21343A411, proprietary) for the technical basis related to the reduction of inspections of reactor vessel circumferential welds for extended operations of up to 80 years. The applicant stated that plant-specific RPV dimensions for DNPS Units 2 and 3 were evaluated for the applicability criteria in Section 5.0 of BWRVIP-329-A, and that this evaluation confirmed that that the DNPS RPV dimensions are within the limits of the enveloping RPV dimensions in BWRVIP-329-A.

Additionally, the applicant explained that the end-of-interval (EOI) is defined as 80 years, which is equivalent to 67 EFPY for neutron fluence, and the limiting maximum reference temperatures (RT_{max}) at 67 EFPY were calculated using plant-specific material chemistry, initial unirradiated RT_{NDT}, and projected 80-year fluence values for the DNPS RPV plates and welds. The staff noted that the projected 80-year neutron fluence values are addressed in SLRA Section 4.2.2, and the plant-specific material chemistry and initial unirradiated RT_{NDT} values for the RPV materials are addressed in SLRA Section 4.2.3. The staff’s evaluation is documented in SE Sections 4.2.2 and 4.2.3, respectively. The staff noted that the EOI RT_{max} values, per BWRVIP-329-A, are determined by using the neutron fluence values at the RPV inner diameter (i.e., 0T location, where T is the wall thickness of the RPV), whereas the ART values documented in SLRA Section 4.2.3 are determined at ¼T location from the RPV inner diameter.

During its audit and based on the available information in SLRA Section 4.2.2 and 4.2.3, the staff confirmed that the following are the limiting RPV plate materials and circumferential welds at DNPS:

- Plate Material
  - Unit 2 – Shell Ring 2 Plate – ID 6-198-12 – Heat No. B-4065-1
  - Unit 3 – Shell Ring 2 Plate – ID 6-111-3 – Heat No. A0237-1
- Circumferential Welds
  - Unit 2 – Shell Ring 1 to Shell Ring 2 Girth/Circ Weld – Heat No. 71249/8504
  - Unit 3 – Shell Ring 1 to Shell Ring 2 Girth/Circ Weld – Heat No. 299L44/8650

During its audit, the staff assessed the applicant’s plant-specific EOI maximum reference temperature (RT_{max}) and relevant RPV dimensions to determine whether the RPVs of DNPS are enveloped by the limiting RT_{max} values established in BWRVIP-329-A. The staff confirmed that plant-specific RT_{max} values were calculated using plant-specific unirradiated initial RT_{NDT} (RT_{NDT}(U), °F), copper content (weight percent), nickel content (weight percent), and chemistry factor (CF, °F) based on 67 EFPY. The staff’s review of these material property values for RPV materials is documented in SE Section 4.2.3.

During the audit, the staff made the following confirmations and observations:

- The plant-specific RPV dimensions for DNPS are within the limits of applicability established in Table 5-1 of BWRVIP-329-A.
- The plant-specific EOI RT_{max} values for the limiting plate and circumferential weld for DNPS were calculated based on material properties of the RPV based on 67 EFPY.
- The plant-specific EOI RT_{max} values for the limiting plate and circumferential weld for DNPS were calculated consistent with the methods in BWRVIP-329-A.

- The plant-specific EOI RT_{max} values for the limiting plate and circumferential weld, for DNPS were less than the corresponding limiting RT_{max} value for plate materials and circumferential welds in BWRVIP-329-A.

The staff noted that this assessment of plant-specific EOI RT_{max} values compared to the limiting RT_{max} values established in BWRVIP-329-A provides the supporting technical basis should the applicant decide to pursue an alternative pursuant to 10 CFR 50.55a(z)(1) from the required ASME Code, Section XI examinations for the RPV circumferential welds during the subsequent period of extended operation.

Additionally, the staff noted that the purpose of BWRVIP-329-A, in part, was to use NRC safety goals and analysis procedures developed since the publication of BWRVIP-05 to update the evaluation procedure and acceptance criteria specified in BWRVIP-74-A for providing relief from examination of circumferential welds and assessing axial weld integrity. Furthermore, the staff noted that with respect to a licensee seeking a proposed alternative from the inservice inspection of the RPV circumferential welds, Renewal Applicant Action Item 11 of BWRVIP-74-A indicates, in part, that licensees must demonstrate that they have implemented operator training and established procedures that limit the frequency of cold overpressure events to the amount specified in the staff's July 28, 1998, final safety evaluation report for BWRVIP-05.

The staff noted that the submittal of a proposed alternative related to inspection of the circumferential welds of the RPV would be made by a licensee during the applicable 10-year inservice inspection interval for DNPS (i.e., seventh or eighth inservice inspection interval). The staff noted that a review of the licensee's operator training and established procedures that limit the frequency of cold overpressure events during the subsequent license renewal term would be associated with the licensee's submittal for an alternative to the inspection requirements in ASME Code, Section XI, in accordance with 10 CFR 50.55a.

Based on its review, and pursuant to 10 CFR 54.21(c)(1)(iii), the staff finds the applicant has demonstrated that the effects of loss of fracture toughness due to neutron irradiation on the intended functions of the RPV circumferential welds will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.2.2.1.5 because (1) the applicant met the applicability criteria of BWRVIP-329-A, provided plant-specific calculations to evaluate the safety significance of a postulated low temperature isothermal transient in BWR RPVs, and demonstrated that the NRC regulatory safety goals defined in BWRVIP-329-A were satisfied for the postulated transient, and (2) an alternative from the inspection of circumferential welds during the subsequent period of expended operation will be reviewed by the NRC staff if the applicant pursues such a request in accordance with 10 CFR 50.55a.

4.2.5.3 UFSAR Supplement

SLRA Section A.4.2.7 provides the UFSAR supplement summarizing the RPV circumferential weld failure probability TLAA. The staff reviewed SLRA Section A.4.2.7 consistent with the review procedures in SRP-SLR Section 4.2.3.2.

Based on its review, the staff finds the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.2.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the circumferential weld failure probability, as required by 10 CFR 54.21(d).

4.2.5.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of loss of fracture toughness due to neutron irradiation on the circumferential welds of the RPV will be adequately managed by the 10 CFR 50.55a process for alternatives to the ASME Code, Section XI, requirements during the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.6 Reactor Pressure Vessel Axial Weld Failure Probability Analyses

4.2.6.1 Summary of Technical Information in the Application

SLRA Section 4.2.6 describes the applicant’s TLAA for the RPV axial weld failure probability analyses. The applicant dispositioned the TLAA for the RPV axial welds in accordance with 10 CFR Section 54.21(c)(1)(ii) by demonstrating that the effects analysis has been projected to the end of the subsequent period of extended operation.

4.2.6.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the RPV axial welds and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii), consistent with the review procedures in SRP-SLR Section 4.2.3.1.6.

The applicant used BWRVIP-329-A for the technical basis related to its assessment of axial weld integrity for extended operations of up to 80 years. The applicant stated that plant-specific RPV dimensions for DNPS Units 2 and 3 were evaluated for the applicability criteria in Section 5.0 of BWRVIP-329-A, and this evaluation confirmed that that the DNPS RPVs are within the limits of the enveloping RPV dimensions in BWRVIP-329-A.

Additionally, the applicant explained that the EOI is defined as 80 years, which is equivalent to 67 EFPY for neutron fluence, and the limiting RT_{max} at 67 EFPY was calculated using plant-specific material chemistry, initial unirradiated RT_{NDT}, and projected 80-year fluence values for the DNPS Units 2 and 3 RPV plates and welds. The staff noted that the projected 80-year neutron fluence values are addressed in SLRA section 4.2.2, and the plant-specific material chemistry and initial unirradiated RT_{NDT} values for the RPV materials are addressed in SLRA Section 4.2.3. The staff’s evaluation is documented in SER Section 4.2.2 and 4.2.3, respectively. The staff noted that the EOI RT_{max} values, per BWRVIP-329-A, are determined by using the neutron fluence values at the RPV inner diameter (i.e., 0T location, where T is the wall thickness of the RPV), whereas the ART values documented in SLRA Section 4.2.3 are determined at ¼T location from the RPV inner diameter.

During its audit and based on the available information in SLRA Section 4.2.2 and 4.2.3, the staff confirmed that the following are the limiting RPV plate materials and axial welds at DNPS:

- Plate Material
  - Unit 2 – Shell Ring 2 Plate – ID 6-198-12 – Heat No. B-4065-1
  - Unit 3 – Shell Ring 2 Plate – ID 6-111-3 – Heat No. A0237-1

- Axial Welds
  - Unit 2 - Shell Ring 2 Axial Weld – Electroslag - Heat 34A167/3496
  - Unit 3 - Shell Ring 2 Axial Weld – Electroslag at 142°– Heat 34A167/3496

During its audit, the staff assessed the applicant's plant-specific EOI RT_{max} and relevant RPV dimensions to determine whether the RPVs of DNPS Units 2 and 3 are enveloped by the limiting RT_{max} values established in BWRVIP-329-A. The staff confirmed that plant-specific RT_{max} values were calculated using plant-specific unirradiated initial RT_{NDT} (RT_{NDT}(U), °F), copper content (weight percent), nickel content (weight percent), and chemistry factor (CF, °F) based on 67 EFPY. The staff's review these material property values for RPV materials is documented in SER Section 4.2.3.

During the audit, the staff made the following confirmations and observations:

- The plant-specific RPV dimensions for DNPS are within the limits of applicability established in Table 5-1 of BWRVIP-329-A.
- The plant-specific EOI RT_{max} values for the limiting plate and axial weld for DNPS were calculated based on material properties of the RPV based on 67 EFPY.
- The plant-specific EOI RT_{max} values for the limiting plate and axial weld for DNPS were calculated consistent with the methods in BWRVIP-329-A.
- The plant-specific EOI RT_{max} values for the limiting plate and axial weld for DNPS were less than the corresponding limiting RT_{max} value for plate materials and axial welds in BWRVIP-329-A.

Based on this review and pursuant to 10 CFR 54.21(c)(1)(ii), the staff finds the applicant has demonstrated that the failure probability analysis for the axial welds of the RPV has been projected to the end of the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.2.2.1.6 because the applicant:

- met the applicability criteria of BWRVIP-329-A
- provided plant-specific calculations to evaluate the safety significance of a postulated, low-temperature isothermal transient in BWR RPVs
- demonstrated that the NRC regulatory safety goals defined in BWRVIP-329-A are satisfied for the postulated transient through the subsequent period of extended operation

4.2.6.3 UFSAR Supplement

SLRA Section A.4.2.6 provides the UFSAR supplement summarizing the RPV axial weld failure probability TLAA. The staff reviewed SLRA Section A.4.2.6 consistent with the review procedures in SRP-SLR Section 4.2.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.2.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the axial weld failure probability, as required by 10 CFR 54.21(d).

4.2.6.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the effects of loss of fracture toughness due to neutron irradiation on the axial weld failure probability analyses have been adequately projected to the end of the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.7 Reactor Pressure Vessel Re-Flood Thermal Shock Analysis

4.2.7.1 Summary of Technical Information in the Application

SLRA Section 4.2.7 describes the applicant’s TLAA for protection against brittle fracture of the RPV during RPV re-flood thermal shock. The applicant dispositioned the TLAA for the RPV fracture toughness in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analysis has been projected to the end of the subsequent period of extended operation.

4.2.7.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for adequate RPV fracture toughness during RPV re-flood thermal shock and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii), consistent with the review procedures in SRP-SLR Section 4.2.3. The applicant’s analysis involves determination of the ART of the RPV steel, which is related to the fracture toughness. The analysis assumes that a pre-existing flaw with depth equal to one-fourth of the RPV thickness will initiate only if the steel temperature drops below the ART. The applicant compared the updated 80-year ART to the calculated steel temperature and found that margin existed. The methodology used for this analysis was reviewed and accepted by the NRC staff in Section 4.2.2.3 of NUREG-1796, “Safety Evaluation Report Related to the License Renewal of the DNPS, Units 2 and 3, and the Quad Cities Nuclear Power Station, Units 1 and 2” for the initial license renewal. Given the acceptable methodology and the projected ART, the staff concludes that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that the analysis for the RPV fracture toughness has been projected to the end of the subsequent period of extended operation.

4.2.7.3 UFSAR Supplement

SLRA Section A.4.2.9 provides the UFSAR supplement summarizing the analysis for adequate RPV fracture toughness during RPV reflood thermal shock. The staff reviewed SLRA Section A.4.2.9 consistent with the review procedures in SRP-SLR Section 4.2.3.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.2.3 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the analysis for adequate RPV fracture toughness during RPV reflood thermal shock, as required by 10 CFR 54.21(d).

4.2.7.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the analysis for adequate RPV fracture toughness during RPV re-flood thermal shock has been projected to the end of the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.8 Core Shroud Reflood Thermal Shock Analysis

4.2.8.1 Summary of Technical Information in the Application

SLRA Section 4.2.8 describes the applicant’s TLAA for protection against failure of the core shroud during a thermal shock transient. The applicant dispositioned the TLAA for the core shroud ductility in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.2.8.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for protection against failure of the core shroud during a thermal shock transient and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.2.3. The applicant’s analysis involves determination of the maximum projected 80-year fluence at the core shroud inner surface. The applicant determined that the 80-year fluence value (5.25×10^{20} n/cm^2 for DNPS Unit 2 and 5.21×10^{20} n/cm^2 for DNPS Unit 3) remains less than the fluence threshold for 20 percent strain of $1{\times}10^{21}$ n/cm^2. The methodology of this analysis was reviewed and accepted by the NRC staff in Section 4.2.1.4 of NUREG-1796, “Safety Evaluation Report Related to the License Renewal of the DNPS, Units 2 and 3, and the Quad Cities Nuclear Power Station, Units 1 and 2” for the initial license renewal. Given the acceptable methodology and the projected fluence value that remains below the threshold, the staff concludes that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for protection against failure of the core shroud during a thermal shock transient remains valid for the subsequent period of extended operation.

4.2.8.3 UFSAR Supplement

SLRA Section A.4.2.10 provides the UFSAR supplement summarizing the analysis for adequate core shroud ductility during a thermal shock transient. The staff reviewed SLRA Section A.4.2.10 consistent with the review procedures in SRP-SLR Section 4.2.3.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.2.3 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the analysis for adequate core shroud ductility during a thermal shock transient, as required by 10 CFR 54.21(d).

4.2.8.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for protection against failure of the core shroud during a thermal shock transient remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.9 Jet Pump Beam Bolt, and Access Hole Cover Bolt Preload Relaxation Analyses

4.2.9.1 Summary of Technical Information in the Application

SLRA Section 4.2.9 describes the applicant's TLAA for loss of preload due to irradiation of the Units 2 and 3 RPV jet pump beam bolts and the Unit 2 access hole cover bolts. The applicant dispositioned the TLAA for the DNPS Units 2 and 3 RPV jet pump beam bolt and DNPS Unit 2 access hole cover bolt preload relaxation analyses in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the subsequent period of operation.

4.2.9.2 Staff Evaluation

The staff reviewed the applicant's TLAA for loss of preload due to irradiation of the DNPS Units 2 and 3 RPV jet pump beam bolts and the Unit 2 access hole cover bolts, and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1. These SRP-SLR criteria permit the staff to accept the TLAA in accordance with the criterion in 10 CFR 54.21(c)(1)(i) if the staff can verify that the time-dependent parameter, as expected at the end of the subsequent period of operation for the applicable system, structure, or component assessed in the analysis, is less than that assumed for the time-dependent parameter in the original design analysis. The time-dependent parameter that is applicable to the preload evaluation of the DNPS Units 2 and 3 RPV jet pump beam bolts and the DNPS Unit 2 access hole cover bolts is the neutron fluence exposure at the end of the subsequent period of extended operation.

The staff noted that, as described in SLRA Section 4.2.1, to evaluate loss of preload for the subsequent period of extended operation, the applicant used neutron fluence projections for 80 years at a projected 67 EFPY. The staff's review of the neutron fluence projections of the reactor vessel internals through the subsequent period of extended operation is documented in SE Section 4.2.1.

Based on its review and audit, the staff confirmed that the applicant's maximum projected 80-year fluence value for the RPV jet pump beam bolts are 1.18E19 n/cm^2 and 1.17E19 n/cm^2 for DNPS Units 2 and 3, respectively, and for the DNPS Unit 2 access hole cover bolts are 1.37E19 n/cm^2.

The staff noted that this analysis provides sufficient demonstration that the neutron fluence for the DNPS RPV jet pump beam bolts at 67 EFPY is bounded by the neutron fluence value in the original design analysis (i.e., 1.27E19 n/cm^2). Additionally, the staff noted that this analysis provided sufficient demonstration that the neutron fluence for the DNPS Unit 2 access hole cover bolts at 67 EFPY is bounded by the neutron fluence value in the original design analysis (i.e., 9.00E19 n/cm^2).

Therefore, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the DNPS RPV jet pump beam bolts and the Unit 2 access hole cover bolts remain valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because: the applicant has demonstrated that:

(1) The neutron fluence for the DNPS RPV jet pump beam bolts and the Unit 2 access hole cover bolts, as projected to 67 EFPY, is bounded by the neutron fluence assumed in the original design analysis.

(2) The TLAA will remain valid for the subsequent period of extended operation.

4.2.9.3 UFSAR Supplement

SLRA Section A.4.2.11 provides the UFSAR supplement summarizing the TLAA for loss of preload due to irradiation of the DNPS Units 2 and 3 RPV jet pump beam bolts and the DNPS Unit 2 access hole cover bolts. The staff reviewed SLRA Section A.4.2.11 consistent with review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the loss of preload due to irradiation of the DNPS Units 2 and 3 RPV jet pump beam bolts and the DNPS Unit 2 access hole cover bolts TLAA, as required by 10 CFR 54.21(d).

4.2.9.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses for the loss of preload due to irradiation of the DNPS Units 2 and 3 RPV jet pump beam bolts and the DNPS Unit 2 access hole cover bolts remain valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.10 Jet Pump Auxiliary Wedge Assembly Loss of Preload Analysis

4.2.10.1 Summary of Technical Information in the Application

SLRA Section 4.2.10 describes the applicant’s TLAA for loss of preload due to irradiation of the DNPS jet pump auxiliary wedge assembly. The applicant dispositioned the TLAA for the jet pump auxiliary wedge assembly loss of preload analysis in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the subsequent period of operation.

4.2.10.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the loss of preload due to irradiation of the DNPS jet pump auxiliary wedge assembly and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

SLRA Section 4.2.10 states that the jet pump assemblies have had auxiliary wedge assemblies installed to maintain lateral support for the jet pump inlet mixer and were installed in DNPS jet pumps. Furthermore, the applicant stated that all auxiliary wedge assemblies will have in-service times of over 40 years at the end of the subsequent period of extended operation. During its audit, the staff confirmed that the original design analysis for the DNPS jet pump auxiliary wedge assembly addressed loss of preload and considered a neutron fluence of 1.40E20 n/cm^2, which is consistent with the information provided in SLRA Sections 4.2.10 and A.4.2.12.

The staff noted that, as described in SLRA Section 4.2.1, to evaluate loss of preload for the subsequent period of extended operation, that applicant used neutron fluence projections for

80 years at a projected 67 EFPY. The staff's review of the neutron fluence projections of the reactor vessel internals through the subsequent period of extended operation is documented in SE Section 4.2.1. Based on its review and audit, the staff confirmed that the applicant's maximum projected 80-year fluence value at the limiting auxiliary wedge assembly is 2.80E18 n/cm^2 and 2.78E18 n/cm2 for Units 2 and 3, respectively.

Therefore, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for loss of preload due to irradiation of the Units 2 and 3 jet pump auxiliary wedge assembly remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because the applicant has demonstrated that its original design analysis for the auxiliary wedge assemblies remains valid during the subsequent period of extended operation. Specifically, loss of preload of the DNPS jet pump auxiliary wedge assembly due to exposure to neutron fluence in the original design analysis bounds the projected neutron fluence exposure of these components through the subsequent period of extended operation.

