Safety Evaluation

Related to the License Renewal of Diablo Canyon Nuclear Power Plant, Units 1 and 2

Docket Nos. 50-275 and 50-323

Pacific Gas and Electric Company

Issued: June 2025

Office of Nuclear Reactor Regulation

ABSTRACT

This safety evaluation (SE) documents the safety review by the U.S. Nuclear Regulatory Commission (NRC) staff of the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 license renewal application (LRA).

DCPP is located in San Luis Obispo County, CA, approximately 12 miles west-southwest of the City of San Luis Obispo, CA. DCPP, Units 1 and 2 both employ a four-loop pressurized water reactor Nuclear Steam Supply System supplied by Westinghouse Electric Corporation. The plant's licensee, Pacific Gas and Electric Company (PG&E), designed and constructed the balance of the plant with the assistance of various consultants, including Bechtel. The licensed reactor core power level of each unit is 3,411 megawatts thermal.

By letter dated November 7, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23311A154), as supplemented, PG&E submitted to the NRC the LRA for the DCPP 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." PG&E requested renewal for a period of 20 years beyond the current expiration at midnight on November 2, 2024, for Unit 1 (Facility Operating License No. DPR-80) and at midnight on August 26, 2025, for Unit 2 (Facility Operating License No. DPR-82). Consistent with an exemption from the NRC's rules issued to PG&E on March 2, 2023 (ML23026A115), and the NRC's finding that the LRA was acceptable for docketing on December 19, 2023 (ML23341A004), the DCPP, Units 1 and 2 licenses are in timely renewal under NRC regulations and do not expire until the NRC has made a final determination on whether to approve the LRA.

This SE documents the NRC staff's safety review of the information submitted by PG&E through March 6, 2025. Based on its review of this information, the NRC staff determined that PG&E has met the requirements of 10 CFR 54.29(a).

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ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
AC	alternating current
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act
AERM	aging effect requiring management
AMP	Aging Management Program
AMR	aging management reviews
AMSAC	ATWS mitigation system actuation circuitry
ANSI	American National Standards Institute
ASME	American Society for Mechanical Engineers
ASR	alkali-silica reaction
ASTM	American Society for Testing and Materials
ASW	auxiliary saltwater
ATWS	anticipated transients without scram
B&PV	Boiler and Pressure Vessel
B&W	Babcock & Wilcox
BIT	Boron Injection Tank
BMI	bottom mounted instrument
BWR	boiling-water reactor
BWRVIP	Boiling Water Reactor Vessel Internals Project
CAP	corrective action program
CASS	cast austenitic stainless steel
CETNA	core exit thermocouple nozzle assemblies
CLB	current licensing basis
CMAA	Crane Manufacturers Association of America
CRDM	control rod drive mechanism
CRGT	control rod guide tube
CST	condensate storage tank
CUF	cumulative usage factor
DBA	design-basis accident
DBE	design-basis event

DDE	double design earthquake
DE	design earthquake
DFOST	diesel fuel oil storage tank
DMW	dissimilar metal welds
EAF	environmentally assisted fatigue
EDG	emergency diesel generator
EFPY	effective full-power years
EOLE	end-of-license extension
EPRI	Electric Power Research Institute
EPU	extended power uprate
EQ	environmental qualification
ESF	engineered safety features
FOLS	facility operating license
FR	*Federal Register*
FSAR	final safety analysis report
FWST	fire water storage tank
GALL	Generic Aging Lessons Learned for Subsequent License
GALL-SLR	*Generic Aging Lessons Learned for Subsequent License Renewal Report (NUREG-2191)*
HE	Hosgri earthquake
HELB	high-energy line break
I&C	instrumentation and controls
I&E	inspection and evaluation
IASCC	irradiation-assisted stress corrosion cracking
IGSCC	intergranular stress corrosion cracking
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
ISG	interim staff guidance
ISI	inservice inspection
L&C	limitations and conditions
LBB	leak-before-break
LR	license renewal
LRA	license renewal application
LRBD	license renewal boundary drawings
LTOP	Low-Temperature Overpressure Protection
LWR	light water reactor
MEB	Metal Enclosed Bus