4.2.10.3 UFSAR Supplement

SLRA Section A.4.2.12 provides the UFSAR supplement summarizing the TLAA for loss of preload analysis for the DNPS jet pump auxiliary wedge assembly. The staff reviewed SLRA Section A.4.2.12 consistent with review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address loss of preload for the DNPS jet pump auxiliary wedge assembly, as required by 10 CFR 54.21(d).

4.2.10.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for loss of preload of the DNPS jet pump auxiliary wedge assembly remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.11 Unit 2 Jet Pump Riser Repair/Mitigation Clamps Loss of Preload Analysis

4.2.11.1 Summary of Technical Information in the Application

SLRA Section 4.2.11 describes the applicant's TLAA for loss of preload due to irradiation of the DNPS Unit 2 jet pump riser repair/mitigation clamp. The applicant dispositioned the TLAA for the DNPS Unit 2 jet pump riser repair/mitigation clamp loss of preload analysis in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the subsequent period of operation .

4.2.11.2 Staff Evaluation

The staff reviewed the applicant's TLAA for the loss of preload due to irradiation of the DNPS Unit 2 jet pump riser repair/mitigation clamp and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

SLRA Section 4.2.11 explained that a crack was detected in the jet pump riser brace (JPRB) on the DNPS Unit 2 jet pump 9 side of the jet pump 9/10 riser. As a result, a mechanical clamping system designed to structurally replace the affected weld was installed in the JPRB during the fall 2003 refueling outage, and mitigation clamps were installed on the other 19 JPRBs. During its audit, the staff confirmed that the original design analysis for the Unit 2 JPRBs addressed loss of preload and considered a neutron fluence of 5E20 n/cm^2, which is consistent with the information provided in SLRA Sections 4.2.11 and A.4.2.13.

The staff noted that, as described in SLRA Section 4.2.1, to evaluate loss of preload for the subsequent period of extended operation, the applicant used neutron fluence projections for 80 years at a projected 67 EFPY. The staff's review of the neutron fluence projections of the reactor vessel internals through the subsequent period of extended operation is documented in SE Section 4.2.1. Based on its review and audit, the staff confirmed that the applicant's maximum projected 80-year fluence value at the limiting Unit 2 JPRB clamp location is 2.43E17 n/cm^2.

Therefore, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the loss of preload to due irradiation of the DNPS Unit 2 jet pump riser repair/mitigation clamp remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because the applicant has demonstrated that its original design analysis for the JPRBs remains valid during the subsequent period of extended operation. Specifically, loss of preload of the DNPS Unit 2 jet pump riser repair/mitigation clamp due to exposure to neutron fluence in the original design analysis bounds the projected neutron fluence exposure of these components through the subsequent period of extended operation.

4.2.11.3 UFSAR Supplement

SLRA Section A.4.2.13 provides the UFSAR supplement summarizing the TLAA for loss of preload analysis for the DNPS Unit 2 jet pump riser repair/mitigation clamp. The staff reviewed SLRA Section A.4.2.13 consistent with review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the loss of preload for the DNPS Unit 2 jet pump riser repair/mitigation clamp, as required by 10 CFR 54.21(d).

4.2.11.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the loss of preload of the DNPS Unit 2 jet pump riser repair/mitigation clamp remain valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.12 Core Spray Replacement Piping Bolting Loss of Preload Evaluation

4.2.12.1 Summary of Technical Information in the Application

SLRA Section 4.2.12 describes the applicant's TLAA for core spray replacement piping bolting loss of preload evaluation. The applicant dispositioned the TLAA for the core spray replacement piping bolting in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.2.12.2 Staff Evaluation

The staff reviewed the applicant's TLAA for core spray replacement piping bolting loss of preload evaluation and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

The applicant evaluated DNPS Unit 3 in 2007,and DNPS Unit 2 in 2009, for bolting preload loss in the replacement core spray piping using the GEH design report. During its audit, the staff noted that GEH confirmed that the original design analysis for the core spray replacement piping bolt considered a conservative fluence of 1.4E+19 n/cm^2 over a 60-year service life, which is consistent with the information provided in SLRA Sections 4.2.12 and A.4.2.12.

The staff noted that, as described in SLRA Section 4.2.1, the applicant used neutron fluence projections for 80 years at a projected 67 EFPY. The staff's review of the neutron fluence projections through the subsequent period of extended operation is documented in SE Section 4.2.1. The analysis determined that the most limiting bolting would experience fluence of 8.02E+18 n/cm^2, which remains significantly below the original design assumption.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the core spray replacement piping bolting remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2 because the original analysis remains valid for the entire subsequent period of extended operation without requiring modification or further assessment.

4.2.12.3 UFSAR Supplement

SLRA Section A.4.2.14 provides the UFSAR supplement summarizing the core spray replacement piping bolting loss of preload evaluation. The staff reviewed SLRA Section A.4.2.14 consistent with the review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address Core Spray Replacement Piping Bolting Loss of Preload Evaluation as required by 10 CFR 54.21(d).

4.2.12.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to10 CFR 54.21(c)(1)(i), that the analysis for the Core Spray Replacement Piping Bolting Loss of Preload Evaluation remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.2.13 Core Shroud Repair Stabilizer Assembly Bracket Preload Relaxation Analysis

4.2.13.1 Summary of Technical Information in the Application

SLRA Section 4.2.13 describes the applicant's TLAA for loss of preload due to irradiation of the DNPS core shroud repair stabilizer assembly bracket. The applicant dispositioned the TLAA for the core shroud repair stabilizer assembly bracket loss of preload analysis in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the subsequent period of operation.

4.2.13.2 Staff Evaluation

The staff reviewed the applicant's TLAA for loss of preload due to irradiation of the DNPS core shroud repair stabilizer assembly bracket and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

SLRA Section 4.2.13 states that in-vessel inspections found linear indications in the horizontal core shroud welds, determined to be caused by intergranular stress corrosion cracking. As a result, a core shroud repair was designed to structurally replace the core shroud's horizontal welds H1 through H7 and provide vertical clamping forces on the shroud and installed on Unit 2 in 1995 and Unit 3 in 1997. The applicant explained that the design consists of four tie rod stabilizer assemblies, which are installed 90° apart in the core shroud/RPV annulus, between attachment points at the top of the core shroud head flange and core shroud support plate. During its audit, the staff confirmed that the original design analysis for the DNPS Units 2 and 3 core shroud repair stabilizer assembly bracket accounted for preload relaxation and considered a neutron fluence of 3.12E20 n/cm^2, which is consistent with the information provided in SLRA Section 4.2.13 and A.4.2.15.

The staff noted that, as described in SLRA Section 4.2.1, to evaluate loss of preload for the subsequent period of extended operation, the applicant used neutron fluence projections for 80 years at a projected 67 EFPY. The staff's review of the neutron fluence projections of the reactor vessel internals through the subsequent period of extended operation is documented in SE Section 4.2.1. Based on its review and audit, the staff confirmed that the applicant's peak projected 80-year fluence value (i.e., 67 EFPY) at the shroud stabilizer tie rod and spring fluence projections are less than the original design analysis for Units 2 and 3.

Therefore, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the loss of preload due to irradiation of the Units 2 and 3 core shroud repair stabilizer assembly bracket remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because the applicant has demonstrated that its original design analysis for the Units 2 and 3 core shroud repair stabilizer assembly bracket remains valid during the subsequent period of extended operation. Specifically, the loss of preload of the DNPS Units 2 and 3 core shroud repair stabilizer assembly bracket due to exposure to neutron fluence in the original design analysis bounds the projected neutron fluence exposure of these components through the subsequent period of extended operation.

4.2.13.3 UFSAR Supplement

SLRA Section A.4.2.15 provides the UFSAR supplement summarizing the TLAA for loss of preload analysis for the DNPS Units 2 and 3 core shroud repair stabilizer assembly bracket. The staff reviewed SLRA Section A.4.2.15 consistent with review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the loss of preload for the DNPS Units 2 and 3 core shroud repair stabilizer assembly bracket as required by 10 CFR 54.21(d).

4.2.13.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the loss of preload of the DNPS Units 2 and 3 core shroud repair stabilizer assembly bracket remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3 Metal Fatigue Analyses

4.3.1 Transient and Cumulative Usage Projections for 80 Years

4.3.1.1 Summary of Technical Information in the Application

SLRA Section 4.3.1, as amended by letter dated April 10, 2025, describes the applicant's 80-year transient cycle and cumulative usage projections. The applicant performed cycle projections based on the actual cycles up to December 31, 2022, for DNPS Unit 2 and June 30, 2022, for DNPS Unit 3. These 80-year projected cycles are used as inputs to the fatigue TLAAs described in SLRA Sections 4.3.2 through 4.3.7. The cumulative usage projections include the 80-year projections for CUF and CUF_{en} values. The applicant determined that the 80-year cycle projections, including the associated cumulative usage projections, are not a TLAA because the projected cycles are used as inputs to fatigue TLAAs and the specific evaluations and dispositions of the fatigue TLAAs are separately addressed in SLRA Sections 4.3.2 through 4.3.7.

4.3.1.2 Staff Evaluation

The staff noted that SLRA Section 4.3.1 only addresses the 80-year cycle projections for design transients, including the associated projections of CUF and CUF_{en} values, respectively. The related fatigue TLAAs, which use these transient cycle projections, are separately addressed in SLRA Sections 4.3.2 (Class 1 fatigue analyses), 4.3.3 (environmentally assisted fatigue analyses), 4.3.4 (Class 1 fatigue waiver analyses), 4.3.5 (allowable stress and associated high-energy line break analyses), 4.3.6 (reactor vessel internal fatigue analyses) and 4.3.7 (fatigue analysis of the isolation condensers).

The staff agreed with the applicant's evaluation that the 80-year cycle projections, including the associated projections of CUF and CUF_{en} values, are not a fatigue TLAA by themselves, because these projections are used as inputs to fatigue TLAAs and the specific evaluations and dispositions of the TLAAs are separately discussed in SLRA Section 4.3.2 through 4.3.7. Accordingly, this section documents the staff's evaluation of the adequacy of 80-year transient cycle and cumulative usage projections.

The applicant explained that the intent of the design basis transient definitions is to bound a wide range of possible events with varying ranges of severity in temperature and pressure. The applicant also indicated that the existing fatigue analyses are based upon the number of transient occurrences (cycles) postulated to bound 60 years of service, making them a TLAA. In addition, the applicant stated that the projections of the transient cycles through the subsequent period of extended operation were developed to determine whether the existing analyses remain valid for 80 years. The staff noted that these transient occurrences and projections are documented in SLRA Tables 4.3.1-1 and 4.3.1-2 for DNPS Units 2 and 3, respectively.

The staff also noted that, based on the 80-year cycle projections, the applicant estimated the 80-year CUF and CUF_{en} values for the limiting locations of ASME Code Section III, Class 1 components, as described in SLRA Table 4.3.1-3. The staff further noted that the 80-year CUF and CUF_{en} values were compared to the fatigue design limit (1.0). The staff finds that all 80-year projected CUF and CUF_{en} values in SLRA Table 4.3.1-3 adequately meet the fatigue design limit.

With respect to the 80-year cycle projections, the applicant stated that a review of fatigue monitoring data (SLRA Section B.3.1.1) was performed to identify the cumulative transient cycles for each transient that occurred at DNPS Units 2 and 3 up to December 31, 2022, and June 30, 2022, respectively. The applicant also indicated that linear cycle projections are performed based on the actual cycle data.

The applicant further explained that, since most nuclear power plants, including DNPS Units 2 and 3, have experienced a significant declining trend in accumulation of transients over time, transient cycle projections based on recent operating experience provides an accurate basis for future projections. Therefore, in the determination of the cycle accumulation rate for the projections of the transients that have current cycles greater than zero, the applicant used a weighting factor of 0.75 for the most recent 10-year cycle accumulation rate and a weighting factor of 0.25 for the overall cycle accumulation rate (i.e., cycle accumulation rate since the plant operation).

The staff finds that the applicant's approach for cycle and cumulative usage projections for the transients that have current cycles greater than zero is reasonable because:

(1) The cycle and cumulative usage projections are based on the actual transient cycles that were accumulated since the start of the plant operation including the most recent 10-year cycle data.

(2) In the cycle projections, a greater weighting factor is applied for the most recent 10-year cycle accumulation rate compared to the weighting factor for the long-term cycle accumulation rate (i.e., cycle accumulation rate since the start of plant operation).

(3) The applicant's approach is consistent with industry operating experience that the more recent cycle data better represents the future cycle projections.

In addition, the applicant explained that DNPS Units 2 and 3 have not experienced some of the design transients (e.g., "sudden start of recirculation loop" and "core spray injection (emergency)" transients) in SLRA Tables 4.3.1-1 and 4.3.1-2. For each transient that has never occurred, the applicant has assumed one occurrence. The staff finds that the applicant's approach to calculating cycle and cumulative usage projections for transients that have never occurred to date is reasonable because the applicant conservatively assumed one occurrence for each of these transients.

SLRA Section 4.3.1, as supplemented by the response to RAI 4.3.1-1 dated April 10, 2025, further discusses the potential impact of the 80-year projected cycles of the Unit 2 "turbine roll and increase to rated power" transient and the Units 2 and 3 "main steam fill during flood-up" transient that exceed the design cycles. The applicant clarified that these transients are not applicable to, and thus do not affect the validity of, the fatigue TLAAs dispositioned per 10 CFR 54.21(c)(1)(i) (i.e., fatigue TLAAs in SLRA Sections 4.3.7 and 4.7.5). The staff finds the applicant's conclusion that these transients do not affect the validity of the fatigue TLAAs dispositioned per 10 CFR 54.21(c)(1)(i) to be acceptable because these transients are not applicable to the fatigue TLAAs dispositioned per 10 CFR 54.21(c)(1)(i).

As discussed above, the staff finds that the applicant performed adequate projections of transient cycles and cumulative usage values based on actual transient cycle data. The staff's evaluations of the fatigue TLAAs and associated TLAA dispositions are documented in Sections 4.3.2 through 4.3.7 of this SE. In addition, the staff's evaluation of the plant-specific fatigue TLAA for the Unit 2 core spray replacement piping and associated TLAA disposition is documented in Section 4.7.5 of this SE.

4.3.1.3 UFSAR Supplement

SLRA Section A.4.3.1 provides the UFSAR supplement summarizing the 80-year transient cycle and cumulative usage projections. The staff reviewed SLRA Section A.4.3.1, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. The staff also finds that the applicant provided an adequate summary description to address the transient cycle and cumulative usage projections for 80 years of operation, as required by 10 CFR 54.21(d).

4.3.1.4 Conclusion

On the basis of its review, the staff concludes that the applicant's 80-year transient cycle and cumulative usage projections are based on the actual transient cycle data; therefore, these projections are reasonable for use in the fatigue analyses for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the 80-year cycle and cumulative usage projections, as required by 10 CFR 54.21(d).

4.3.2 ASME Section III, Class 1 Fatigue Analyses

4.3.2.1 Summary of Technical Information in the Application

SLRA Section 4.3.2 describes the applicant's fatigue TLAAs for ASME Code Section III, Class 1 components. The fatigue analyses include the CUF analyses for the Class 1 reactor vessel and piping systems such as recirculation, core spray and residual heat removal piping systems. The fatigue analyses for 80 years of operation indicate that the 80-year projected CUF values for the Class 1 components do not exceed the fatigue design limit (i.e., 1.0).

The applicant dispositioned the Class 1 fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) to demonstrate that the effects of cumulative fatigue damage on the intended functions of the Class 1 components will be adequately managed by the Fatigue Monitoring AMP for the subsequent period of extended operation. The Fatigue Monitoring AMP will be used to ensure that the CUF values for the Class 1 components do not exceed the design limit of 1.0.

4.3.2.2 Staff Evaluation

The staff reviewed the applicant's fatigue TLAAs for ASME Code Section III, Class 1 components and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.3.3.1.1.3.

The applicant explained that as part of the DNPS's initial license renewal the Class 1 fatigue analyses, which were part of design analyses, were evaluated for environmentally assisted fatigue (EAF). The applicant indicated that these 60-year fatigue evaluations serve as the CLB and have been identified as TLAAs for 80 years of operation. The staff finds that the applicant described an adequate basis of the identification of Class 1 fatigue analyses as TLAAs, consistent with the CLB.

The applicant also explained that the Class 1 fatigue analyses are based on the transient cycles listed in SLRA Tables 4.3.1-1 and 4.3.1-2. The staff noted that SLRA Table 4.3.1-3 documents the 80-year projected CUF and CUF_{en} values for the limiting locations based on the 80-year transient cycle projections. The staff finds that the 80-year projected CUF and CUF_{en} values for the limiting locations continue to meet the fatigue design limit (1.0) for the subsequent period of extended operation and, therefore, are acceptable.

With respect to the aging management related to the Class 1 fatigue analyses, the applicant proposed to use the Fatigue Monitoring AMP (SLRA Section B.3.1.1) to manage the aging effect of cumulative fatigue damage. The staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles, which are used as the input to the CUF calculations, and performs corrective actions as needed (e.g., repair and replacement activities and refinement of fatigue analyses) to ensure that the CUF values will not exceed the fatigue design limit of 1.0 (SE Section 3.0.3.2.24). The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of cumulative fatigue damage because it is consistent with the SRP-SLR Section 4.3.2.1.1.3. The staff's evaluation of the applicant's Fatigue Monitoring AMP is documented in SE Section 3.0.3.2.24.

As discussed above, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage on the intended functions of the Class 1 components will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.3.2.1.1.3 because the Fatigue Monitoring AMP is adequate to manage the effects of cumulative fatigue damage.

4.3.2.3 UFSAR Supplement

SLRA Section A.4.3.2 provides the UFSAR supplement summarizing the Class 1 fatigue analyses. The staff reviewed SLRA Section A.4.3.2, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. The staff also finds that the applicant provided an adequate summary description to address the fatigue TLAAs for the ASME Code Section III, Class 1 components, as required by 10 CFR 54.21(d).

4.3.2.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage on the intended functions of the ASME Code Section III, Class 1 components will be adequately managed by the Fatigue Monitoring AMP for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.3 Environmental Fatigue Analyses for RPV and Class 1 Piping

4.3.3.1 Summary of Technical Information in the Application

SLRA Section 4.3.3, as supplemented by letters dated April 10, 2025, and May 8, 2025, describes the EAF TLAAs for the RPV and ASME Code Section III Class 1 piping. The EAF analyses consider the EAF locations described in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components" and additional plant-specific locations that may be more limiting than the NUREG/CR-6260 locations. In the EAF analyses, the CUF_{en} value is calculated in accordance with NUREG/CR-6909, Revision 1, "Effect of LWR Water Environments on the Fatigue Life of Reactor Materials."

The applicant dispositioned the EAF TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of EAF on the intended functions of the RPV and Class 1 piping will be adequately managed by the Fatigue Monitoring AMP (SLRA Section B.3.1.1).

4.3.3.2 Staff Evaluation

The staff reviewed the EAF TLAAs and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.3.3.1.2.3.

The applicant performed EAF analyses on the RPV and piping locations that are described for an old-vintage BWR plant, such as DNPS, in NUREG/CR-6260. The staff finds that the applicant adequately included the NUREG/CR-6260 locations in the EAF analyses, consistent with the guidance in SRP-SLR 4.3.2.1.2. The staff also finds that the CUF_{en} calculations for the NUREG/CR-6260 locations were performed in accordance with NUREG/CR-6909, Revision 1, which is approved in RG 1.207, Revision 1, "Guidelines for Evaluating the Effects of Light-Water Reactor Water Environments in Fatigue Analyses of Metal Components" and, therefore, are acceptable.