MIC	microbiologically induced corrosion
MRP	Material Reliability Program
NDT	nil-ductility transition
NDTT	nil-ductility transition temperature
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NSSS	nuclear steam supply system
OE	operating experience
PEO	period of extented operation
PG&E	Pacific Gas and Electric Company
P-T	pressure-temperature
PTLR	pressure-temperature limits report
PTS	pressurized thermal shock
PVC	polyvinyl chloride
PWR	pressurized-water reactors
PWROG	Pressurized-Water Reactor Owners Group
PWSCC	primary water stress corrosion cracking
PWST	primary water storage tank
QA	quality assurance
RAI	requests for additional information
RB	reactor building
RCI	request for confirmation of information
RCL	reactor coolant line
RCPB	reactor coolant pressure boundary
RCP	reactor coolant pumps
RCS	reactor coolant system
RCSC	Research Council for Structural Connections
RHR	residual heat removal
RPV	reactor pressure vessel
RRVCH	replacement reactor vessel closure head
RT	reference temperature
RTD	resistance temperature detector
RTS	reactor trip system
RT_{NDT}	reference temperature for nil-ductility transition
RV	reactor vessel
RVI	reactor vessel internal

RWST	refueling water storage tank
SBO	station blackout
SC	structures and components
SCC	stress corrosion cracking
SE	safety evaluation
SEEIN	Significant Event Evaluation and Information Network
SER	safety evaluation report
SFP	spent fuel pool
SG	steam generator
SLR	subsequent license renewal
SRP	Standard Review Plan
SRP-SLR	*Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants (NUREG-2192)*
SSC	structures, systems, and components
SSER	supplemental safety evaluation report
SWOL	structural weld overlay
TC	transfer canal
TLAA	time-limited aging analyses
TR	topical report
TS	technical specifications
UFSAR	updated final safety analysis report
USAR	updated safety analysis report
USE	upper-shelf energy
UT	ultrasonic testing

SECTION 1 INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This safety evaluation (SE) documents the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff's safety review of the license renewal application (LRA) for the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 submitted by Pacific Gas and Electric Company (PG&E, the applicant) by letter dated November 7, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23311A154), as supplemented.

The LRA seeks to renew Facility Operating License Nos. DPR-80 and DPR-82 for DCPP, Units 1 and 2, respectively, for an additional 20 years beyond the current expiration of the licenses on November 2, 2024, for Unit 1, and August 26, 2025, for Unit 2. Consistent with an exemption from the NRC's rules issued to PG&E on March 2, 2023 (ML23026A115), and the NRC's finding that the LRA was acceptable for docketing on December 19, 2023 (ML23341A004), the DCPP, Units 1 and 2 licenses are in timely renewal under NRC regulations and do not expire until the NRC has made a final determination on whether to approve the LRA. The NRC staff performed a safety review of the LRA 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," and applicable NRC guidance. The NRC project manager for the safety review was Brian Harris. Mr. Harris may be contacted by email at Brian.Harris2@nrc.gov.

DCPP is located in San Luis Obispo County, CA, approximately 12 miles west-southwest of the City of San Luis Obispo, CA. The construction permits for DCPP, Units 1 and 2 were issued on April 23, 1968 and December 9, 1970, respectively. The operating licenses for DCPP, Units 1 and 2 were issued on November 2, 1984 and August 26, 1985, respectively. DCPP, Units 1 and 2 both employ a four-loop pressurized water reactor (PWR) Nuclear Steam Supply System supplied by Westinghouse Electric Corporation. PG&E designed and constructed the balance of the plant with the assistance of various consultants, including Bechtel. The licensed reactor core power level of each unit is 3,411 megawatts thermal with a gross electrical output of approximately 1,190 megawatts electric. The DCPP updated final safety analysis report (UFSAR) (ML24323A239) contains details of the plant and the site.

The NRC license renewal process consists of two concurrent reviews: (1) a safety review and (2) an environmental review. NRC regulations in 10 CFR Part 54 and 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," set forth the requirements for the safety review and the environmental review, respectively. The safety review of the DCPP LRA is based on the LRA, NRC staff audits, responses to the staff's requests for additional information (RAIs), and responses to the staff's requests for confirmation of information (RCIs). PG&E supplemented the LRA and provided clarifications through its responses to the staff audits, RAIs, and RCIs, as well as through meetings and docketed correspondence. Unless otherwise noted, the staff reviewed and considered information submitted through March 6, 2025.

The public may obtain publicly available information related to the LRA on the Federal Rulemaking Website at https://www.regulations.gov by searching for Docket ID NRC-2023-0192. The public may also obtain publicly available documents online in the 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, at 301-415-4737, or by email to PDR.Resource@nrc.gov. The PDR, where the public may examine and order copies of publicly available documents, is open by appointment. To make an appointment to visit the PDR, please send an email to PDR.Resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8 a.m. and 4 p.m. Eastern Time, Monday through Friday, except Federal holidays. Finally, information is also available on the NRC website at https://www.nrc.gov/reactors/operating/licensing/renewal/applications/diablo-canyon.html.

This SE summarizes the results of the NRC staff's safety review of the LRA and the technical details considered in evaluating the safety aspects of the units' proposed operation for an additional 20 years beyond the term of the current operating licenses. The staff's safety review was performed in accordance with applicable NRC regulations and guidance, specifically, 10 CFR Part 54, NUREG 1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), dated December 2010 (ML103490036), and NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report" (GALL Report), dated December 2010 (ML103490041).

SE Sections 2 through 4 summarize the NRC staff's evaluation of license renewal issues considered during the safety review of the LRA. SE Section 5 discusses the required role of the Advisory Committee on Reactor Safeguards (ACRS). The conclusions of this SE are in Section 6.

SE Appendix A contains a table showing PG&E's commitments for renewal of the operating licenses. SE Appendix B contains a chronology of the principal correspondence between the NRC staff and PG&E, as well as other relevant correspondence, regarding the safety review of the LRA. SE Appendix C contains a list of the principal contributors to this SE, and SE Appendix D contains a bibliography of the references that support the staff's safety review.

1.2 License Renewal Background

Under the Atomic Energy Act of 1954, as amended (AEA), and NRC regulations, the NRC issues initial operating licenses for commercial nuclear 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 renewals of nuclear power operating licenses for up to 20 additional years per renewal. The NRC issues renewed operating licenses only after it determines that a nuclear power reactor can operate safely to the end of the period of extended operation. There are no limitations in the AEA or NRC regulations limiting the number of times an operating license may be renewed.

In 1982, the NRC staff anticipated interest in license renewal and held a workshop on nuclear power plant aging. This workshop led the NRC to establish a comprehensive program plan for nuclear plant aging research. From the results of that research, a technical review group concluded that many aging phenomena are readily manageable and pose no technical issues that would prevent life extension for nuclear power plants. In 1986, the NRC staff published a request for comment on a policy statement intended to address major policy, technical, and procedural issues related to license renewal for nuclear power plants.