In addition, the applicant performed an EAF screening evaluation to identify additional plant-specific locations that may be more limiting than the NUREG/CR-6260 locations in terms of CUF_{en}. The limiting EAF locations (also called bounding or sentinel locations) determined in the screening evaluation are described in SLRA Table 4.3.1-3. SLRA Section 4.3.3 discusses the applicant's approach for the EAF screening evaluation.

The staff finds that the overall approach for the screening evaluation to determine the limiting EAF locations is reasonable because of the following:

(1) Each thermal zone evaluated in the screening evaluation is defined as a collection of component locations that undergo essentially the same temperature and pressure transients during the plant operation such that the comparison of the CUF_{en} values in each thermal zone can result in relevant and comprehensive selections of limiting EAF locations.

(2) If the thermal zone contains multiple material types, the limiting location is determined for each material type.

(3) Within each material type in a thermal zone, the location with the highest CUF_{en} is selected as the limiting location.

(4) The location with the second highest CUF_{en} is also selected if the second highest CUF_{en} is within 25 percent of the highest CUF_{en} in the screening evaluation.

SLRA Section 4.3.3, as supplemented by the response to RAI 4.3.3-2 dated April 10, 2025, also provides information on the materials of the limiting EAF locations. The staff finds the applicant's supplemental information acceptable because it clarifies the specific materials of fabrication for the limiting EAF locations and the associated thermal zones.

SLRA Section 4.3.3, as supplemented by the response to RAI 4.3.3-1 dated April 10, 2025, explains how the applicant determined the bounding CUF_{en} values in the screening evaluation to determine the limiting EAF locations. The staff finds the applicant's approach acceptable because the following conservative approach is used in the screening evaluation:

(1) The lowest strain rate described in NUREG/CR-6909, Revision 1 is used for each material type.

(2) The maximum temperature in each thermal zone is used.

(3) The maximum value of the sulfur content parameter (S*) described in NUREG/CR-6909, Revision 1 is used for the components fabricated with carbon or low-alloy steel.

(4) The applicant's approach for the screening evaluation conservatively results in the maximum contribution of the strain rate, sulfur content, and temperature to the environmental effect on fatigue.

The applicant also performed the more detailed EAF analysis to refine the CUF_{en} values that involve excessive conservatism in the screening evaluation discussed above. The staff's evaluation of the detailed EAF analysis is documented below.

SLRA Section 4.3.3, as supplemented by the response to RAI 4.3.3-1 dated April 10, 2025, describes the applicant's overall approach of the detailed EAF analysis to remove the excessive conservatism associated with the CUF_{en} values after the screening evaluation. The staff finds that the overall approach for the detailed analysis is acceptable because of the following:

(1) The detailed analysis uses the 80-year projected transient cycles representing the actual cycle accumulation rates rather than the conservative 80-year design cycles used in the screening evaluation (e.g., 40-year design cycles scaled by a factor of 2.0.

(2) The temperature of each specific transient is considered in the detailed analysis rather than the maximum temperature of each thermal zone used in the screening evaluation.

In addition, SLRA Section 4.3.3, as supplemented by the response to RAI 4.3.3-3 dated May 8, 2025, discusses the average temperature approach for the detailed EAF analysis that uses the average temperature of the transient maximum temperature and the higher of the transient minimum temperature and the threshold temperature for environmental fatigue correction factor (F_{en}) for each material type below which the effect of EAF is insignificant.

The staff finds that the applicant's average temperature approach is acceptable because:

(1) The average temperature approach is adequate for simple, linear transients, as discussed in NUREG/CR-6909, Revision 1 and most of the applicant's transients evaluated in the EAF analyses are simple, linear transients.

(2) The applicant's approach uses the lowest (bounding) strain rate value for each material type described in NUREG/CR-6909, Revision 1 in the determination of the environmental fatigue effect in the detailed EAF analysis so that the approach conservatively considers the maximum contribution of the strain rate to the environmental fatigue effect.

(3) By using an actual complex transient, the applicant's plant-specific demonstration confirms that the average temperature approach estimates a higher conservative F_{en} value than the modified rate approach discussed in NUREG/CR-6909, Revision 1, Section 4.4 that considers the more detailed strain rate increments and associated temperatures as a function of time during the transient.

(4) The most limiting component in the EAF analyses (i.e., feedwater nozzle subject to complex transients) has an 80-year projected CUF_{en} value less than 0.5 so that there is a large margin greater than 2.0 against the fatigue design limit (1.0), as described in SLRA Table 4.3.1-3.

(5) The applicant will continue to perform periodic inspections on the feedwater nozzle (the most limiting component) to ensure the structural integrity for the subsequent period of extended operation, as described in SLRA Sections 4.7.4 and B.2.1.1.

Based on the evaluation above, the staff finds that the applicant adequately refined the CUF_{en} values in the detailed EAF analysis because the refined CUF_{en} values were calculated in accordance with NUREG/CR-6909, Revision 1, consistent with SRP-SLR Section 4.3.2.1.2.

With respect to aging management, the applicant indicated that the effects of EAF on the intended functions of the RPV and Class 1 piping will be managed by the Fatigue Monitoring AMP (SLRA Section B.3.1.1). The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of EAF because the program monitors the transient cycles, which are used as the input to the CUF_{en} calculations, and performs corrective actions as needed (e.g., repair and replacement of components and refinement of CUF_{en} calculations) to ensure that the CUF_{en} values meet the fatigue design limit (1.0), consistent with SRP-SLR Section 4.3.2.1.2.3.

As discussed above, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of EAF on the intended functions of the RPV and Class 1 piping will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.3.2.1.2.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of EAF, consistent with the guidance in SRP-SLR Section 4.3.2.1.2.3.

4.3.3.3 UFSAR Supplement

SLRA Section A.4.3.3 provides the UFSAR supplement summarizing the EAF analyses for the RPV and Class 1 piping. The staff reviewed SLRA Section A.4.3.3, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. The staff also finds that the applicant provided an adequate summary description to address the EAF TLAAs for the RPV and Class 1 piping, as required by 10 CFR 54.21(d).

4.3.3.4 Conclusion

Based on its review, the staff concludes the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of EAF on the intended functions of the RPV and Class 1 piping will be adequately managed by the Fatigue Monitoring AMP for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.4 ASME Section III, Class 1 Fatigue Waivers

4.3.4.1 Summary of Technical Information in the Application

SLRA Section 4.3.4, as amended by letter dated April 10, 2025, describes the applicant's fatigue waiver TLAAs for ASME Code Section III, Class 1 RPV components. The fatigue waiver analyses were performed in accordance with ASME Code Section III, paragraph N-415.1. The applicant dispositioned the fatigue waiver TLAAs in accordance with 10 CFR 54.21(c)(1)(ii) to demonstrate that the analyses have been projected to the end of the subsequent period of extended operation.

4.3.4.2 Staff Evaluation

The staff reviewed the applicant's fatigue waiver TLAAs for the ASME Code Section III Class 1 components and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(ii), consistent with the review procedures in SRP-SLR Section 4.3.3.1.1.2.

The applicant explained that ASME Code Section III, paragraph N-415.1 describes the provisions for a fatigue waiver. The applicant also explained that the design stress reports for the RPVs of DNPS Units 2 and 3 determined that some RPV components did not require explicit fatigue analyses in accordance with the provisions in ASME Code Section III, paragraph N-415.1. SLRA Table 4.3.4-1 lists the RPV components that are subject to the fatigue waiver TLAAs.

In addition, SLRA Section 4.3.4 and Table 4.3.4-2, as amended by letter dated April 10, 2025, confirm that the transient cycles assumed in the fatigue waiver reevaluations for 80 years of operation are greater than or equal to the 80-year projected cycles for the RPV components. The applicant indicated that the "overpressure to 1,375 psig" transient is the only transient for which the number of cycles assumed in the fatigue waiver reevaluations is equal to the number of 80-year projected cycles. The applicant also indicated that this transient has not occurred in DNPS Units 2 and 3, as described in SLRA Tables 4.3.1-1 and 4.3.1-2, respectively. The applicant conservatively assumed the number of 80-year projected cycles for this transient to be one cycle even though this transient has not occurred. For the other transients, the transient cycles assumed in the fatigue waiver reevaluations are greater than the 80-year projected cycles. Accordingly, the staff noted that the applicant demonstrated that the RPV components subject to the fatigue waiver analyses continue to meet the fatigue waiver provisions in ASME Code Section III, paragraph N-415.1 due to the 80-year projected cycles that do not exceed the transient cycles assumed in the fatigue waiver reevaluations for 80 years of operation.

The staff finds that the fatigue waiver TLAAs for 80 years of operation is acceptable because:

(1) The 80-year cycle projections are based on actual cycle data as discussed in Section 4.3.1 of the SLRA.

(2) The 80-year projected cycles for the RPV components subject to the fatigue waiver analyses do not exceed the transient cycles assumed in the fatigue waiver reevaluations for 80 years of operation.

(3) The fatigue waiver reevaluations meet the fatigue waiver criteria in ASME Code Section III, paragraph N-415.1.

As discussed above, for the ASME Code Section III Class 1 components subject to the fatigue waiver analyses, the staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that the fatigue waiver analyses have been projected to the end of the subsequent period of extended operation. Additionally, the fatigue waiver TLAAs meet the acceptance criteria in SRP-SLR Section 4.3.2.1.1.2 because the applicant demonstrated that the fatigue waiver analyses continue to meet the fatigue waiver criteria in ASME Code Section III, paragraph N-415.1 for the subsequent period of extended of operation, consistent with the guidance in SRP-SLR Section 4.3.2.1.1.2.

4.3.4.3 UFSAR Supplement

SLRA Section A.4.3.4 provides the UFSAR supplement summarizing the fatigue waiver TLAAs for the ASME Code Section III, Class 1 components. The staff reviewed SLRA Section A.4.3.4 consistent with the review procedures in SRP-SLR Section 4.3.3.2. \

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of the fatigue waiver TLAAs for the ASME Code Section III, Class 1 components, as required by 10 CFR 54.21(d).

4.3.4.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the Class 1 fatigue waiver analyses have been projected to the end of the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.5 ASME Section III, Class 2 & 3, and ANSI B31.1 Allowable Stress Analyses and Associated HELB Analyses

4.3.5.1 Summary of Technical Information in the Application

SLRA Section 4.3.5, as amended by letter dated April 10, 2025, describes the allowable stress TLAAs for the ASME Code Section III, Class 2 and 3, and ANSI B31.1 piping systems (also called non-Class 1 piping systems). The piping systems are not required to have an explicit analysis of CUF, but cyclic loading is considered in a simplified manner in the design process to determine if a stress range reduction factor less than 1.0 is required. In addition, the high-energy line break (HELB) location selection for the non-Class 1 piping systems is based on the criterion that involves the cycle-dependent stress range reduction factor and allowable stress range for thermal expansion.

The applicant dispositioned the TLAAs on the non-Class 1 allowable stress and associated HELB location selection in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the period of extended operation.

4.3.5.2 Staff Evaluation

The staff reviewed the allowable stress TLAAs and related HELB location selection (postulation) TLAAs for the non-Class 1 piping systems and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.3.3.1.1.1. The allowable stress TLAAs are also called implicit fatigue TLAAs.

The applicant indicated that the DNPS has piping systems that were designed in accordance with the ASME Code Section III Class 2 or 3, or ANSI B31.1 design rules. These non-Class 1 piping systems are not required to have an explicit fatigue analysis that involves calculations of CUF values per the provisions of ASME Code Section III for Class 1 piping systems. Instead, implicit fatigue analyses are performed based on the number of equivalent full temperature cycles and the corresponding stress range reduction factor.

If the total number of the transient cycles is 7,000 or less, a stress range reduction factor of 1.0 is applied to the allowable stress range for expansion stress, which means the allowable stress range does not need to be reduced because of cyclic loading and, therefore, the existing stress analyses for non-Class 1 piping systems will continue to be valid for 80 years of operation. If the total number of transient cycles is greater than 7,000, a stress range reduction factor less than 1.0 is applied to the allowable stress range, as discussed in SLRA Table 4.3.5-1.

The applicant explained that some of the non-Class 1 piping systems or lines (e.g., main steam and extraction steam piping) are affected only by the same pressure and temperature transients as the reactor coolant system transients that are listed in SLRA Tables 4.3.1-1 and 4.3.1-2. The applicant also indicated that the summation of all 80-year cycle projections from SLRA Tables 4.3.1-1 and 4.3.1-2 is less than 2,200 cycles (occurrences).

The staff finds that the applicant’s evaluation for the non-Class 1 piping systems or lines, which are only affected by the reactor coolant system transients, is acceptable, and the existing allowable stress TLAAs remain valid for the subsequent period of extend operation because:

- The number of 80-year projected cycles does not exceed 7,000 cycles.

- There is no need to apply a stress range reduction factor less than 1.0 because the 80-year estimated cycles are less than 7,000 cycles.

In addition, the applicant explained that the other non-Class 1 piping systems and lines are affected by transients different from the reactor coolant system transients. The applicant provided the 80-year estimated transient cycles for these non-Class 1 piping systems and lines in SLRA Table 4.3.5-2.

SLRA Section 4.3.5, as supplemented by the response to RAI 4.3.5-1 dated April 10, 2025, discusses how the applicant estimated the 80-year transient cycles for the non-Class 1 piping systems and lines that are affected by the transients that are different from the reactor coolant system transients. The staff finds that the applicant's approach for estimating the 80-year cycles for these non-Class 1 piping systems and lines is acceptable, and the existing allowable stress TLAAs remain valid for the subsequent period of extended operation because:

- The applicant's cycle projections used the relevant information such as piping system design information, UFSAR information, surveillance and inspection schedules, maintenance history, test requirements, and specific transient cycles for the piping per unit time period (e.g., annual cycles).
- The 80-year estimated cycles are less than 7,000 cycles such that there is no need to reduce the existing stress range reduction factor (i.e., 1.0).

In addition, the applicant explained that the HELB location selection for the non-Class 1 piping systems is based on the criterion that involves the cycle-dependent stress range reduction factor and allowable stress range for thermal expansion. Accordingly, the applicant identified that the analyses for the non-Class 1 HELB location postulation are TLAAs based on the time-dependency of the stress range reduction factor and associated criterion for HELB location selection. Based on the 80-year cycle estimations discussed above, the applicant dispositioned the HELB location selection for the non-Class 1 piping systems in accordance with 10 CFR 54.21(c)(1)(i).

The staff finds that the non-Class 1 HELB location selection remains valid for the subsequent period of extended operation and the applicant's TLAA evaluation regarding the non-Class 1 HELB location selection is acceptable because:

- The applicant demonstrated that the number of transient cycles estimated for 80 years of operation does not exceed 7,000 cycles.
- There is no need to reduce the existing stress range reduction factor (1.0).

As discussed above, and pursuant to 10 CFR 54.21(c)(1)(i), the staff finds the applicant has demonstrated that the TLAAs on the allowable stress and related HELB location selection for the non-Class 1 piping systems remain valid for the subsequent period of extended operation. Additionally, the TLAAs meet the acceptance criteria in SRP-SLR Section 4.3.2.1.1.1 because the applicant demonstrated that the estimated transient cycles for 80 years of operation are bounded by 7000 cycles such that the allowable stress and HELB location selection TLAAs remain valid for the subsequent period of extended operation.

4.3.5.3 UFSAR Supplement

SLRA Section A.4.3.5 provides the UFSAR supplement summarizing the TLAAs on the allowable stress and HELB location selection for the non-Class 1 piping systems. The staff reviewed SLRA Section A.4.3.5, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the allowable stress and HELB location selection TLAAs for the non-Class 1 piping systems, as required by 10 CFR 54.21(d).

4.3.5.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the allowable stress and HELB location selection TLAAs remain valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.6 Reactor Pressure Vessel Internals Fatigue Analyses

4.3.6.1 Summary of Technical Information in the Application

SLRA Section 4.3.6, as amended by letter dated May 8, 2025, describes the applicant’s fatigue TLAAs for RPV internals (also called reactor vessel internals). The applicant dispositioned the fatigue TLAA for the Unit 2 and Unit 3 reactor vessel core shroud supports in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of cumulative fatigue damage on the intended functions of the components will be managed by the Fatigue Monitoring AMP (SLRA Section B.3.1.1). In addition, the applicant dispositioned the fatigue analysis for the Unit 2 JPRB repair and vibration mitigation clamps in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analysis has been projected to the end of the subsequent period of extended operation.

4.3.6.2 Staff Evaluation

The staff reviewed the applicant’s fatigue TLAA for the Unit 2 and Unit 3 core shroud supports and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.3.3.1.2.3. The staff also reviewed the applicant’s fatigue TLAA for the Unit 2 JPRB repair and vibration mitigation clamps and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii), consistent with the review procedures in SRP-SLR Section 4.3.3.1.1.2.

With respect to the core shroud supports, the applicant explained that the 80-year projected environmentally adjusted CUF_{en} values of the Unit 2 and Unit 3 core shroud supports are 0.302 and 0.284, respectively, as described in SLRA Table 4.3.1-3. The staff noted that the limiting location of the component is the weld location of the shroud support leg to the reactor vessel and is part of the reactor vessel pressure boundary. Accordingly, the applicant performed an EAF analysis for this limiting location of the core shroud. The applicant proposed to use the Fatigue Monitoring AMP to manage the aging effect of cumulative fatigue damage associated with the fatigue TLAA.

The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of cumulative fatigue damage because the program monitors the transient cycles that are used as input to the calculations of CUF_{en} for the core shroud supports and performs corrective actions as needed (e.g., revision of fatigue analysis and component repair/replacement activities) to ensure that the CUF_{en} values do not exceed the fatigue design limit (1.0).

With respect to the Unit 2 JPRB clamps, the applicant explained that in the fall 2001 refueling outage, a crack was detected in the riser brace for Unit 2 jet pumps 9 and 10. The applicant also explained that a mechanical clamp designed to structurally replace the affected weld was installed in 2003 and that a thermal fatigue analysis was performed based on the 40-year cycles of the startup transient.

In addition, the applicant indicated that the CUF for the repair clamp is 0.04 for 40-year service life. To bound the subsequent license renewal period for Unit 2 ending in 2049, the applicant estimated the 50-year CUF to be 0.05 by multiplying the 40-year CUF by a factor of 50/40. The staff noted that the 50-year projected CUF corresponds to the fatigue analysis period up to 2053 that sufficiently covers the end of 80 years of operation).

SLRA Section 4.3.6, as supplemented by the response to RAI 4.3.6-1 dated May 8, 2025, also discusses the Unit 2 JPRB repair and vibration mitigation clamps and the applicability of the fatigue TLAA to the vibration mitigation clamps. The staff finds that the applicant's fatigue analysis for the Unit 2 JPRB repair and vibration mitigation clamps is acceptable because of the following:

(1) The specific JPRB weld on which one repair clamp was installed is the upper "leaf brace to block" weld on the jet pump 9 side of the JPRB (RB-4b weld).

(2) In the same 2003 refueling outage, vibration mitigation clamps were installed on the remaining 19 upper and lower leaf pairs of the Unit 2 JPRB to mitigate vibration concerns.

(3) The fatigue analysis in SLRA Section 4.3.6 is applied to the vibration mitigation clamps as well as the repair clamp.

(4) The applicant conservatively projected the existing fatigue analysis to bound the service of the clamps through the subsequent period of extended operation.

(5) The 50-year projected CUF (0.05) for the JPRB clamps is significantly less than the fatigue design limit (1.0).

As discussed above and pursuant to 10 CFR 54.21(c)(1)(iii), the staff finds the applicant has demonstrated that the effects of cumulative fatigue damage on the intended functions of the Unit 2 and Unit 3 core shroud supports will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.3.2.1.2.3 because the applicant will use the Fatigue Monitoring AMP for managing the effects of cumulative fatigue damage.

As discussed above, and pursuant to 10 CFR 54.21(c)(1)(ii), the staff also finds the applicant has demonstrated that the fatigue analysis for the Unit 2 JPRB repair and vibration mitigation clamps has been projected to the end of the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.3.2.1.1.2 because the applicant adequately estimated the CUF value through the subsequent period of extended operation, and the projected CUF value meets the fatigue design limit (1.0) with a large margin.