In 1991, the NRC published what it called the License Renewal Rule as 10 CFR Part 54 (see Volume 56, page 64943 of the *Federal Register* (FR) (56 FR 64943), dated December 13, 1991). After publication of this original License Renewal Rule, the NRC staff participated in an industry sponsored demonstration program to apply 10 CFR Part 54 to a pilot nuclear power plant and to gain experience to develop implementation guidance. To establish a scope of review for license renewal, the original 10 CFR Part 54 License Renewal Rule defined age-related degradation unique to license renewal; however, during the industry sponsored demonstration program on the pilot plant, the NRC staff found that adverse aging effects on plant systems and components are also managed during the period of the initial license and that the scope of the license renewal review did not allow sufficient credit for those management programs. In particular, the original 10 CFR Part 54 License Renewal Rule did not sufficiently credit the implementation of 10 CFR 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants,” for regulating the management of plant aging phenomena. As a result of this finding, the NRC amended 10 CFR Part 54 on May 8, 1995 (60 FR 22461). Amended 10 CFR Part 54 establishes a regulatory process that is simpler, more stable, and more predictable than the original 10 CFR Part 54 regulatory process. In particular, the amended License Renewal Rule at 10 CFR Part 54 focuses on the management of adverse aging effects rather than on the identification of age-related degradation unique to license renewal. The NRC made these rule changes to ensure that important systems, structures, and components (SSCs) will continue to perform their intended functions during the period of extended operation. In addition, the amended 10 CFR Part 54 clarifies and simplifies the integrated plant assessment process to be consistent with the revised focus on passive, long-lived structures and components.

Concurrent with these initiatives, the NRC pursued a separate rulemaking effort to focus the scope of the environmental review of license renewal (61 FR 28467, June 5, 1996). This resulted in a rule entitled “Environmental Review for Renewal of Nuclear Power Plant Operating Licenses,” which amended 10 CFR Part 51 and describes the NRC staff’s responsibilities under the National Environmental Policy Act of 1969, as amended, with respect to license renewal reviews.

1.2.1 Safety Review

As described in 10 CFR Part 54, the focus of the NRC staff’s license renewal 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 license renewal to perform their intended functions, and to demonstrate that these effects will be adequately managed during the period of extended operation. The license renewal requirements for power reactors 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 exceptions of the detrimental aging effects on the functions of certain SSCs, as well as 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 license renewal as including the following SSCs:

(1) Safety-related SSCs 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 10 CFR 50.34(a)(1), 50.67(b)(2), or 100.11, as applicable.

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

(3) All SSCs relied on 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), a license renewal 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, as described in 10 CFR 54.4, without moving parts or without a change in configuration or properties and that are not subject to replacement based on a qualified life or specified time period. As also required by 10 CFR 54.21(a), 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, the 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), an LRA must include a final safety analysis report (FSAR) supplement with a summary description of the applicant's programs and activities for managing the effects of aging and an evaluation of time-limited aging analyses (TLAAs) for the period of extended operation.

License renewal also requires the identification and updating of TLAAs. Section 54.3, "Definitions," of 10 CFR establishes the criteria that determine which licensee calculations and analyses are to be considered TLAAs for the purposes of license renewal. As required by 10 CFR 54.21(c)(1), the applicant must demonstrate either that these analyses will remain valid for the period of extended operation, that these 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 LRA, PG&E stated that it used the process defined in the GALL Report, 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 the safety review of the LRA can be greatly reduced, improving the efficiency and effectiveness of the review process. The GALL 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 applicants and staff reviewers on AMPs and activities that can manage aging adequately during the period of extended operation.

1.2.2 Environmental Review

Part 51 of 10 CFR contains the NRC's regulations on environmental protection. In December 1996, the NRC revised these regulations to help facilitate the environmental review of LRAs. The NRC staff also prepared NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (the GEIS) (ML24087A133), to document its evaluation of possible environmental impacts associated with nuclear power plant license renewals. For certain types of environmental impacts (i.e., Category 1 issues), the GEIS contains generic findings that apply to all nuclear power plants and that are codified in Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of 10 CFR Part 51. Pursuant to 10 CFR 51.53(c)(3)(i), a license renewal applicant may incorporate these generic findings into its environmental report. In accordance with 10 CFR 51.53(c)(3)(ii), an environmental report must also include analyses of the environmental impacts that must be evaluated on a plant-specific basis (i.e., Category 2 issues).

In accordance with National Environmental Policy Act and 10 CFR Part 51, the NRC staff is required to review the plant-specific environmental impacts related to the DCPP LRA, including any new and significant information that was not considered in the GEIS. As part of its environmental scoping process, the staff held public scoping meetings, one via webinar on February 1, 2024 (ML24030A806), and one in person on February 8, 2024 (ML24022A104), to assist the staff in identifying plant-specific environmental issues. The staff issued an environmental scoping summary report in September 2024, which includes the comments received during the scoping process and the staff's responses to those comments (ML24240A023).

In October 2024, the NRC staff issued the draft of a GEIS supplement specific to the DCPP LRA (ML24299A167), which documents the results of the staff's environmental review and makes a preliminary recommendation on the LRA based on environmental considerations. The staff will consider comments on this draft document received from members of the public and local, State, Federal, and Tribal agencies. After considering these comments, the staff will publish the final version of the GEIS supplement separately from this SE.

1.3 Principal Review Matters

Part 54 of 10 CFR describes the requirements for the renewal of operating licenses for nuclear power plants. The NRC staff's safety review of the DCPP LRA was performed in accordance with 10 CFR Part 54 and applicable guidance. Section 54.29, "Standards for issuance of a renewed license," of 10 CFR sets forth the license renewal standards. This SE summarizes the results of the staff's safety review in accordance with 10 CFR Part 54 requirements.

As required by 10 CFR 54.19(a), an LRA must provide general information as specified in 10 CFR 50.33(a) through (e), (h), and (i), which PG&E provided in LRA Section 1. The NRC staff reviewed LRA Section 1 and finds that it provides the required information.

As required by 10 CFR 54.19(b), an LRA 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." On this issue, PG&E stated, in part, in LRA Section 1.1.8 the following:

> Indemnity Agreement No. B-75 states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the attachment. Indemnity Agreement B-75 had Amendments 1 - 10 and there are no new Amendments; only Amendments 7 and 8 discuss item 3. Amendment No. 7 (Reference DC8411150132) to Indemnity Agreement No. B-75 was issued as part of the Unit 1 full power license DPR-80 on November 2, 1984. Amendment No. 8 (Reference DC8505070305) to Indemnity Agreement No. B-75 was issued as part of the Unit 2 full power license DPR-82 on April 25, 1985. Neither of these amendments had an expiration date specified in Item 3. Therefore, no conforming changes to the indemnity agreement are deemed necessary as part of this application. Should the license numbers be changed by the NRC upon issuance of the renewed license, PG&E requests that NRC amend the indemnity agreement to include conforming changes to Item 3 of the attachment and other affected sections of the agreement.

The NRC staff intends to maintain the original license numbers upon the issuance of the renewed licenses, if approved. Therefore, PG&E need not make conforming changes to the indemnity agreement, and the NRC staff finds that the LRA meets 10 CFR 54.19(b).

As required by 10 CFR 54.21, “Contents of application—technical information,” the LRA must contain (1) an integrated plant assessment, (2) a description of any CLB changes during the NRC staff’s review of the LRA, (3) an evaluation of TLAAs, and (4) an FSAR supplement. LRA Section 2, Section 3, Section 4, and Appendix B address the license renewal requirements of 10 CFR 54.21(a) and (c). LRA Appendix A satisfies the license renewal requirement of 10 CFR 54.21(d). By letter dated March 6, 2025 (ML25069A508), PG&E submitted an LRA amendment that summarizes the CLB changes that have occurred during the staff’s review of the LRA. This submission satisfies 10 CFR 54.21(b).

As required by 10 CFR 54.22, “Contents of application—technical specifications,” the LRA must include any changes or additions to the technical specifications (TS) necessary to manage the effects of aging during the period of extended operation. In LRA Appendix D, PG&E stated that it has not identified any TS changes necessary for issuance of the renewed operating licenses. This statement adequately addresses 10 CFR 54.22.

The NRC staff evaluated the technical information required by 10 CFR 54.21 and 10 CFR 54.22 in accordance with applicable NRC regulations and guidance. SE Sections 2, 3, and 4 summarize the staff’s evaluation of the remainder of the LRA technical information.