4.3.6.3 UFSAR Supplement

SLRA Sections A.4.3.6 through A.4.3.8, as amended by letter dated May 8, 2025, provide the UFSAR supplement summarizing the fatigue TLAAs for the reactor vessel internal components. The staff reviewed SLRA Sections A.4.3.6 through A.4.3.8, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. The staff also finds that the applicant provided an adequate summary description of its actions to address the fatigue TLAAs for the reactor vessel internal components, as required by 10 CFR 54.21(d).

4.3.6.4 Conclusion

Based on its review, the staff concludes the following for the reactor vessel internals fatigue analyses:

(1) Pursuant to 10 CFR 54.21(c)(1)(iii), the applicant has provided an acceptable demonstration that the effects of cumulative fatigue damage on the intended functions of the Unit 2 and Unit 3 core shroud supports will be adequately managed by the Fatigue Monitoring AMP for the subsequent period of extended operation.

(2) Pursuant to 10 CFR 54.21(c)(1)(ii), the applicant has provided an acceptable demonstration that the fatigue analysis for the Unit 2 JPRB repair and vibration mitigation clamps has been projected to the end of the subsequent period of extended operation.

The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.7 Fatigue Analysis of the Isolation Condensers

4.3.7.1 Summary of Technical Information in the Application

SLRA Section 4.3.7, as amended by letter dated April 28, 2025, describes the fatigue TLAA for the isolation condensers. As described in SLRA Table 4.3.1-3, the 80-year projected CUF and CUF_{en} values of the limiting locations (also called bounding locations) of the isolation condensers are less than 0.4. The applicant dispositioned the fatigue TLAA for the isolation condensers in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of cumulative fatigue damage on the intended functions of the isolation condensers will be adequately managed by the Fatigue Monitoring AMP (SLRA Section B.3.1.1).

4.3.7.2 Staff Evaluation

The staff reviewed the fatigue TLAA for the isolation condensers and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.3.3.1.2.3.

The applicant explained that the DNPS isolation condensers provide core cooling when the RPV becomes isolated from the turbine and the main condenser. The applicant also indicated that a fatigue analysis of the isolation condensers was performed as part of original component design and that the 40-year CUF values for the isolation condenser components are less than the fatigue design limit (1.0).

In addition, the applicant explained that an EAF analysis was performed for the isolation condensers and the 80-year projected CUF and environmentally adjusted CUF values of the limiting (bounding) locations are less than 0.4, as described in SLRA Table 4.3.1-3. The staff finds that the 80-year CUF and CUF_{en} values of the liming locations of the isolation condensers meet the fatigue design limit (1.0).

With respect to aging management, the applicant indicated that the effects of cumulative fatigue damage, including EAF, on the intended functions of the isolation condensers will be managed by the Fatigue Monitoring AMP (SLRA Section B.3.1.1). The staff finds that the applicant’s use of the Fatigue Monitoring AMP is adequate to manage the effects of EAF because the program monitors the transient cycles that are used as input to the CUF and CUF_{en} calculations, and requires that corrective actions are performed as needed (e.g., repair and replacement of components and refinement of CUF_{en} calculations) to ensure that the CUF and CUF_{en} values meet the fatigue design limit (1.0), consistent with SRP-SLR Section 4.3.2.1.2.3.

As discussed above, and pursuant to 10 CFR 54.21(c)(1)(iii), the staff finds the applicant has demonstrated that the effects of cumulative fatigue damage on the intended functions of the isolation condenser will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.3.2.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of cumulative fatigue damage including EAF, consistent with the guidance in SRP-SLR Section 4.3.2.1.2.3.

4.3.7.3 UFSAR Supplement

SLRA Section A.4.3.9, as amended by letter dated April 28, 2025, provides the UFSAR supplement summarizing the fatigue TLAA for the isolation condensers. The staff reviewed SLRA Section A.4.3.9, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the fatigue TLAA for the isolation condensers, as required by 10 CFR 54.21(d).

4.3.7.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage, including EAF, on the intended functions of the isolation condensers will be adequately managed by the Fatigue Monitoring AMP for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.4 Environmental Qualification of Electrical Equipment

4.4.1 Summary of Technical Information in the Application

SLRA Section 4.4 describes the applicant's TLAA for environmental qualification (EQ) of electric equipment for the subsequent period of extended operation. Thermal, radiation, and cyclic aging analyses of plant electrical and instrumentation and control components required to meet 10 CFR 50.49 requirements, have been identified as a TLAA. The applicant dispositioned the TLAA for the EQ of electric equipment in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of EQ of electric components on the intended functions will be adequately managed by the Environmental Qualification of Electric Equipment program for the subsequent period of extended operation.

4.4.2 Staff Evaluation

The staff reviewed the applicant's TLAA for the EQ of electric equipment and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.4.3.1.3.

The EQ requirements established by 10 CFR 50.49 require each applicant to establish a program to qualify electrical equipment so that such equipment, in its end-of-life condition, will meet its performance specifications during and following design-basis accidents. An EQ of electric equipment important to safety, in accordance with the requirements of 10 CFR 50.49, is considered an adequate AMP for the purposes of license renewal. Electrical and instrumentation components in the applicant's EQ program identified as having a qualified life equal to, or greater than, the current operating term (i.e., 60 years) are considered a TLAA for subsequent license renewal. The applicant's EQ program manages the effects of thermal, radiation, and cyclic aging using aging evaluation based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49(e)(5), EQ components are refurbished, replaced, or their qualification is extended prior to reaching the aging limit established in the evaluation.

The staff reviewed SLRA Section 4.4 and the associated program basis documents to determine if the applicant's EQ program meets the requirement of 10 CFR 54.21(c)(1). The applicant's EQ program is implemented per the requirements of 10 CFR 54.21(c)(1)(iii) to show that components evaluated under the applicant's TLAA evaluation are adequately managed during the subsequent period of operation. The staff's evaluation of the applicant's EQ of Electric Equipment AMP is documented in SE Section 3.0.3.2.25.

The staff also reviewed the applicant's EQ program reanalysis attributes evaluation and concluded that it is consistent with SRP-SLR Section 4.4.3.1.3 and SRP-SLR Table 4.4-1. Reanalysis of an aging evaluation addresses attributes of analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, ongoing qualification, and corrective action (if acceptance criteria are not met). The applicant noted that EQ components not qualified for the current license term are to be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation.

The staff finds the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of thermal, radiation, and cyclical aging on the intended functions of the plant electrical and instrumentation components located in harsh environments, qualified to meet 10 CFR 50.49 requirements, will be adequately managed for the subsequent period of extended operation.

Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.4.2.1.3 because the EQ program is capable of programmatically managing the qualified life of components within the scope of program for license renewal and that the continued implementation of the EQ program in accordance with 10 CFR 50.49 provides assurance that the aging effects will be managed and that environmentally qualified electric components will continue to perform their intended functions for the subsequent period of extended operation consistent with the requirements of 10 CFR 54.21(c)(1)(iii).

4.4.3 UFSAR Supplement

SLRA Section A.4.4 provides the UFSAR supplement summarizing the EQ of electric equipment. The staff reviewed SLRA Section A.4.4 consistent with the review procedures in SRP-SLR Section 4.4.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.4.3.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address EQ of electric equipment, as required by 10 CFR 54.21(d).

4.4.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of thermal, radiation, and cyclic aging on the intended functions of the plant electrical and instrumentation and control components required to meet 10 CFR 50.49 will be adequately managed by the Environmental Qualification of Electric Equipment program for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.5 Concrete Containment Tendon Prestress Analysis

SLRA Section 4.5 describes the applicant’s disposition for the concrete containment tendon prestress forces for the subsequent period of extended operation as not a TLAA because the DNPS containment does not have pre-stressed tendons. The NRC staff agrees that this topic is not a TLAA.

4.6 Primary Containment Fatigue Analyses

SLRA Section 4.6 provides the applicant’s evaluation of the DNPS Units 2 and 3 primary containment fatigue TLAAs for the subsequent period of extended operation. The SLRA states that the original design of DNPS Units 2 and 3 primary containment was in accordance with the ASME Code, Section III, 1965 Edition, including 1965 Summer Addenda.

4.6.1 Fatigue Analysis of the Torus Shell and Welds

4.6.1.1 Summary of Technical Information in the Application

SLRA Section 4.6.1 describes the applicant’s TLAA for fatigue of the torus shell and welds. The applicant dispositioned the TLAAs for the torus shell and welds in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions will be adequately managed by the SLRA B.3.1.1 “Fatigue Monitoring Program” for the subsequent period of extended operation.

4.6.1.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for fatigue of the torus shell and welds and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.3 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.3.

The staff noted from the SLRA that the fatigue analyses of the torus shell and welds, documented in the DNPS Plant Unique Analysis Report (PUAR), considered the following limiting transients for both 40 years and 60 years: 300 safety relief valve (SRV) actuations per valve (with all 5 SRVs actuating together), 600 operating basis earthquake (OBE) cycles (5 OBE events with 120 cycles each from SLRA Tables 4.3.1-1 and 4.3.1-2), and50 SRV actuations during small break loss-of-coolant accident (LOCA). The staff noted the resulting maximum calculated CUF values were 0.50 for the torus shell and 0.80 for the torus shell weld, which are less than the acceptance criteria of 1.0. From SLRA Table 4.3.1-3, the limiting 80-year projected CUF values, based on actual transient occurrences monitored by the Fatigue Monitoring Program for components 30 and 32, are 0.257 and 0.562, respectively. The actual transient occurrences are not expected to exceed the acceptance criteria of 1.0 prior to the end of the subsequent period of extended operation.

The staff also noted from the SLRA that the projected cumulative fatigue usage for the torus shell and welds will be managed by the Fatigue Monitoring program, (SLRA B.3.1.1) which uses SI:FatiguePro software to monitor fatigue transient cycles of bounding primary containment locations, computing CUF-to-date values based on cumulative fatigue transient occurrences as of the monitoring date. The staff further noted that the Fatigue Monitoring program will track transient cycles for the transients listed in SLRA Tables 4.3.1-1 and 4.3.1-2, including SRV actuations and OBE events applicable to this TLAA. Monitoring fatigue transient cycles under the Fatigue Monitoring program provides reasonable assurance that corrective action will be initiated when CUF values reach 80 percent of the acceptance criteria of 1.0. The staff evaluation of the Fatigue Monitoring Program is documented in SE Section 3.0.3.2.24. The staff concludes that the applicant has identified an acceptable AMP, consistent with SRP-SLR acceptance criteria, to adequately manage cumulative fatigue damage of the torus shell and welds and supports the TLAA disposition in accordance with 10 CFR 54.21(c)(1)(iii).

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage on the intended functions of the fatigue of torus shell and welds will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.3 because, consistent with the TLAA acceptance criterion in 10 CFR 54.21(c)(1)(iii), the applicant has proposed the Fatigue Monitoring Program to manage the effects of cumulative fatigue damage due to cyclic loading on the intended functions of the fatigue of the torus shell and welds during the subsequent period of extended operation.

4.6.1.3 UFSAR Supplement

SLRA Section A.4.6.1 provides the UFSAR supplement summarizing the torus shell and welds fatigue evaluation. The staff reviewed SLRA Section A.4.6.1 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address cumulative fatigue damage of the torus shell and welds, as required by 10 CFR 54.21(d).

4.6.1.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage on the intended functions of the torus shell and welds will be adequately managed by the Fatigue Monitoring Program for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.6.2 Fatigue Analysis of the Drywell-to-Torus Vents and Vent Headers to Downcomers

4.6.2.1 Summary of Technical Information in the Application

SLRA Section 4.6.2 describes the applicant's TLAA for fatigue of the drywell-to-torus vents and vent headers to downcomers. The applicant dispositioned the TLAA for the drywell-to-torus vents and vent headers to downcomers in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions will be adequately managed by the Fatigue Monitoring AMP for the subsequent period of extended operation.

4.6.2.2 Staff Evaluation

The staff reviewed the applicant's TLAA for fatigue of the drywell-to-torus vents and vent headers to downcomers, and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.3 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.3.

The staff noted from the SLRA that the fatigue analyses of the torus vents, including the vent headers to downcomers, as documented in the DNPS PUAR, considered the following limiting transient for both 40 years and 60 years: 1,000 OBE cycles occurring with 50 SRV actuations during small break LOCA. The staff noted the resulting CUF values for bounding components were 0.92 for the vent header and 0.26 for the for the vent header to downcomer stiffener plate weld, which are less than the acceptance criteria of 1.0. From SLRA Table 4.3.1-3 (Component 31), the limiting 80-year projected CUF value based on actual transient occurrences monitored by the Fatigue Monitoring Program for the bounding vent header location is 0.518.The limiting 80-year projected CUF value is not expected to exceed the acceptance criteria of 1.0 prior to the end of the subsequent period of extended operation.

The staff also noted from the SLRA that the projected CUF for the torus vent header location, which bounds the vent header to downcomer stiffener plate weld, will be managed by the Fatigue Monitoring program, which use SI:FatiguePro software to monitor fatigue transient cycles of bounding primary containment locations (vent header location in this case), computing CUF-to-date values based on cumulative fatigue transient occurrences as of the monitoring date. The staff further noted that the Fatigue Monitoring program will track transient cycles for the transients listed in SLRA Tables 4.3.1-1 and 4.3.1-2, including SRV actuations and OBE events applicable to this TLAA. Monitoring fatigue transient cycles under the Fatigue Monitoring program provides reasonable assurance that corrective action will be initiated when CUF values reach 80 percent of the acceptance criteria of 1.0. The staff evaluation of the Fatigue Monitoring Program is documented in SE Section 3.0.3.2.24. The staff concludes that the applicant has identified an acceptable AMP, consistent with SRP-SLR acceptance criteria, to adequately manage cumulative fatigue damage of the drywell-to-torus vents and vent headers to downcomers that supports the TLAA disposition, in accordance with 10 CFR 54.21(c)(1)(iii).

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage on the intended functions of the fatigue of drywell-to-torus vents and vent headers to downcomers will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.3 because, consistent with the TLAA acceptance criterion in 10 CFR 54.21(c)(1)(iii), the applicant has proposed the Fatigue Monitoring Program to manage the effects of cumulative fatigue damage on the intended functions of the drywell-to-torus vents and vent headers to downcomers during the subsequent period of extended operation.

4.6.2.3 UFSAR Supplement

SLRA Section A.4.6.2 provides the UFSAR supplement summarizing the fatigue evaluation of the drywell-to-torus vents and vent headers to downcomers. The staff reviewed SLRA Section A.4.6.2 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address cumulative fatigue damage of the drywell-to-torus vents and vent headers to downcomers, as required by 10 CFR 54.21(d).

4.6.2.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cumulative fatigue damage on the intended functions of the drywell-to-torus vents and vent headers to downcomers will be adequately managed by the Fatigue Monitoring Program for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.6.3 Fatigue Analysis of SRV Discharge Piping Inside the Torus, External Torus Attached Piping, and Associated Penetrations

4.6.3.1 Summary of Technical Information in the Application

SLRA Section 4.6.3 describes the applicant's TLAA for fatigue of the DNPS Units 2 and 3 SRV discharge piping inside the torus, external torus attached piping, and associated penetrations. The applicant dispositioned the TLAA for the SRV discharge piping inside the torus, external torus attached piping, and associated penetrations in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.6.3.2 Staff Evaluation

The staff reviewed the applicant's TLAA in SLRA Section 4.6.3 for fatigue of the SRV discharge piping inside the torus, external torus attached piping, and associated penetrations and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.1 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1.

The staff noted that the DNPS SRV discharge piping inside the torus, external torus attached piping, and associated penetrations were evaluated for the original 40-year life using an NRC-approved generic fatigue analysis for Class 2 and 3 piping that assumed 800 SRV actuations per valve. The staff also noted that only the SRV load cases contribute to fatigue during normal operation. From SLRA Tables 4.3.1-1 and 4.3.1-2, the staff noted that the maximum 80-year projection of SRV actuations for any valve is 75. Because the 800 actuations assumed in the generic analysis is significantly higher than the projected SRV actuations for 80 years, the staff verified the analysis remains valid for the subsequent period of extended operation.

The staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses for fatigue of the DNPS SRV discharge piping inside the torus, external torus attached piping, and associated penetrations remain valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1 because the number of occurrences and severities of assumed cyclic loads are not projected to be exceeded during the subsequent period of extended operation.

4.6.3.3 UFSAR Supplement

SLRA Section A.4.6.3 provides the UFSAR supplement summarizing the fatigue evaluation for the DNPS SRV discharge piping inside the torus, external torus attached piping, and associated penetrations. The staff reviewed SLRA Section A.4.6.3 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address fatigue of the DNPS SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines, as required by 10 CFR 54.21(d).

4.6.3.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the effects of cumulative fatigue damage on the intended functions of the DNPS Units 2 and 3 SRV discharge piping inside the torus, external torus attached piping, and associated penetrations remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluations, as required by 10 CFR 54.21(d).

4.6.4 SRV Discharge Line Penetrations at the Drywell-to-Torus Vent Lines and Associated Sections of the SRV Discharge Lines

4.6.4.1 Summary of Technical Information in the Application

SLRA Section 4.6.4 describes the applicant's TLAA for fatigue of the DNPS Units 2 and 3 SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines. The applicant dispositioned the TLAA for the SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.6.4.2 Staff Evaluation

The staff reviewed the applicant's TLAA in SLRA Section 4.6.4 for fatigue of the Class MC SRV discharge lines penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines, and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.1 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1.

The staff noted that the fatigue analyses of the DNPS Class MC SRV discharge lines penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines identified the bounding analyses by considering two cases. For the Class MC portions of SRV discharge lines at the drywell-to-torus vent line penetrations, the staff noted the analysis assumed 220 SRV actuations for 40 years resulting in a maximum CUF of 0.09. From SLRA Tables 4.3.1-1 and 4.3.1-2, the staff noted that the maximum 80-year projection of SRV actuations for any valve is 75, which is less than the 220 actuations assumed in the analysis. For the Class MC penetration components and attachments, the staff noted the analysis assumed 220 SRV actuations with five pressure cycles per actuation plus 4,050 cycles due to condensation oscillations or chugging (LOCA conditions) resulting in a CUF of less than 0.4 which is below the acceptance criteria of 1.0. From SLRA Tables 4.3.1-1 and 4.3.1-2, the staff noted that the maximum 80-year projection of SRV actuations for any valve is 75. Since this is less than the 220 SRV actuations assumed in the analyses and a LOCA condition has not occurred, the number of transient cycles considered in the existing analyses bounds the expected cycles for the subsequent period of extended operation. Because the CUF in both cases is less than 1.0 and the projected SRV actuations for 80 years is less than that assumed in the CUF evaluation, the staff verified the analysis remains valid for the subsequent period of extended operation.

The staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses for fatigue of the DNPS SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines remain valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1 because the number of occurrences and severities of assumed cyclic loads are not projected to be exceeded during the subsequent period of extended operation.

4.6.4.3 UFSAR Supplement

SLRA Section A.4.6.4, provides the UFSAR supplement summarizing the fatigue evaluation for the DNPS SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines. The staff reviewed SLRA Section A.4.6.4 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address fatigue of the DNPS SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines, as required by 10 CFR 54.21(d).

4.6.4.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the effects of cumulative fatigue damage on the intended functions of the DNPS Units 2 and 3 SRV discharge line penetrations at the drywell-to-torus vent lines and associated sections of the SRV discharge lines remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluations, as required by 10 CFR 54.21(d).