As required by 10 CFR 54.25, “Report of the Advisory Committee on Reactor Safeguards,” the ACRS will review and report on the LRA. SE Section 5 discusses the required role of the ACRS. SE Section 6 documents the NRC findings required by 10 CFR 54.29.

1.4 Interim Staff Guidance

License renewal is a living program. The NRC staff, industry, and other interested stakeholders gain experience and develop lessons learned with each license renewal review. The lessons learned contribute to the staff’s performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence. To these ends, the NRC issues license renewal interim staff guidance (ISG) that the staff, industry, and other interested stakeholders can use until the NRC can incorporated it into license renewal guidance documents such as the SRP-LR and the GALL Report.

Table 1.4-1 shows the current set of license renewal ISG topics, as well as the sections in this SE that address each topic.

Table 1.4-1. Current License Renewal Interim Staff Guidance

License Renewal ISG Topic (Approved LR-ISG Number)	Title	SE Section(s)
LR-ISG-2012-01 (ML12352A057)	Wall Thinning Due to Erosion Mechanisms	3.0.3.2.4
LR-ISG-2012-02 (ML13227A361)	Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation	3.0.3.1.11 3.0.3.2.11
LR-ISG-2013-01 (ML14225A059)	Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers, and Tanks	3.0.3.2.17
LR-ISG-2015-01 (ML15308A018)	Changes to Buried and Underground Piping and Tank Recommendations	3.0.3.1.9
LR-ISG-2016-01 (ML16237A383)	Changes to Aging Management Guidance for Various Steam Generator Components	3.0.3.2.6
SLR-ISG-2021-01-PWRVI (ML20217L203)	Updated Aging Management Criteria for Reactor Vessel Internal Components for Pressurized-Water Reactors	3.0.3.1.6
SLR-ISG-2021-02-MECHANICAL (ML20181A434)	Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance	3.0.3.1.2

1.5 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 yet received the necessary documentation to confirm that resolution. After reviewing the DCPP LRA and all the related information submitted through March 6, 2025, the staff has determined that no confirmatory items exist that require a formal response from PG&E.

1.6 Summary of Proposed License Conditions

After reviewing the DCPP LRA and all the related information submitted through March 6, 2025, the NRC staff determined that the imposition of two license conditions was appropriate and necessary.

The first license condition requires PG&E, following the NRC's issuance of the renewed licenses, to include the license renewal UFSAR supplement (containing a summary description of the programs and activities for managing the effects of aging and an evaluation of TLAAs for the period of extended operation (as required by 10 CFR 54.21(d))) in its next periodic UFSAR update required by 10 CFR 50.71(e). The regulations at 10 CFR 50.71(e) require each nuclear power plant licensee to periodically update its plant's UFSAR "to assure that the information included in the report contains the latest information developed." PG&E may make changes to the programs and activities for managing the effects of aging described in the license renewal UFSAR supplement and the UFSAR update provided that PG&E 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.

The second license condition requires PG&E to implement the new programs and enhancements to existing programs for managing the effects of aging described in the license renewal UFSAR supplement no later than the dates specified in the license renewal UFSAR supplement and to complete the activities for managing the effects of aging described in the license renewal UFSAR supplement no later than the dates specified in the license renewal UFSAR supplement.

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 license renewal application (LRA) contain an integrated plant assessment (IPA) of the systems, structures, and components (SSCs) within the scope of license renewal (LR), 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 LR that are subject to an aging management review (AMR). Furthermore, 10 CFR 54.21 requires that an LRA describe and justify the methods used to identify the SSCs within the scope of LR and the SCs therein that are subject to an AMR.

2.1.2 Summary of Technical Information in the Application

Section 2.0, "Scoping and Screening Methodology for Identifying Structures and Components Subject to Aging Management Review, and Implementation Results," of the Pacific Gas and Electric Company (PG&E, the applicant) LRA for Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 provides the technical information required by 10 CFR 54.21.