4.6.5 Fatigue Analysis of Replacement ECCS Suction Strainers

4.6.5.1 Summary of Technical Information in the Application

SLRA Section 4.6.5 describes the applicant’s TLAA for fatigue of the DNPS Units 2 and 3 replacement ECCS suction strainer header containment penetrations. The applicant dispositioned the TLAA for the ECCS suction strainer header containment penetrations in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.6.5.2 Staff Evaluation

The staff reviewed the applicant’s TLAA in SLRA Section 4.6.5 for fatigue of the replacement ECCS strainer header containment penetrations and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.1 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1.

The staff noted that the DNPS replacement ECCS strainer penetrations fatigue analyses assumed 300 SRV actuations plus 50 SRV actuations for the limiting small break accident, resulting in a controlling CUF of 0.14. The staff also noted that the total number of SRV actuations were conservatively assumed to occur in the same torus bay and all actuations conservatively assumed to be multiple valve actuations. The staff also noted from SLRA Tables 4.3.1-1 and 4.3.1-2 that the maximum projected SRV actuations for any one valve for 80 years of operation is 75. Since the projected SRV actuations for 80 years is less than that assumed in the CUF evaluation, the staff verified the analysis remains valid for the subsequent period of extended operation.

The staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses for fatigue of the DNPS replacement ECCS strainer penetrations remain valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1 because the number of occurrences and severities of assumed cyclic loads are not projected to be exceeded during the subsequent period of extended operation.

4.6.5.3 UFSAR Supplement

SLRA Section A.4.6.5 provides the UFSAR supplement summarizing the fatigue evaluation for the DNPS replacement ECCS strainer containment penetrations. The staff reviewed SLRA Section A.4.6.5 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address fatigue of the DNPS replacement ECCS strainer penetrations, as required by 10 CFR 54.21(d).

4.6.5.4 Conclusion

Based on its review, and pursuant to 10 CFR 54.21(c)(1)(i), the staff concludes that the applicant has provided an acceptable demonstration that the analysis for the effects of cumulative fatigue damage on the intended functions of the DNPS Units 2 and 3 replacement ECCS strainer penetrations remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluations, as required by 10 CFR 54.21(d).

4.6.6 Drywell-to-Torus Vent Line Bellows Fatigue Analysis

4.6.6.1 Summary of Technical Information in the Application

SLRA Section 4.6.6 describes the applicant's TLAA for fatigue of the DNPS Units 1 and 2 drywell-to-torus vent line bellows. The applicant dispositioned the TLAA for the drywell-to-torus vent line bellows in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.6.6.2 Staff Evaluation

The staff reviewed the applicant's TLAA in SLRA Section 4.6.6 for fatigue of the drywell-to-torus vent line bellows and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.1 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1.

The staff noted that the DNPS drywell-to-torus vent line bellows have a rated capacity of 1,000 cycles of maximum displacement resulting from design basis accident conditions and that displacements due to thermal loads and internal pressure are the largest contributors to bellows fatigue. The staff also noted that this maximum displacement bounds the axial and lateral movements that the bellows experience during normal operation, and plant startups and shutdowns. The staff also noted from SLRA Tables 4.3.1-1 and 4.3.1-2 that the projected heatup and cooldown transient cycles for 80 years of operation is less than 300 cycles, which is significantly less than the 1,000 cycles rated capacity of the bellows. Thus, the staff verified that analysis remains valid for the subsequent period of extended operation.

The staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses for fatigue of the DNPS drywell-to-torus vent line bellows remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1 because the number of occurrences and severities of assumed cyclic loads are not projected to be exceeded during the subsequent period of extended operation.

4.6.6.3 UFSAR Supplement

SLRA Section A.4.6.6, provides the UFSAR supplement summarizing the fatigue evaluation for the DNPS drywell-to-torus vent line bellows. The staff reviewed SLRA Section A.4.6.6 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address fatigue of the DNPS drywell-to-torus vent line bellows, as required by 10 CFR 54.21(d).

4.6.6.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the effects of cumulative fatigue damage on the intended functions of the DNPS Units 2 and 3 drywell-to-torus vent line bellows remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluations, as required by 10 CFR 54.21(d).

4.6.7 Containment Process Line Penetration Bellows

4.6.7.1 Summary of Technical Information in the Application

SLRA Section 4.6.7 describes the applicant’s TLAA for fatigue of the DNPS Units 1 and 2 primary containment process line penetration bellows. The applicant dispositioned the TLAA for the containment process line penetrations bellows in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.6.7.2 Staff Evaluation

The staff reviewed the applicant’s TLAA in SLRA Section 4.6.7 for fatigue of the primary containment process line penetration bellows and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.6.3.1.1.1 and the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1.

The staff noted from the SLRA that the primary containment process line penetration bellows have been designed for 7,000 operating thermal cycles. The staff also noted that the transient cycles on the bellows are composed of thermal cycles experienced by the associated piping. The staff further noted from SLRA Tables 4.3.1-1 and 4.3.1-2 that the imposed thermal cycles, which can be conservatively approximated by the thermal cycles used for the reactor vessel fatigue analysis, represented by the summation of all projected transient cycles for 80 years of operation, is less than 2,200 cycles. This number of cycles is significantly less than the 7,000 thermal cycles for which the primary containment process line penetration bellows was originally designed. Therefore, the applicant concluded, and the staff verified, that the thermal cycles for which the primary containment process line penetration bellows was implicitly designed are not projected to be exceeded for the subsequent period of extended operation.

The staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses for fatigue of the primary containment process line penetration bellows remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.6.2.1.1.1 because the number of occurrences and severities of thermal cycles for which the primary containment process line penetration bellows was designed are not projected to be exceeded during the subsequent period of extended operation.

4.6.7.3 UFSAR Supplement

SLRA Section A.4.6.7 provides the UFSAR supplement summarizing the fatigue evaluation for the DNPS Units 2 and 3 primary containment process line penetration bellows. The staff reviewed SLRA Section A.4.6.7 consistent with the review procedures in SRP-SLR Section 4.6.3.2.

Based on its review of the SLRA, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.6.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address fatigue of the DNPS primary containment process line penetration bellows, as required by 10 CFR 54.21(d).

4.6.7.4 Conclusion

Based on its review, the staff concludes that the applicant has acceptably demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the effects of cumulative fatigue damage on the intended functions of the DNPS Units 2 and 3 primary containment process line penetration bellows remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluations, as required by 10 CFR 54.21(d).

4.7 Other Plant-Specific Time-Limited Aging Analyses

4.7.1 Reactor Building Overheard Crane Load Cycles

4.7.1.1 Summary of Technical Information in the Application

SLRA Section 4.7.1 describes the applicant's TLAA for Reactor Building Overhead Crane load cycles. The applicant dispositioned the TLAA for the Reactor Building Overhead Crane in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.7.1.2 Staff Evaluation

The staff reviewed the applicant's TLAA for the reactor building overhead crane and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

The applicant stated in SLRA Section 4.7.1 that the 125-ton reactor building overhead crane services both Units 2 and 3 and is considered a Class A crane experiencing irregular occasional use followed by long idle periods in accordance with the Crane Manufacturers Association of America Specification 70 (CMAA-70). The applicant further stated that 20,000 load cycles is a conservative limit for the reactor building overhead C=crane because the allowable number of load cycles for a Class A crane is between 20,000 and 100,000. The applicant considered load cycles that lift 50 tons or more because load cycles that lift less than 50 percent of the crane design capacity of 125 tons result in minimal fatigue of the crane. The applicant projected 8,160 cycles for the reactor building overhead crane in SLRA Table 4.7.1-1, "Dresden Unit 2 and 3 Reactor Building Overhead Crane Load Cycles," for the 80-year plant operating life including the subsequent period of extended operation. The staff reviewed the basis for the estimated number of cycles for each heavy load type in the table and finds that the estimates for the expected number of cycles over the plant life to the end of the subsequent period of extended operation are reasonable. The applicant's projected number of 8,160 cycles remains well below the load cycle limit of 20,000 provided for a Class A crane in CMAA-70, and the reactor building overhead crane TLAA remains valid for the subsequent period of extended operation.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the reactor building overhead crane remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because the applicant has demonstrated that the number of crane load cycles expected for the subsequent period of extended operation remains below the bounding CMAA-70 allowable load cycles considered in the original analysis and, therefore, is valid through the subsequent period of extended operation.

4.7.1.3 UFSAR Supplement

SLRA Section A.4.7.1 provides the UFSAR supplement summarizing the TLAA for reactor building overhead crane load cycles, the number of expected load cycles for the subsequent period of extended operation, and the load cycle limit. The staff reviewed SLRA Section A.4.7.1 consistent with the review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address crane load cycle limits, as required by 10 CFR 54.21(d).

4.7.1.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the load cycles analysis for the reactor building overhead crane remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7.2 Crack Growth Calculation of a Postulated Flaw in The Heat Affected Zone of an Arc Strike in The Torus Shell

4.7.2.1 Summary of Technical Information in the Application

SLRA Section 4.7.2 describes the applicant's TLAA for stress cycles in the torus shell crack growth calculation for DNPS Unit 3. The applicant dispositioned the TLAA for the torus shell in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.7.2.2 Staff Evaluation

The staff reviewed the applicant's TLAA, as amended by letter dated April 28, 2025 (ML25118A278), for the torus shell arc strike flaw crack growth and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

The applicant stated in SLRA Section 4.7.2, as amended, that the crack growth evaluation of the DNPS Unit 3 torus shell performed in 1991 was based on 850 normal operation stress cycles, which consisted of SRV actuations, plant startup temperature transients, and plant startup pressure transients. In addition, the applicant stated that a further evaluation performed in 1997 determined that the flaw depth of the arc strike was not of sufficient depth to warrant permanent repairs and the area of the arc strike is subject to the ASME Section XI, Subsection IWE AMP described in SLRA Section B.2.1.29, to continue to ensure the acceptability of the condition. To address the period from 1991 (when the original crack growth calculation was performed) to 2051 (the end of the subsequent period of extended operation for DNPS Unit 3), the applicant estimated that the total number of startups projected to occur from 1991 to 2051 is 120, which results in 240 projected stress cycles (considering two stress cycles per startup) due to startup pressure and temperature transients. Although DNPS Unit 3 is projected to experience 375 SRV actuations in 80 years of operation per SLRA Table 4.3.1-2, the applicant conservatively assumed the entire 375 SRV actuations to occur between 1991 and 2051. Therefore, for the period from 1991 to 2051, the applicant projected 615 stress cycles to account for 375 SRV actuations and 240 temperature and pressure transients. The staff reviewed the basis for the estimated number of SRV actuations and temperature and pressure transients and finds that the estimate for the expected number of stress cycles over the plant life to the end of the subsequent period of extended operation is reasonable. The applicant's projected number of 615 stress cycles remains below the 850 stress cycles considered in the original crack growth calculation, and the torus shell crack growth TLAA remains valid for the subsequent period of extended operation.

The staff finds the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the analysis for the torus shell crack growth remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because the applicant has demonstrated that the number of stress cycles expected for the subsequent period of extended operation remains below the number of stress cycles considered in the original analysis and, therefore, is valid through the subsequent period of extended operation.

4.7.2.3 UFSAR Supplement

SLRA Section A.4.7.2 provides the UFSAR supplement summarizing the TLAA for stress cycles in the torus shell crack growth evaluation, the number of stress cycles considered for the evaluation, and the number of expected stress cycles for the subsequent period of extended operation. The staff reviewed SLRA Section A.4.7.2 consistent with the review procedures in SRP-SLR Section 4.7.3.2.

Based on its review, the staff finds that the UFSAR supplement, as amended by letter dated April 28, 2025, meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address stress cycles in the torus shell crack growth calculation, as required by 10 CFR 54.21(d).

4.7.2.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the stress cycles analysis for the torus shell crack growth calculation remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement, as amended, contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7.3 Radiation Degradation of Drywell Shell Expansion Gap Polyurethane Foam

4.7.3.1 Summary of Technical Information in the Application

SLRA Section 4.7.3, “Radiation Degradation of Drywell Shell Expansion Gap Polyurethane Foam,” discusses the analysis for the ability of the polyurethane foam located between the drywell shell and shielding concrete to resist environmental radiation for the life of the plant.

4.7.3.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the evaluation of drywell shell expansion gap polyurethane foam radiation tolerance. The 80-year cumulative radiation exposure has been calculated and determined to be valid to the end of the subsequent period of extended operation, consistent with the review procedures in SRP-SLR Section 4.7.3.

To accommodate thermal expansion of the drywell shell, compressible foam was used to form an expansion gap between the concrete and the drywell shell. An analysis evaluated the external compressive loads on the drywell exterior, due to compression of this foam, for worst-case accident conditions. The analysis demonstrated that external loads on the drywell shell would not exceed ASME Code allowable limits during a LOCA when thermal expansion of the drywell causes compression of the foam.

The polyurethane foam material was chosen for its resistance to the environmental conditions likely to exist during its service life. Polyurethane foam samples, similar to those used in the gap, were irradiated in a test laboratory at various levels, from 1E+7 to 1E+9 rads. The test results established that there was no detectable change in resilience below 1E+8 rads. The original design considered the effects of a 40-year lifetime projected dose of 2.5E+7 rads on the foam material. The first license renewal application conservatively projected a total radiation exposure of 4.2E+7 rads, including the increased exposure due to the approved increase in reactor power.

The revised SLRA analysis projected the cumulative radiation exposure of the polyurethane foam through the end of the subsequent period of extended operation, including the increased exposure due to the approved increase in reactor power, and determined the cumulative radiation exposure to be 5.63E+7 rads. This is well below the radiation exposure limit of 1E+8 rads. Therefore, the material properties of the polyurethane foam assumed by the original design will remain unchanged for the 80-year extended operating period.

The SLRA refines the previous calculations of cumulative radiation exposure of drywell shell expansion gap polyurethane foam to account for the duration of the subsequent period of extended operation. The staff finds the applicant's revised analysis for this TLAA to be representative of the radiation exposure of the drywell shell expansion gap polyurethane foam. The calculated cumulative radiation exposure of the containment coatings remains below the allowable exposure threshold for the drywell shell expansion gap polyurethane foam.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the drywell shell expansion gap polyurethane foam radiation tolerance remains valid when extrapolated to the end of the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.i because the protective coatings radiation tolerance remains valid for the subsequent period of extended operation.

4.7.3.3 UFSAR Supplement

SLRA Section A.4.7.3 provides the UFSAR supplement summarizing the drywell shell expansion gap polyurethane foam radiation tolerance. The staff reviewed SLRA Section A.4.7.3 consistent with the review procedures in SRP-SLR Section 4.7.2.2.

Based on its review, the staff finds the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the drywell shell expansion gap polyurethane foam radiation tolerance, as required by 10 CFR 54.21(d).

4.7.3.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to10 CFR 54.21(c)(1)(i), that the analysis for the drywell shell expansion gap polyurethane foam radiation tolerance remains valid to the end of the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7.4 Generic Letter 81-11 Crack Growth Analysis to Demonstrate Conformance to The Intent of NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking"

4.7.4.1 Summary of Technical Information in the Application

SLRA Section 4.7.4 describes the applicant's TLAA for crack growth in the feedwater and control rod drive return nozzles. The applicant dispositioned the TLAA for the feedwater and control rod drive return line nozzles in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of cracking on the intended functions will be adequately managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Aging Management Program for the subsequent period of extended operation.

4.7.4.2 Staff Evaluation

The staff reviewed the applicant's TLAA for the feedwater and control rod drive return nozzles and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii), consistent with the review procedures in SRP-SLR Section 4.7.3.1.3.

The applicant stated that NUREG-0619 was issued by the NRC per Generic Letter 81-11 in February 1981 to address cracking on the inside surfaces of the BWR feedwater nozzles at the blend radius and bore. In 1981 and 1982, the applicant implemented three NUREG-0619 recommended modifications to reduce or eliminate the root causes of the cracking mechanisms throughout the associated systems at Dresden Units 2 and 3. In addition to the modifications, NUREG-0619 established inspection intervals and methodologies. The inspection methodologies and the underlying crack growth analyses have been updated since the issuance of NUREG-0619 based on improvements in crack growth modeling and in nondestructive testing techniques.

The applicant stated that it will manage the effect of cracking on the subject components by the inspections performed as part of the Dresden Units 2 and 3, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The staff noted that the applicant has made a commitment to maintain these inspections within that AMP as part of their original license renewal application. The adequacy of the inspections was addressed by the NRC staff during the License Renewal Post-Approval Site Inspection IP 71003 for Units 2 and 3 (ML103560677 and ML093570258, respectively). The staff noted that the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is a condition monitoring program which manages the aging effects of cracking, loss of material, loss of fracture toughness, and loss of preload for pressure-retaining bolting in Class 1, 2, and 3 piping and components exposed to a reactor coolant or treated water environment with the use of periodic visual, surface, and volumetric examinations. The staff's evaluation of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is documented in SE Section 3.0.3.1.1.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cracking on the intended functions of the feedwater and control rod drive return nozzles will be adequately managed for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.3 because the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been reviewed and dispositioned as discussed in Section 3.0.3.1.1 of this SE.

4.7.4.3 UFSAR Supplement

SLRA Section A.4.7.4 provides the UFSAR supplement summarizing the TLAA for crack growth in the feedwater and control rod drive return nozzles. The staff reviewed SLRA Section A.4.7.4 consistent with the review procedures in SRP-SLR Section 4.7.3.1.3.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.1.3 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address potential cracking in the feedwater and control rod drive return nozzles, as required by 10 CFR 54.21(d).

4.7.4.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of cracking on the intended functions of the feedwater and control rod drive return nozzles will be adequately managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7.5 Unit 2 Core Spray Replacement Piping Fatigue and Leakage Assessment

4.7.5.1 Summary of Technical Information in the Application

SLRA Section 4.7.5, as supplemented by letters dated April 28, 2025, and May 8, 2025, describes the applicant's fatigue TLAA for the core spray replacement piping inside the DNPS Unit 2 RPV. The applicant dispositioned the fatigue TLAA for the Unit 2 core spray replacement piping in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.7.5.2 Staff Evaluation

The staff reviewed the applicant's fatigue TLAA for the Unit 2 core spray replacement piping and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.3.3.1.1.1.

The applicant explained that in November 2009, all four lower sections on the core spray system downcomers were replaced. The applicant also explained that a fatigue analysis of the new piping sections and associated bolting determined a maximum design CUF value of 0.0785 for 40 years of service following the piping section replacement.

SLRA Section 4.7.2, as amended by the response to RAI 4.7.5-1 dated May 8, 2025, included a comparison of the design transient cycles (occurrences) assumed in the existing 40-year fatigue analysis and the projected cycles through the subsequent period of extended operation since the core spray piping replacement. The applicant's evaluation regarding the transient cycles shows that the transient cycles assumed in the existing fatigue analysis are conservative and are greater than or equal to the projected transient cycles such that the existing analysis continues to be valid for the subsequent period of extended operation.

Accordingly, the staff finds the applicant's fatigue TLAA for the Unit 2 core spray replacement piping remains valid due to the following:

- The conservative nature of the transient cycles assumed in the existing fatigue analysis in comparison with the projected transient cycles.
- The acceptable CUF value that is significantly less than the fatigue design limit (1.0).

As discussed above, and pursuant to 10 CFR 54.21(c)(1)(i), the staff finds the applicant has demonstrated that the fatigue analysis for the Unit 2 core spray replacement piping remains valid for the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.3.2.1.1.1 because the applicant demonstrated that the transient cycles assumed in the existing fatigue analysis are conservative compared to the projected transient cycles for the subsequent period of extended operation since the core spray piping replacement, consistent with the guidance in SRP-SLR Section 4.3.2.1.1.1.

4.7.5.3 UFSAR Supplement

SLRA Section A.4.7.5 provides the UFSAR supplement summarizing the fatigue analysis for the Unit 2 core spray replacement piping. The staff reviewed SLRA Section A.4.7.5, consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff also finds that the applicant provided an adequate summary description of its actions to address the fatigue TLAA for the Unit 2 core spray replacement piping, as required by 10 CFR 54.21(d).

4.7.5.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the fatigue analysis for the Unit 2 core spray replacement piping remains valid for the subsequent period of extended operation. In addition, the staff concludes that the UFSAR supplement contains an appropriate summary.

4.7.6 Unit 2 Reactor Pressure Vessel Closure Flange Flaw

4.7.6.1 Summary of Technical Information in the Application

SLRA Section 4.7.6 describes the applicant’s TLAA for a flaw evaluation of a reportable indication in the Dresden Unit 2 closure flange to upper shell circumferential weld (“2-SC4-FLG”). The applicant dispositioned the TLAA for the closure flange flaw in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the subsequent period of extended operation.

4.7.6.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the closure flange flaw and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

The applicant explained that a reportable indication was discovered in the Dresden Unit 2 closure flange to upper shell circumferential weld in November 2011. The inspection results were not acceptable in accordance with ASME Section XI, Subsection IWB-3500 inspection standards, but an analytical evaluation in accordance with ASME Section XI IWB-3600 determined the flaw was acceptable without repair or modification. A flaw evaluation was performed in 2019 that was based on the results of nondestructive testing that was performed during the fall 2019 outage and determined that the flaw would not reach critical crack size in 870 full range stress cycles associated with the Boltup, Unbolt, Hydro Test, Heatup, and Cooldown transients. Thus, the applicant determined that the flaw would be stable for 60 years since the number of transient occurrences projected for 60-years was less than 870 occurrences.

The staff noted that SLRA Table 4.3.1-1 documents the projections of the relevant transients through 80-years, covering the subsequent period of extended operation. The number of occurrences for these transients are 702 for Dresden Unit 2, which is less than the 870 occurrences considered in the evaluation performed in 2019, as described above.

The staff noted the 80-year transient cycle projections are based on the applicant's review of historical plant transient data for Unit 2 plant operation up to December 31, 2022. The historical data establishes a baseline upon which the applicant incorporated the recent 10-year occurrence rate to reflect recent operating practices and experience and basis to project expected for future plant performance and develop 80-year transient cycle projections. The staff determined that the 80-year transient cycle projections can be compared to the results of the 2019 flaw evaluation for the subsequent period of extended operation because transient cycle projections are less than the analyzed 870 stress cycles. The staff's review of the applicant's methodology for these 80-year transient cycle projections is documented in SE Section 4.3.1.

Additionally, the staff noted that periodic volumetric examinations of the closure flange to upper shell circumferential weld is required by ASME Section XI pursuant to 10 CFR 50.55a, which will provide ongoing confirmation that the flaw remains within bounding flaw dimensions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD AMP covers the relevant inservice inspections and has been reviewed and dispositioned as discussed in Section 3.0.3.1.1 of this SE.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the closure flange flaw remains valid for the subsequent period of extended operation because the number of expected transient occurrences is less than the limit of transient cycles considered in the previous analysis. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 because the number of transient occurrences used in the analysis remains bounding for the number of transient occurrences expected through the end of the subsequent period of extended operation.

4.7.6.3 UFSAR Supplement

SLRA Section A.4.7.6 provides the UFSAR supplement summarizing the TLAA for crack growth in the Dresden Unit 2 closure flange to upper shell circumferential weld. The staff reviewed SLRA Section A.4.7.6 consistent with the review procedures in SRP-SLR Section 4.7.3.1.1.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.1.1 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address potential crack growth in the closure flange flaw, as required by 10 CFR 54.21(d).

4.7.6.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the Dresden Unit 2 closure flange to upper shell circumferential weld remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7.7 Isolation Condenser Weld Flaw TLAA

4.7.7.1 Summary of Technical Information in the Application

SLRA Section 4.7.7 describes the applicant's TLAA for the DNPS Unit 3 flaw analysis performed for the isolation condenser inlet nozzle-to-vessel shell weld. The applicant stated that the flaw analysis assumed 1,000 isolation condenser actuations and 1,000 cycles of safe-shutdown earthquake (SSE) loads. The applicant stated that both assumptions are very conservative. The applicant dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the evaluation remains valid for the subsequent period of extended operation.

4.7.7.2 Staff Evaluation

The staff reviewed the applicant's TLAA for the flaw evaluation of the isolation condenser inlet nozzle-to-vessel shell weld and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i), consistent with the review procedures in SRP-LR Section 4.3.3.1.1.

The staff noted that the applicant performed a flaw evaluation using a methodology based on applied stress intensity factors, allowed by the 2007 Edition/2008 Addenda ASME Section XI, Subsections IWC-3600 and IWB-3600 in accordance with 10 CFR 50.55a, for the indications discovered during fall 2018 outage for the applicant's Unit 3 isolation condenser inlet nozzle-to-vessel shell weld. Because the flaw growth is a function of isolation condenser transient cycles, or actuations, this issue is evaluated as a TLAA for the subsequent period of extended operation.

The staff also noted that the applicant used very conservative assumed cycles in its evaluation with acceptable results for the projected 80-year operation. Specifically, the DNPS Unit 3 isolation condenser only had 30 actuations through June 30, 2022, as documented in SLRA Table 4.3.1-2. Additionally, the applicant's flaw evaluation also included 1,000 cycles of SSE loads, which is also very conservative given that even a single SSE is considered a rare event. Because of the high level of conservatism assumed in in this evaluation compounded by the rarity of actual transient occurrences, the NRC staff verified that the analysis remains valid for the subsequent period of extended operation.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that its flaw analysis remains valid for the subsequent period of extended operation . Additionally, the TLAA meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.1 because the applicant demonstrated that the number of transient cycles assumed in the existing flaw evaluation remains valid for the period of extended operation.

4.7.7.3 UFSAR Supplement

SLRA Section A.4.7.7 provides the UFSAR supplement summarizing the TLAA for the flaw evaluation for the isolation condenser inlet nozzle-to-vessel shell weld. The staff reviewed SLRA Section A.4.7.7 consistent with the review procedures in SRP-SLR Section 4.3.3.2.

Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff finds that applicant provided an adequate summary description of its actions to address the flaw analysis TLAA for the Unit 3 isolation condenser inlet nozzle-to-vessel shell weld, as required by 10 CFR 54.21(d).

4.7.7.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the TLAA on the flaw evaluation for the Unit 3 isolation condenser inlet nozzle-to-vessel shell weld remains valid for the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7.8 Protective Coatings

4.7.8.1 Summary of Technical Information in the Application

SLRA Section 4.7.8, “Protective Coatings”, discusses the analysis for the ability of the qualified coatings inside containment to resist environmental radiation for the life of the plant.

DNPS UFSAR Section 6.1.2, “Organic Materials” identifies the various protective coatings systems that are used in containment. These coating systems were originally applied to the DNPS drywell shell, reactor shield wall, supports, and concrete surfaces. UFSAR Section 6.1.2 documents the cumulative radiation exposure thresholds below which the coating systems will not degrade (e.g., peel or flake). The coating system with the lowest exposure threshold is a Carboline coating system that can withstand a cumulative radiation exposure of 4.0E+08 rads. The original analysis demonstrated that this threshold is more than the maximum cumulative radiation exposure in the containment projected over 40 years of normal operation plus the maximum cumulative radiation exposure expected in containment over a one-year post-design-basis accident period, which is a total of 1.12E+8 rads.

4.7.8.2 Staff Evaluation

The staff reviewed the applicant’s TLAA for the evaluation of protective coatings radiation tolerance. The SLRA analysis updates cumulative radiation exposures during normal operation under EPU conditions and the one-year post design basis accident exposure for various zones in the containment. Based on the information in this re-evaluation, the maximum cumulative radiation exposure in containment expected over 80 years of normal operation plus the maximum cumulative radiation exposure during a one-year period post-design-basis accident, is a total of 1.94E+08 rads, which remains lower than the exposure threshold of 4.0E+08 rads. Based on this analysis, the threshold documented in the UFSAR remains valid for the subsequent period of extended operation.

The SLRA refines the previous calculations of cumulative radiation exposure of containment coatings to account for EPU operating conditions during the subsequent period of extended operation and a year of post design basis accident exposure. Because the analysis is based upon the most current operating conditions, the staff finds the applicant’s revised analysis for this TLAA to be representative of the radiation exposure of the containment coatings. The calculated cumulative radiation exposure of the containment coatings remains below the allowable exposure threshold for the coatings. The 80-year cumulative radiation exposure has been calculated and determined to be valid to the end of the subsequent period of extended operation, consistent with the review procedures in SRP-SLR Section 4.7.3.

The staff finds the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the protective coatings radiation tolerance remains valid when extrapolated to the end of the subsequent period of extended operation. Additionally, the TLAA meets the acceptance criteria in SRP-SLR Section 4.7.2.1.i because the protective coatings radiation tolerance remains valid for the subsequent period of extended operation.

4.7.8.3 UFSAR Supplement

SLRA Section A.4.7.8 provides the UFSAR supplement summarizing the protective coatings radiation tolerance. The staff reviewed SLRA Section A.4.7.8 consistent with the review procedures in SRP-SLR Section 4.7.2.2.

Based on its review, the staff finds the UFSAR supplement meets the acceptance criteria in SRP-SLR Section 4.7.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the protective coatings radiation tolerance, as required by 10 CFR 54.21(d).

4.7.8.4 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to10 CFR 54.21(c)(1)(i), that the analysis for the protective coatings radiation tolerance remains valid to the end of the subsequent period of extended operation. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.8 Conclusion for Time-Limited Aging Analyses

The NRC staff reviewed SLRA Section 4 on TLAAs. Based on its review, the staff concludes that the applicant provided a sufficient list of TLAAs, as defined in 10 CFR 54.3, and that the applicant demonstrated that:

- The TLAAs remain valid for the subsequent period of extended operation, as required by 10 CFR 54.21(c)(1)(i).
- The TLAAs have been projected to the end of the subsequent period of extended operation, as required by 10 CFR 54.21(c)(1)(ii).
- The effects of aging on the intended function(s) will be adequately managed for the subsequent period of extended operation, as required by 10 CFR 54.21(c)(1)(iii).

The staff also reviewed the UFSAR supplements for the TLAAs and concludes that, as required by 10 CFR 54.21(d), the UFSAR supplement contain a summary description of the evaluation of TLAAs for the period of subsequent extended operation at DNPS. In addition, the staff concludes, as required by 10 CFR 54.21(c)(2), that no plant-specific, TLAA-based exemptions are in effect.

The NRC staff concludes that there is reasonable assurance that the activities authorized by the subsequent renewed licenses will continue to be conducted in accordance with the CLB, and that any changes made to the CLB to remain in compliance with 10 CFR 54.29(a) are in accordance with the Atomic Energy Act of 1954, as amended, as well as the NRC's regulations.

SECTION 5 CONCLUSION

The NRC staff reviewed the SLRA for DNPS in accordance with the NRC's regulations and the guidance in NUREG--2192, *Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants* (ADAMS Accession No. ML17188A158) and NUREG-2191, *Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report* (ADAMS Accession Nos. ML17187A031 and ML17187A204). Section 54.29 of 10 CFR, "Standards for issuance of a renewed license," sets the standards for issuance of subsequent renewed licenses. In accordance with 10 CFR 54.29, the Commission may issue a renewed license if it finds, among other things, that (1) actions have been identified and have been or will be taken, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB, and (2) any applicable requirements of Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of 10 CFR Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions" (i.e., addressing environmental review), have been satisfied.

Based on its review of the SLRA, the NRC staff determined that CEG has met the requirements of 10 CFR 54.29(a). Specifically, actions have been identified and have been taken or will be taken with respect to (1) managing the effects of aging during the subsequent period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21(a)(1) and (2) time-limited aging analyses that have been identified to require review under 10 CFR 54.21(c).

Concerning 10 CFR 54.29(b), the NRC staff's environmental review under the requirements of 10 CFR Part 51, Subpart A, is ongoing. The NRC staff will publish its environmental review findings in a separate report.

APPENDIX A

LICENSE RENEWAL COMMITMENTS

APPENDIX A – LICENSE RENEWAL COMMITMENTS

During the U.S. Nuclear Regulatory Commission (NRC) staff's review of the Dresden Nuclear Power Station, Unit, 2 and 3 subsequent license renewal application, Constellation Energy Generation, LLC made commitments related to the aging management programs used to manage aging effects for structures and components. The following table lists these commitments along with the implementation schedules and sources for each commitment. The subsequent period of extended operation for Units 2 and 3 begin on December 22, 2029, and January 12, 2031, respectively.

Table A-1 Dresden, Units 2 and 3, Subsequent License Renewal Commitments

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
2	Water Chemistry	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
3	Reactor Head Closure Stud Bolting	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
4	BWR Vessel ID Attachment Welds	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
5	BWR Stress Corrosion Cracking	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
6	BWR Penetrations	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
7	BWR Vessel Internals	BWR Vessel Internals is an existing program that will be enhanced to: 1. Limit the scope expansion exemption detailed in BWRVIP-41, Revision 4-A, to 60 years of operation. The currently allowed scope expansion exemption applies to large diameter jet pump diffuser, adapter and lower ring welds (DF-1, DF-2, DF-3, AD-1, AD-2, and AD-3a,b) that are inspected by UT.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
8	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) aging management program is a new condition monitoring program that will provide assurance that reactor coolant pressure boundary CASS components (i.e., Class 1 piping and pump casings) with the potential for significant thermal aging embrittlement meet their intended functions.	Program will be implemented no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
9	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion is an existing program that will be enhanced to: 1. Reassess infrequently used piping systems excluded from the scope of the program to ensure adequate bases exist to justify this exclusion for periods of extended operation beyond 60 years.	Program will be enhanced no later than six months prior to the	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
			subsequent period of extended operation.	
10	Bolting Integrity	Bolting Integrity is an existing program that will be enhanced to: 1. Revise procedure guidance to clarify that the use of lubricants that contain molybdenum disulfide (MoS_2) is prohibited at DNPS for bolts in the scope of license renewal. 2. Perform periodic visual inspections of a representative sample of bolting for bolted joints where leakage is difficult to detect. A representative sample will consist of twenty percent of closure bolting or a maximum of 19 bolts for each material and environment population per unit, whichever is less, and inspections will be performed during each 10-year period of the subsequent period of extended operation. Inspections will be performed of bolting utilized in joints that are submerged, in systems that are not normally pressurized, and in systems containing air or gas. If the minimum sample size is not achieved during a 10-year period, then alternative inspections may be performed. For submerged bolting exposed to treated water, alternative inspections may include (a) diver inspections or (b) remote video inspections. For systems containing air/gas, alternative inspections may include (a) visual inspection for discoloration when leakage from inside the piping system would discolor the external surfaces of the component; (b) monitoring and trending of pressure decay when the bolted connection is located within an isolated boundary; (c) soap bubble testing on the external mating surface of the bolted component; or (d) thermography, when the temperature of the process fluid is higher than ambient conditions around the component. 3. Revise procedures governing the direct visual examination of bolted joints to include inspection parameters such as lighting, distance, and offset. Cameras and video equipment may be used to supplement these inspections. 4. Ensure no fewer than five additional bolts are inspected for each sample-based inspection that does not meet acceptance criteria, or 20 percent of the total bolt population of each applicable material, environment, and aging effect combination; whichever is less. If these subsequent inspections do not meet acceptance criteria, an extent of condition and extent of cause analysis are performed to determine the further extent of inspections. These additional inspections will be completed within the inspection interval in which the original sample-based inspections are conducted.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 1 (ML25051A253)
11	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System is an existing program that will be enhanced to: 1. Perform a minimum of 20 inspections for recurring internal corrosion in the raw water systems, including water-based fire systems, every 24 months until the rate of recurring internal corrosion occurrence no longer meets the criteria for	Program will be enhanced no later than six months prior to the	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		recurring internal corrosion as defined in SLRA Section 3.3.2.2.7. The selected inspection locations will be periodically reviewed to validate their relevance and usefulness and adjusted as appropriate. Evaluation of the inspection results will include (1) a comparison to the nominal wall thickness or previous wall thickness measurements to determine rate of corrosion degradation; (2) a comparison to the design minimum allowable wall thickness to determine the acceptability of the component for continued use; and (3) a determination of re-inspection interval.	subsequent period of extended operation.	
12	Closed Treated Water Systems	Closed Treated Water Systems is an existing program that will be enhanced to: 1. Perform condition monitoring including opportunistic visual inspections and sample-based periodic inspections using techniques (visual, surface, or volumetric) capable of detecting loss of material, cracking, and fouling, as appropriate to verify the effectiveness of water chemistry control to mitigate aging effects in each 10-year period during the subsequent period of extended operation. If degradation is identified, then the rate of degradation will be projected until the next scheduled inspection. Additional sample-based inspections will be performed if unacceptable aging is identified. If those inspections identify unacceptable aging, then the corrective action program will be used to determine the extent of condition and extent of cause to determine the extent of further inspections.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
13	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
14	Compressed Air Monitoring	Compressed Air Monitoring is an existing program that will be enhanced to: 1. Perform opportunistic visual inspections of in scope component internal surfaces exposed to a dry air environment for signs of loss of material.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
15	Fire Protection	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
16	Fire Water System	Fire Water System is an existing program that will be enhanced to: 1. Perform a one-time volumetric wall thickness inspection on a representative sample of piping that is periodically subjected to flow during functional testing. The representative sample will be based on the population of water-based fire suppression system piping that is periodically subject to flow but is normally dry.	Program will be enhanced no later than the six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		The one-time volumetric wall thickness inspection activity will include criteria for selection of inspection locations, acceptance criteria, and will specify the need for follow-up examinations based on inspection results. 2. Perform biennial (2 year) external visual inspections of sprinkler systems in accessible and inaccessible areas. 3. Revise the hydrant flushing procedure to include drainage acceptance criteria requiring that hydrants drain within one hour. 4. Perform internal visual inspections of sprinkler and preaction system piping to identify internal corrosion, foreign material, and obstructions to flow. Follow-up volumetric wall thickness examinations will be performed if internal visual inspections detect an unexpected level of degradation due to corrosion and corrosion product deposition. If organic or foreign material, or internal flow blockage that could result in failure of system function is identified, then an obstruction investigation will be performed within the corrective action program that includes removal of the material, an extent of condition determination, review for increased inspections, extent of follow-up examinations, and a flush in accordance with NFPA 25 Annex D.5, Flushing Procedures. The internal visual inspections will consist of the following: a. Wet pipe sprinkler systems - 50 percent of the wet pipe sprinkler systems in scope for license renewal will have internal visual inspections of piping by removing a hydraulically remote sprinkler, performed every five years, consistent with NFPA 25, 2011 Edition, Section 14.2. During the next five-year inspection period, the alternate systems previously not inspected shall be inspected. b. Preaction sprinkler systems - Preaction sprinkler systems in scope for license renewal will have internal visual inspections of piping by removing a hydraulically remote sprinkler, performed every five years, consistent with NFPA 25, 2011 Edition, Section 14.2. 5. Revise the testing frequency of the transformer deluge systems to be once every two years. 6. Revise the flow test and main drain test procedures to, at a minimum, perform two additional tests within the same test interval (frequency) for each failed test.	One-Time inspections will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	
17	Outdoor and Large Atmospheric Metallic Tanks	Outdoor and Large Atmospheric Metallic Tanks is an existing program that will be enhanced to: 1. Apply sealant to provide a moisture barrier at the perimeter of the base of the clean and contaminated demineralized water storage tanks. 2. Perform an inspection of the sealant at the perimeter of the base of the contaminated condensate storage tanks and demineralized water storage tanks for signs of degradation every two years. The visual inspections of sealant and caulking are supplemented with physical manipulation to detect degradation.	Program will be enhanced no later than six months prior to the subsequent period of extended operation. Inspections that are required to be	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		3. Perform periodic volumetric inspections of the contaminated condensate storage tanks, clean demineralized water storage tank, and contaminated demineralized water storage tank bottoms in each 10-year period starting 10 years prior to the subsequent period of extended operation to monitor the tank bottoms for loss of material and cracking. Volumetric inspections are performed at representative sample locations to include 25 one square foot locations or 20 percent coverage conducted in different locations unless the program states the basis for why repeated inspections are conducted in the same location (i.e., previous findings). Additionally, a minimum of 10 of the random one square foot sample locations will be performed within the 30-inch band at the perimeter of the shell. The scope of subsequent examinations may be adjusted based upon the results of previous examinations.	completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	
18	Fuel Oil Chemistry	Fuel Oil Chemistry is an existing program that will be enhanced to: 1. Perform periodic internal inspection of the emergency diesel generator fuel oil day tanks and Unit 2/3 fire pump fuel oil day tank at least once during each 10-year period starting 10 years prior to the subsequent period of extended operation. Each tank will be drained and cleaned, the internal surfaces visually inspected (if physically possible), and, if evidence of degradation is observed during inspections, or if visual inspection is not possible, then these diesel fuel tanks will be volumetrically inspected. 2. Change the path through which periodic fuel oil sampling and periodic draining of accumulated water are performed for the station blackout diesel fuel oil day tanks to the existing drain valves that are connected to the flush drain connections of these tanks. 3. Perform periodic (quarterly) particulate contamination, water and sediment checks, and microbiological activity checks for the isolation condenser makeup pump fuel oil day tanks.	Program will be enhanced no later than six months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
19	Reactor Vessel Material Surveillance	Reactor Vessel Material Surveillance is an existing program that will be enhanced to: 1. Implement BWRVIP-321 Revision 1-A to maintain compliance with 10 CFR 50 Appendix H during the subsequent period of extended operation.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
20	One-Time Inspection	One-Time Inspection is a new condition monitoring program consisting of a one-time inspection of selected components to verify: (a) the system-wide effectiveness of an AMP that is designed to prevent or minimize aging to the extent that it will not cause the loss of intended function during the subsequent period of extended operation; (b) the insignificance of an aging effect; and	Program will be implemented no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		(c) that long-term loss of material will not cause a loss of intended function for steel components exposed to environments that do not include corrosion inhibitors as a preventive action.	Inspections will be completed within the 10 years prior to the subsequent period of extended operation and no later than the last refueling outage prior to the subsequent period of extended operation.	
21	Selective Leaching	Selective Leaching is a new condition monitoring program that will monitor components constructed of materials that are susceptible to selective leaching and that are exposed to environments that may result in the occurrence of selective leaching in susceptible materials. Susceptible materials include gray cast iron, malleable iron, ductile iron, and copper alloys containing greater than 15 percent zinc. Copper alloys containing greater than 8 percent aluminum are also susceptible to selective leaching; however, there are no components within the scope of license renewal that are constructed of this material at Dresden. The selective leaching program includes one-time inspections for susceptible components exposed to closed cycle cooling water and treated water environments since plant-specific operating experience has not revealed selective leaching in these environments. Opportunistic and periodic inspections are conducted for susceptible components exposed to raw water, waste water, and soil (which may include groundwater) environments.	Program will be implemented no later than six months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed within the 10 years prior to the subsequent period of extended operation and no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
22	ASME Code Class 1 Small-Bore Piping	ASME Code Class 1 Small-Bore Piping is a new condition monitoring program that augments the existing ASME Code, Section XI requirements and is applicable to ASME Code Class 1 small-bore piping and systems with a NPS diameter less than 4 inches and greater than or equal to 1 inch. This program provides for volumetric examination of a sample of full penetration (butt) welds and partial penetration (socket) welds in Class 1 piping to manage cracking due to stress corrosion cracking or thermal or vibratory fatigue loading. Volumetric examinations will employ techniques that have been demonstrated to be capable of detecting flaws and discontinuities in the examination volume of interest. Destructive examination methods may be performed in lieu of volumetric examination. The program examinations are performed to verify that degradation is not occurring and to validate the effectiveness of existing programs and practices, thereby, confirming that	Program will be implemented no later than six months prior to the subsequent period of extended operation. Inspections will be completed within the six years prior the subsequent period of extended operation and no later than the last	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		no additional aging management is required for the subsequent period of extended operation.	refueling outage prior to the subsequent period of extended operation.	
23	External Surfaces Monitoring of Mechanical Components	External Surfaces Monitoring of Mechanical Components is a new condition monitoring program that directs visual inspections of external surfaces of components be performed during system inspections and walkdowns. Periodic visual inspections will be conducted of metallic components, elastomers, polymers, and insulation jacketing on a two year frequency.	Program will be implemented no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
24	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components is a new condition monitoring program that will consist of inspections of the internal surfaces of piping, piping components, ducting, heat exchanger components, and other components exposed to potentially aggressive environments. These environments include air, condensation, diesel exhaust, and various water environments.	Program will be implemented no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
25	Lubricating Oil Analysis	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
26	Monitoring of Neutron-Absorbing Materials Other than Boraflex	Monitoring of Neutron-Absorbing Materials Other than Boraflex is an existing program that will be enhanced to: 1. Perform in-situ attenuation testing per NEI 16-03-A Rev 1 guidance at a frequency not to exceed 10 years on the Unit 2 spent fuel pool rack (Boral material) during the subsequent period of extended operation to identify whether loss of B10 is occurring. The first in-situ attenuation test of Boral material will be performed within three years of entering the subsequent period of extended operation. In-situ test results found outside the established criteria will be entered into the corrective action program for engineering evaluation.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 1 (ML25051A253)
27	Buried and Underground Piping and Tanks	Buried and Underground Piping and Tanks is an existing program that will be enhanced to: 1. Perform direct visual inspections of one 10-linear foot section of buried stainless steel piping during each 10 year period beginning 10 years prior to the subsequent period of extended operation. Piping inspection location will be selected based on risk (i.e., susceptibility to degradation and consequences of failure). Inspections will utilize a method that has been demonstrated to be capable of detecting cracking, whenever coatings are removed exposing the base material. 2. Perform direct visual inspections of two 10-linear foot sections of buried carbon fiber reinforced polymer (CFRP) piping during each 10-year period beginning 10 years prior to the subsequent period of extended operation. Piping inspection	Program will be enhanced no later than six months prior to the subsequent period of extended operation. Inspections that are required to be performed prior to the subsequent period of extended operation will be completed within the	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 2 (ML25072A153)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		locations will be selected based on risk (i.e., susceptibility to degradation and consequences of failure). 3. Perform two direct visual inspections of 10-linear foot segments of buried carbon steel piping within the scope of license renewal during each 10-year period beginning 10 years prior to the subsequent period of extended operation. The number of inspections will be increased to nine 10-linear foot segments of buried carbon steel piping within the scope of license renewal if either of the following criteria are not met for the cathodic protection system protecting the buried steel piping within the scope of license renewal: a. System is maintained operational at least 85 percent of the time since 10 years prior to the subsequent period of extended operation (excluding time periods in which the cathodic protection system is off-line for testing) b. System has provided effective protection for buried steel piping as verified through acceptable annual system testing results 80% of the time since 10 years prior to the subsequent period of extended operation. Testing results for cathodic protection systems protecting steel piping is acceptable if instant off potential is -850 mV or more negative, relative to a copper/copper sulfate reference electrode. 4. Perform guided wave inspections of the common (Unit 2/3) nonsafety-related aluminum High Pressure Coolant Injection (HPCI) System suction line from the contaminated condensate storage tank to the Diesel Generator & HPCI Building. Guided wave examinations will be performed during each 10-year period beginning 10 years prior to the subsequent period of extended operation from within the Diesel Generator & HPCI Building and from the ‘B’ contaminated condensate storage tank. If examination results indicate active corrosion is occurring, then direct examination of suspect areas will be performed. If direct examination identifies loss of material that could result in a loss of pressure boundary function when extrapolated to the end of the subsequent period of extended operation, then an analysis will be conducted to determine the extent of condition and extent of cause. Additional corrective actions (e.g., repair, replacement, increased inspection sample size, increased inspection frequency) will be initiated in accordance with the corrective action program based on the extent of condition and extent of cause analysis. 5. Perform extent of condition inspections for steel and stainless steel piping as follows: When measured pipe wall thickness, projected to the end of the subsequent period of extended operation, does not meet the minimum pipe wall thickness requirements due to degradation of the external surface, the number of inspections within the affected piping categories will be doubled or increased by five, whichever is smaller. If adverse indications are found in the expanded sample, an analysis will be conducted to determine the extent of condition and	10 years prior to the subsequent period of extended operation, and no later than the last refueling outage prior to the subsequent period of extended operation.	

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		extent of cause. The scope of the follow-up inspections will be determined based on the analysis. Timing of any additional inspections will be based on the severity of the identified degradation and the consequences of leakage or loss of function. Any additional inspections will be performed within the same 10 year inspection interval in which the original degradation was identified, or within four years after the end of the 10 year interval if the degradation was identified in the latter half of the 10 year interval. Expansion of sample size may be limited by the extent of piping subject to the observed degradation mechanism or if the piping system or portion of the system is replaced within the same 10 year inspection interval in which the original degradation was identified or within four years after the end of the 10 year interval, if the degradation was identified in the latter half of the 10 year interval. 6. Perform annual system monitoring of the cathodic protection system to ensure effective protection of buried piping with a grace period of up to two months. However, in each calendar year, system monitoring is conducted at least once. 7. Perform volumetric examination of a minimum of 25 percent of the internal tank surface of buried fuel oil tanks within the scope of license renewal during each 10 year period, beginning 10 years prior to the subsequent period of extended operation if either of the following criteria are not met for the cathodic protection system protecting the individual buried steel tank: a. System is maintained operational at least 85 percent of the time since 10 years prior to the subsequent period of extended operation (excluding time periods in which the cathodic protection system is off-line for testing). b. System has provided effective protection for the buried steel tank as verified through acceptable annual system testing results 80% of the time since 10 years prior to the subsequent period of extended operation. Testing results for cathodic protection systems protecting the steel tanks is acceptable if instant off potential is -850 mV or more negative, relative to a copper/copper sulfate reference electrode. 8. Perform direct visual inspection of one 10-linear foot section of underground steel pipe located in the condensate piping vault during each 10 year period beginning 10 years prior to the subsequent period of extended operation. 9. Utilize the 100 mV minimum polarization cathodic protection acceptance criterion for aluminum piping within the scope of the program. 10. Perform monthly monitoring of the makeup flow rate from the plant service water system to the fire protection system. The results will be trended to establish a baseline and indications of abnormal flows or increasing trends will be investigated in accordance with the corrective action program. If unexplained changes to the makeup rate to the fire protection system are identified, then a flow test will be performed by the end of the next refueling outage.		

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		11. Perform monitoring of the volume of makeup water supplied to the 2/3 A(B) Condensate Storage Tanks (CST) from the makeup demineralizer system. The results will be trended to establish a baseline and indications of abnormal makeup requirements or increasing makeup trends will be investigated in accordance with the corrective action program. If unexplained changes to the volume of makeup water to the 2/3 A(B) Condensate Storage Tanks (CST) are identified, then the source of water loss will be investigated to determine if water loss is occurring through the buried aluminum HPCI line within the scope of the program.		
28	Internal Coatings/ Linings for in scope Piping, Piping Components, Heat Exchangers, and Tanks	Internal Coatings/ Linings for in scope Piping, Piping Components, Heat Exchangers, and Tanks program is a new condition monitoring program that manages degradation of internal coatings/linings exposed to raw water, treated water, fuel oil, and condensation.	Program will be implemented no later than six months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed within the 10 years prior to the subsequent period of extended operation, and no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
29	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE is an existing program that will be enhanced to: 1. Perform surface or enhanced visual examination (e.g., EVT-1) on accessible portions of a representative sample (i.e., 20 percent of population) of high-temperature drywell penetrations subject to cyclic loading and stress corrosion cracking, to detect cracking, once per 10-year interval during the subsequent period of extended operation. 2. Implement a one-time supplemental volumetric examination of the containment metal shell surfaces that are inaccessible from one side, if triggered by plant-specific OE. The trigger for this supplemental examination is plant-specific occurrence or recurrence of metal shell corrosion (base metal material loss exceeding 10 percent of nominal plate thickness over a local area as defined by ASME Section III 1965, Section N-513.3) initiated on the inaccessible side or	Program will be enhanced no later than six months prior to the subsequent period of extended operation. If required, the supplemental one-time examinations will be performed in accordance with the	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 2 (ML25072A153)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		areas, identified since the date of issuance of the first renewed license. For the purposes of this enhancement, a local area is defined as a circular area with a radius defined by ½ of the square root of the product of the drywell shell diameter times the shell thickness at the location in question. This supplemental volumetric examination consists of a sample of one-foot square locations that include both randomly-selected and focused areas most likely to experience degradation based on plant-specific OE and/or other relevant considerations such as environment. The sample size, locations, and any needed scope expansion (based on findings) for this one-time set of volumetric examinations should be determined on a plant-specific basis to demonstrate statistically with 95 percent confidence that 95 percent of the accessible portion of the containment liner is not experiencing corrosion degradation with greater than 10 percent loss of nominal thickness. If required, the supplemental volumetric examinations will be completed within two refueling outages of identification of the triggering metal shell corrosion or sooner, as determined by the corrective action program based on the severity of the identified degradation. Additionally, the corrective action program will be used to assess the results of the one-time inspection and determine the extent of examinations for the other unit. 3. Provide guidance for proper selection of bolting material and lubricants, and appropriate installation torque or tension to prevent or minimize loss of bolting preload and cracking of high-strength bolting consistent with EPRI NP-5067 and TR-104213. Also, provide guidance for storage, lubricant selection, and bolting and coating material selection consistent with Section 2 of Research Council on Structural Connections (RCSC) publication "Specification for Structural Joints Using High-Strength Bolts."	schedule identified in the commitment.	
30	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF is an existing program that will be enhanced to: 1. Perform periodic evaluations of the acceptability of inaccessible areas of supports (e.g., portions of supports encased in concrete, buried underground, or encapsulated by guard pipe), when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas of supports. Perform these evaluations once every 10 years during the subsequent period of extended operation. 2. Perform a one-time inspection of an additional five percent of the currently inspected sample size specified in Table IWF-2500-1 for Class 1, 2, and 3 piping supports. The one-time inspection will be conducted within five years prior to entering the subsequent period of extended operation. The additional supports will be selected from the remaining population of IWF piping supports not already included in the current inspection sample. The expanded sample locations will be selected to include components that are more susceptible to	Program will be enhanced no later than six months prior to the subsequent period of extended operation. One-Time inspections will be completed within the five years prior to the subsequent period of extended operation and no later than the last refueling outage prior to the subsequent	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 2 (ML25072A153)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		age-related degradation (i.e., based on factors such as time in service, material, and aggressiveness of the environment) than those not in the sample. 3. Revise procedures to require volumetric examination of high-strength bolting (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1-inch nominal diameter (including ASTM A490 and equivalent ASTM F2280), if additional high-strength bolting is installed. The examination shall be comparable to that of ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1 and performed at least once per 10-year interval to detect cracking, in addition to the VT-3 examination required by ASME Section XI. 4. Provide guidance regarding the selection of supports to be examined in subsequent inspection intervals when a support that is acceptable for continued service, as defined in IWF-3400, is restored in accordance with the corrective action program. The enhanced guidance will ensure that the successive inspection is increased or modified to include another support, of the same type and function, that has not been restored to correct the observed condition. 5. Perform volumetric examination comparable to that of ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, of twelve high strength bolts at each of the reactor vessel support skirts, one time per 10-year interval during the subsequent period of extended operation. The selection of the samples will consider susceptibility to stress corrosion cracking (e.g., actual measured yield strength) and ALARA principles. If the volumetric examination of these bolts reveals conditions that do not meet acceptance criteria, then the results will be entered into the corrective action program and the inspection will be expanded to include additional high strength bolts used at the reactor vessel support skirt to ring girder, which is comparable to the methodology used by the ASME Code, Section IWF-2430 for IWF component supports.	period of extended operation.	
31	10 CFR Part 50, Appendix J	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
32	Masonry Walls	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
33	Structures Monitoring	Structures Monitoring is an existing program that will be enhanced to: 1. Add the following structures to the scope of the program. a. Bridge over the Units 2 and 3 intake canal b. Radwaste Solidification Building c. Reactor Building Interlock (Unit 3) d. Turbine Building (Unit 1)	Program will be enhanced and the initial engineering evaluation will be completed no later than six months prior to the subsequent	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 2 (ML25072A153)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		2. Clarify that the 138 kV Control Building and the 345 kV Control Building are within the scope of the program. 3. Shorten frequency for inspecting non-segregated bus ducts supports and the ring girder for the Reactor Vessel support skirt to an interval not to exceed five years. 4. Explicitly include the following components and commodities within the scope of the program: a. Manholes b. Sliding Surfaces c. Trash Racks 5. Implement preventive actions to emphasize proper selection of bolting material and lubricants, and appropriate installation torque or tension to prevent or minimize loss of bolting preload and cracking of high-strength bolting. For ASTM A325 or ASTM A490 bolts, the preventive actions for storage, lubricant selection, and bolting and coating material selection will be in accordance with Section 2 of Research Council for Structural Connection publication “Specification for Structural Joints Using High-Strength Bolts.” 6. Clarify procedures to state that evidence of cracking, spalling, scaling, discoloration, and leaching could indicate the presence of increased porosity and permeability due to mechanisms of aggressive chemical attack or leaching of calcium hydroxide and carbonation. 7. Expand the program to monitor accessible sliding surfaces for indications of significant loss of material due to wear or corrosion, and for accumulation of debris or dirt. Establish acceptance criteria for sliding surfaces as no significant loss of material due to wear or corrosion, and no debris or dirt that could restrict or prevent sliding of the surfaces, as required by design. 8. Expand the program to monitor elastomeric structural sealants, seismic joint fillers, vibration isolators, and bearing pads for cracking, loss of material, and hardening. Supplement visual inspection of elastomeric elements with tactile inspection to detect hardening if the intended function is suspect. Establish acceptance criteria for elastomeric structural sealants, seismic joint fillers, bearing pads, and vibration isolation elements as no loss of material, cracking, or hardening that can lead to loss of intended function. 9. Develop a new implementing procedure or revise an existing implementing procedure to address aging management of inaccessible areas exposed to raw water and groundwater/soil environments that will include the following: a. Monitor raw water and groundwater chemistry, for pH, chlorides, and sulfates, on a frequency not to exceed five years that accounts for seasonal variations (e.g., quarterly monitoring every fifth year). Increase sampling locations to ensure that the results are representative of the groundwater in contact with structures within the	period of extended operation. Baseline inspections will be completed no later the last refueling outage prior to the subsequent period of extended operation. The initial replacement of the degraded components of the cable tray assembly will be performed no later than the last refueling outage prior to the subsequent period of extended operation. The final detailed evaluation of the Units 2 and 3 chimney will be completed no later than two years after entry into the subsequent period of extended operation.	RAI Set 2 (ML25128A184)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		scope of subsequent license renewal. Enter adverse results, which exceed water chemistry criteria, into the corrective action program. b. Develop engineering evaluations to evaluate the water chemistry results to assess the impact, if any, on below-grade concrete, including the potential for degradation due to the aggressive water chemistry, as well as consideration of current conditions. As part of the engineering evaluations, determine if additional actions are warranted, which might include enhanced inspection techniques and/or increased frequency, destructive testing, and focused inspections of representative accessible (leading indicator) or below grade, inaccessible concrete structural elements exposed to the potentially aggressive environment. c. Develop the initial engineering evaluations prior to the subsequent period of extended operation. Develop follow-up engineering evaluations on an interval not to exceed five years. d. If warranted based on the engineering evaluations, perform focused inspections of representative, accessible (leading indicator) structural elements, or if accessible areas will not be leading indicators for the potential aging mechanisms, excavate and inspect buried concrete elements exposed to potentially aggressive groundwater/soil. e. If degraded concrete is identified, as part of the focused inspections of leading indicators (representative, accessible or exposed inaccessible concrete), enter adverse results that exceed ACI 349.3R-02 tier 2 criteria into the corrective action program, and expose inaccessible concrete so that the extent of the condition can be determined, baseline conditions documented, and additional actions identified such as repairs, new preventive actions, additional evaluations, and future inspections. 10. Monitor and trend indications of groundwater infiltration or through-concrete leakage. If leakage volumes allow, procedures will be revised to clarify that water chemistry analysis should be considered for parameters including pH, as well as mineral, chloride, sulfate and iron content in the water to assess for potential impact on age-related degradation of concrete or steel reinforcement. This assessment may include engineering evaluation, more frequent inspections, or destructive testing of affected concrete to validate existing concrete properties, including concrete pH levels. 11. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R-02 with respect to knowledge of inservice inspection of concrete and visual acuity requirements. 12. Evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas.		

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		13. Quantitative baseline inspection data will be established against acceptance criteria provided in the enhanced Structures Monitoring program prior to the subsequent period of extended operation. Previously performed inspections that were conducted using comparable acceptance criteria are acceptable in lieu of performing a new baseline inspection. 14. Provide evaluation criteria for structural concrete using quantitative second tier criteria of Chapter 5 in ACI 349.3R-02. 15. Clarify that loose bolts and nuts are not acceptable unless accepted by engineering evaluations. 16. Provide additional guidance on visual indications such as exudations, surface staining, expansion causing structural deformation, relative movement or displacement, misalignment or distortion of attached components for detection of expansion due to alkali-aggregate reactivity in concrete. 17. Locations of degraded steel structural components due to water in-leakage in the Unit 2 torus basement will be inspected on a two-year frequency. 18. Replace the degraded components of the cable tray assemblies to return the assembly to full structural integrity. This will be performed prior to entering the subsequent period of extended operation and every 20 years thereafter. 19. Perform detailed evaluation of the Units 2 and 3 chimney in accordance with section 5.3 of ACI 349.3R-02. a. Perform the initial detailed evaluation on the quantitative results obtained during the baseline inspections. b. Identify material testing, supplemental inspections, and other corrective actions needed to establish degradation trend during the initial detailed evaluation. c. Perform the final detailed evaluation using the data obtained from the initial detailed evaluation. d. Modify future inspections and perform corrective actions as required, to ensure that the chimney's structural integrity and intended functions are maintained during the SPEO.		
34	Inspection of Water--Control Structures Associated with Nuclear Power Plants	Inspection of Water-Control Structures Associated with Nuclear Power Plants is an existing program that will be enhanced to: 1. Add the following structures to the scope of the program: a. Bridge over the Units 2 and 3 intake canal b. Deicing Line c. Circulating Water Inlet Tunnel d. Embankments of the Unit 1 intake canal e. Embankments of the Units 2 and 3 intake canal 2. Explicitly include the following components within the scope of the program: a. Stop logs	Program will be enhanced and the initial engineering evaluation will be completed no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 2 (ML25072A153)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		b. Trash racks c. Traveling screen foundations 3. Implement preventive actions to emphasize proper selection of bolting material and lubricants, and appropriate installation torque or tension to prevent or minimize loss of bolting preload and cracking of high-strength bolting. For ASTM A325 or ASTM A490 bolts, the preventive actions for storage, lubricant selection, and bolting and coating material selection will be in accordance with Section 2 of Research Council for Structural Connection publication “Specification for Structural Joints Using High-Strength Bolts.” 4. Perform above the waterline inspections of the discharge outfall structure every five years. 5. Develop a new implementing procedure or revise an existing implementing procedure to address aging management of inaccessible areas exposed to raw water and groundwater/soil environments that will include the following: a. Monitor raw water and groundwater chemistry, for pH, chlorides, and sulfates, on a frequency not to exceed five years that accounts for seasonal variations (e.g., quarterly monitoring every fifth year). Increase sampling locations to ensure that the results are representative of the groundwater in contact with structures within the scope of subsequent license renewal. Enter adverse results, which exceed water chemistry criteria, into the corrective action program. b. Develop engineering evaluations to evaluate the water chemistry results to assess the impact, if any, on below-grade concrete, including the potential for degradation due to the aggressive water chemistry, as well as consideration of current conditions. As part of the engineering evaluations, determine if additional actions are warranted, which might include enhanced inspection techniques and/or increased frequency, destructive testing, and focused inspections of representative accessible (leading indicator) or below grade, inaccessible concrete structural elements exposed to the potentially aggressive environment. c. Develop the initial engineering evaluations prior to the subsequent period of extended operation. Develop follow-up engineering evaluations on an interval not to exceed five years. d. If warranted based on the engineering evaluations, perform focused inspections of representative, accessible (leading indicator) structural elements, or if accessible areas will not be leading indicators for the potential aging mechanisms, excavate and inspect buried concrete elements exposed to potentially aggressive groundwater/soil. e. If degraded concrete is identified, as part of the focused inspections of leading indicators (representative, accessible or exposed inaccessible concrete), enter adverse results that exceed ACI 349.3R-02 tier 2	Baseline inspections will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
		criteria into the corrective action program, and expose inaccessible concrete so that the extent of the condition can be determined, baseline conditions documented, and additional actions identified such as repairs, new preventive actions, additional evaluations, and future inspections. f. Monitor and trend indications of groundwater infiltration or through-concrete leakage. If leakage volumes allow, procedures will be revised to clarify that water chemistry analysis should be considered for parameters including pH, as well as mineral, chloride, sulfate and iron content in the water to assess for potential impact on age-related degradation of concrete or steel reinforcement. This assessment may include engineering evaluation, more frequent inspections, or destructive testing of affected concrete to validate existing concrete properties, including concrete pH levels. 6. Evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas. 7. Quantitative baseline inspection data will be established against acceptance criteria provided in the enhanced Inspection of Water-Control Structures Associated with Nuclear Power Plants program prior to the subsequent period of extended operation. Previously performed inspections that were conducted using comparable acceptance criteria are acceptable in lieu of performing a new baseline inspection. 8. Provide evaluation criteria for structural concrete using quantitative second tier criteria of Chapter 5 in ACI 349.3R-02. 9. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R-02 with respect to knowledge of inservice inspection of concrete and visual acuity requirements. 10. Clarify that loose bolts and nuts are not acceptable unless accepted by engineering evaluation. 11. Perform below the waterline inspections of the discharge outfall structure every three refueling cycles. 12. Require visual inspections of submerged concrete structural components by dewatering a structure or by a diver or remote imaging equipment if the structure is not dewatered at least once every five (5) years.		
35	Protective Coating Monitoring and Maintenance	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
36	Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is an existing program that will be enhanced to: 1. Evaluate plant specific OE for previously identified and mitigated adverse localized environments' cumulative aging effects applicable to in scope cable and connection insulation to confirm that the insulation's intended functions continue to be supported during the SPEO. 2. Perform testing of a sample population when a large number of cables are identified as degraded. The sample size will be 20 percent of each affected cable and connection type with a maximum sample size of 25.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
37	Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
38	Electrical Insulation for Inaccessible Medium Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	The Electrical Insulation for Inaccessible Medium Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is an existing program that will be enhanced to: 1. Perform cable testing of the circuits in the scope of this program at a frequency of at least once every six years. The first periodic test will be performed prior to the subsequent period of extended operation. 2. Perform inspections for water accumulation in manholes, duct banks, and conduit ends in the scope of this program after event driven occurrences that could result in water accumulation and cable submergence. 3. Perform periodic inspections for water accumulation in manholes MH-16 and SBO-4. The first periodic inspection will be performed prior to the subsequent period of extended operation.	Program will be enhanced no later than six months prior to the subsequent period of extended operation. Tests and inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
39	Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new condition monitoring program that will manage the effects of reduced insulation resistance of non-EQ, in scope, inaccessible (e.g., installed in buried conduits, cable trenches, cable troughs, duct banks, underground vaults, or direct buried installations), instrument and control cables, exposed to significant moisture.	Program will be implemented no later than six months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
40	Electrical Insulation for Inaccessible Low Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new condition monitoring program that will manage the effects of reduced insulation resistance of non-EQ, in scope, inaccessible (e.g., installed in buried conduits, cable trenches, cable troughs, duct banks, underground vaults, or direct buried installations), low-voltage power cables (operating voltage less than 2 kV), exposed to significant moisture.	Program will be implemented no later than six months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
41	Metal Enclosed Bus	The Metal Enclosed Bus is an existing program that will be enhanced to: 1. Perform periodic inspections of the 4kV switchgear 33 accessible bus duct and a sample of metal enclosed bus bolted connections. The first periodic inspection will be performed prior to the subsequent period of extended operation.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
			Inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	
42	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification aging management program is a new condition monitoring program that requires testing of a representative sample of electrical connections prior to the subsequent period of extended operation. The results will be evaluated to determine if there is a need for subsequent periodic testing on a 10-year frequency.	Program will be implemented no later than six months prior to the subsequent period of extended operation. Tests that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
43	Fatigue Monitoring	Fatigue Monitoring is an existing program that will be enhanced to: 1. The SI:FatiguePro™ software will be updated to monitor for environmentally assisted fatigue at additional plant-specific component locations that may be more limiting than the sample set identified in NUREG/CR-6260. The CUF_{en} values for the additional plant-specific component locations monitored for environmentally assisted fatigue will be calculated in accordance with the methodology in NUREG/CR-6909, Revision 1. 2. Procedural direction will be provided to require periodic validation of chemistry parameters used to determine Fen factors used in SI:FatiguePro™. 3. Applicable fatigue analyses and monitored component locations will be updated based on operating experience, plant modifications, inspection findings, changes to transient definitions, and unanticipated newly discovered fatigue loading events. 4. The SI:FatiguePro™ software will be updated to include all six components of the stress tensor as input into stress-based fatigue transfer functions.	Program will be enhanced no later than six months prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007) SLRA Supplement 1 (ML25051A253)

Item No.	UFSAR Supplement Section	Commitment	Implementation Schedule	Source
44	Neutron Fluence Monitoring	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)
45	Environmental Qualification (EQ) of Electric Components	Environmental Qualification (EQ) of Electric Components is an existing program that will be enhanced to: 1. Visually inspect accessible, passive EQ equipment located in adverse localized environments at least once every 10 years. The first periodic inspection will be performed prior to the subsequent period of extended operation.	Program will be enhanced no later than six months prior to the subsequent period of extended operation. Inspections that are required to be completed prior to the subsequent period of extended operation will be completed no later than the last refueling outage prior to the subsequent period of extended operation.	SLRA, Appendix A, Table A.5 (ML24108A007)
46	Operating Experience	Existing program is credited.	Ongoing	SLRA, Appendix A, Table A.5 (ML24108A007)

APPENDIX B

CHRONOLOGY

APPENDIX B – CHRONOLOGY

This appendix lists chronologically the routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and Constellation Energy Generation, LLC (CEG). This appendix also lists other correspondence under Dresden Nuclear Power Station (Dresden), Units 2 and 3, Docket Nos. 50-237 and 50-249, respectively, related to the NRC staff's review of the Dresden, Units 2 and 3, subsequent license renewal application. These documents may be obtained online in the NRC's Agencywide Documents Access and Management System (ADAMS) Public Documents collection at https://www.nrc.gov/reading-rm/adams.html. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov.

Table B-1 Chronology

Date	ADAMS Accession No.	Subject
7/23/2023	ML23193A005	NRC. Dresden, Units 2 and 3, Subsequent License Renewal Application – Public Meeting Summary of Pre-submittal Meeting
4/17/2024	ML24108A007	CEG. Dresden Nuclear Power Station, Units 2 and 3, Application for Renewed Operating License
5/1/2024	ML24092A340 (Package) ML24092A341 (Letter)	NRC. Notice of Availability Letter
5/7/2024	ML24092A342 (87 FRN 38197)	NRC. Federal Register Notice, Dresden Nuclear Power Station, Units 2 and 3 – Notice of Availability, Regarding the Constellation Energy Generation, LLC Application for Subsequent License Renewal
6/14/2024	ML24128A273 (Package) ML24128A274 (Letter)	NRC. Dresden Nuclear Power Station, Units 2 and 3 – Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Opportunity for a Hearing Regarding the Constellation Energy Generation, LLC Application for Subsequent License Renewal
6/18/2024	ML24138A181	NRC. Dresden Nuclear Power Station, Units 2 and 3 – Aging Management Audit Plan Regarding the Subsequent License Renewal Application Review
6/18/2024	ML24131A062	NRC. Dresden Nuclear Power Station, Units 2 and 3 – Subsequent License Renewal Application Online Reference Portal
6/24/2024	ML24128A275 (89 FR 52514)	NRC. Federal Register Notice, Dresden Nuclear Power Station, Units 2 and 3 – Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Opportunity for a Hearing Regarding the Constellation Energy Generation, LLC Application for Subsequent License Renewal
8/2/2024	ML24184A171	NRC. Dresden Nuclear Power Station, Units 2 And 3 – Subsequent License Renewal Application Review Schedule Letter
2/20/2025	ML25051A253	CEG. Supplement No. 1 – Changes to the Dresden Nuclear Power Station, Units 2 and 3, Subsequent License Renewal Application

Date	ADAMS Accession No.	Subject
3/13/2025	ML25072A153	CEG. Supplement No. 2 – Changes to the Dresden Nuclear Power Station, Units 2 and 3, Subsequent License Renewal Application
3/17/2025	ML25076A728	NRC. Request for Additional Information – Set 1
3/17/2025	ML25076A731	NRC. Request for Confirmation of Information – Set 1
3/26/2025	ML25086A005	NRC. Request for Confirmation of Information – Set 2
4/3/2025	ML25093A082	CEG. Annual Update
4/10/2025	ML25100A132	CEG. Response to Request for Additional Information Set 1 and Request for Confirmation of Information Sets 1 and 2
4/28/2025	ML25118A278	CEG. Supplement No. 3 – Changes to the Dresden Nuclear Power Station, Units 2 and 3, Subsequent License Renewal Application
5/8/2025	ML25128A184	CEG. Response to Request for Additional Information Set 2 and Request for Confirmation of Information Set 3
6/12/2025	ML25126A252	NRC. Aging Management Audit Report
8/7/2025	ML25198A191	NRC. Dresden Units 2 and 3 - Schedule Revision for the Subsequent License Renewal Application Review

APPENDIX C

PRINCIPAL CONTRIBUTORS

APPENDIX C – PRINCIPAL CONTRIBUTORS

This appendix lists the principal contributors for the development of this safety evaluation and their corresponding areas of responsibility.

Table C-1 Principal Contributors

Name	Area of Responsibility
Allik, Brian	Reviewer—Mechanical and Materials
Alvarado, Lydiana	Reviewer—Mechanical and Materials
Ambrosini, Jo	Reviewer—Nuclear
Atienza, Rob	Reviewer—Scoping and Screening Methodology
Benson, Michael	Reviewer—Mechanical and Materials
Bloom, Steve	Management Oversight
Boruk, Reena	Reviewer—Mechanical and Materials
Buford, Angela	Management Oversight
Cintron-Rivera, Jorge	Reviewer—Electrical
Dijamco, David	Reviewer—Mechanical and Materials
Foli, Adakou	Reviewer—Electrical
Fu, Bart	Reviewer—Mechanical and Materials
Gardner, William (Tony)	Reviewer—Mechanical and Materials
Gibson, Lauren	Management Oversight
Haywood, Emma	Reviewer—Mechanical and Materials
Hernandez, Raul	Reviewer—Scoping and Screening Methodology
Iqbal, Naeem	Reviewer—Scoping and Screening Methodology
Ista, Ata	Reviewer—Structural
Jenkins, Joel	Reviewer—Mechanical and Materials
Johnson, Andrew	Reviewer—Mechanical and Materials
Kalikian, Varoujan	Reviewer—Mechanical and Materials
Klein, Paul	Reviewer—Mechanical and Materials
Koch, Patrick	Management Oversight
Krepel, Scott	Management Oversight
Lai, Shaohua	Reviewer—Structural
Lee, Samuel	Management Oversight
Levitus, Steven	Reviewer—Mechanical and Materials
Makar, Gregory	Reviewer—Mechanical and Materials
McConnel, Matthew	Reviewer—Electrical
McGuire, Miranda	Reviewer—Mechanical and Materials
Medoff, James	Reviewer—Mechanical and Materials
Miller, Kenn	Reviewer—Electrical
Min, Seung	Reviewer—Mechanical and Materials
Mitchell, Matthew	Management Oversight
Murdock, Darrell	Management Oversight
Neuhausen, Alissa	Management Oversight

Name	Area of Responsibility
Paige, Jason	Management Oversight
Palmer, Eric	Reviewer—Mechanical and Materials
Park, Si Hwan	Reviewer—Structural
Parker, Cory	Reviewer—Mechanical and Materials
Ramadan, Liliana	Reviewer—Electrical
Ray, Devandra	Reviewer—Mechanical and Materials
Rezai, Ali	Reviewer—Mechanical and Materials
Rogers, Bill	Reviewer—Scoping and Screening Methodology
Sampson, Michele	Management Oversight
Scully, Derek	Reviewer—Scoping and Screening Methodology
Sida, Karen	Reviewer—Mechanical and Materials
Terry, Leslie	Reviewer—Mechanical and Materials
Thomas, George	Reviewer—Structural
Tseng, Ian	Management Oversight
Tyree, Christopher	Reviewer—Scoping and Screening Methodology
Valentin, Milton	Management Oversight
Wagage, Hanry	Reviewer—Scoping and Screening Methodology
Wang, George	Reviewer—Structural
Wise, Brandon	Reviewer – Reactor Systems
Wise, John	Senior Technical Advisor
Yee, On	Reviewer—Mechanical and Materials
Yoder, Matthew	Reviewer—Chemical
Yoo, Mark	Project Manager

APPENDIX D

REFERENCES

APPENDIX D – REFERENCES

This appendix lists the references used throughout this safety evaluation for review of the Dresden Nuclear Power Station, Units 2 and 3, subsequent license renewal application.

Table D-1 References

References
U.S. Nuclear Regulatory Commission (NRC)
Generic Letter 81-11, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking (NUREG-0619)," dated February 29, 1981
Generic Letter 82-04, "Use of INPO SEE-IN Program," dated March 9, 1982
NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking: Resolution of Generic Technical Activity A-10," Revision 1, November 1980 (ML031600712)
NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980 (ML051400209)
NUREG 1509, "Radiation Effects on Reactor Pressure Vessel Supports," May 1996
NUREG-1796, "Safety Evaluation Report Related to the License Renewal of the Dresden Nuclear Power Station, Units 2 and 3 and Quad Cities Nuclear Power Station, Units 1 and 2," October 2004 (ML043060582 and ML043060584)
NUREG-2191, Volumes 1 and 2, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," July 2017 (ML17187A031 and ML17187A204)
NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," July 2017 (ML17188A158)
NUREG/CR-6001, "Aging Assessment of BWR Standby Liquid Control Systems," August 1992 (ML040340671)
NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," March 1995 (ML031480219)
NUREG/CR-6909, "Effect of LWR Coolant Environments on the Fatigue Life of Reactor Materials," Revision 1, May 2018 (ML16319A004)
RG 1.99, "Radiation Embrittlement of Reactor Vessel Material," Revision 2, May 1988 (ML003740284)
RG 1.127, "Criteria and Design Features for Inspection of Water-Control Structures Associated with Nuclear Power Plants." Revision 2, February 2016 (ML15107A412)
RG 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," Revision 0, March 2001 (ML010890301)
RG 1.207, "Guidelines for Evaluating the Effects of Light-Water Reactor Environments in Fatigue Analyses of Metal Components," Revision 1, June 2018 (ML16315A130)
Regulatory Issue Summary 2008-30, "Fatigue Analysis of Nuclear Power Plant Components," December 16, 2008 (ML083450727)
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