LRA Section 2.1, "Scoping and Screening Methodology," describes the methodology used to identify the SSCs within the scope of LR (scoping) and the SCs therein that are subject to an AMR (screening).

LRA Section 2.1.1, "Introduction," states, in part, that the applicant considered the following in developing the scoping and screening methodology described in LRA Section 2.0:

- 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants"; and
- Nuclear Energy Institute (NEI) 95-10, Revision 6, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule" (ML051860406), which is endorsed by the NRC in Regulatory Guide (RG) 1.188, Revision 2, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses" (ML20017A265).

2.1.3 Scoping and Screening Program Review

The NRC staff evaluated the applicant's scoping and screening methodology in accordance with the guidance in Section 2.1, "Scoping and Screening Methodology," of NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" dated December 2010 (SRP-LR) (ML103490036). The following regulations provide the basis for the acceptance criteria that the staff used to assess the adequacy of the applicant's 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 the applicant to identify SCs subject to an AMR

The NRC staff reviewed the information in LRA Section 2.1 to confirm that the applicant described a process (methodology) for identifying SSCs that are within the scope of LR in accordance with the requirements of 10 CFR 54.4 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

LRA Section 2.1.2, "Information Sources Used for Scoping and Screening," addresses the following information sources used for the LR scoping and screening processes:

- Updated Final Safety Analysis Report (UFSAR)
- Technical specifications
- Plant drawings
- Technical position papers
- Plant equipment database
- Quality classification (Q-list)
- Fire protection program
- Station Blackout equipment
- Environmental qualification documentation
- Plant modifications
- Maintenance rule program database records

2.1.3.1.2 Staff Evaluation

In 10 CFR 54.3, "Definitions," the current licensing basis (CLB) is defined as, in part:

> [T]he set of NRC requirements applicable to a specific plant and a licensee'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 UFSAR as required by 10 CFR 50.71, "Maintenance of records, making of reports."

In addition, the CLB includes (1) the licensee's commitments remaining in effect that were made in docketed licensing correspondence, such as applicant responses to NRC bulletins, generic letters, and enforcement actions, and (2) the licensee's commitments documented in NRC safety evaluations (SEs) or licensee event reports.

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

2.1.3.1.3 Conclusion

Based on its review of the LRA, the NRC staff finds that the applicant's consideration of document sources, including CLB information, is consistent with 10 CFR Part 54, the SRP-LR, and NEI 95-10 and, therefore, is acceptable.

2.1.4 Plant Systems, Structures, and Components Scoping Methodology Addressing 10 CFR 54.4(a) Criteria

LRA Section 2.0 states, in part, that the scoping and screening portion of the IPA process is performed in two steps. "Scoping" refers to the process of identifying the plant SSCs that are to be included within the scope of LR in accordance with 10 CFR 54.4. The intended functions that are the bases for including the SSCs within the scope of LR are also identified during the scoping process. "Screening" refers to the process of determining which SCs associated with the in-scope SSCs are subject to an AMR in accordance with 10 CFR 54.21(a)(1) requirements.

2.1.4.1 Application of the Scoping Criteria in 10 CFR 54.4(a)(1) – Safety-Related Systems, Structures, and Components

2.1.4.1.1 Summary of Technical Information in the Application

The applicant addressed the methods used to identify SSCs within the scope of LR, in accordance with the requirements of 10 CFR 54.4(a)(1), in LRA Section 2.1.4.1.1, "Safety-Related Criteria Pursuant to 10 CFR 54.4(a)(1)," which lists the three 10 CFR 54.4(a)(1) criteria and states, in part, the following:

> A DCPP SSC is within the scope of LR per 10 CFR 54.4(a)(1) if it performs a safety function during and/or following a DBE [design basis event]. These systems or structures are classified as nuclear safety-related. DBEs are defined in 10 CFR 50.49(b)(1) as conditions of normal operation, including anticipated operational occurrences, design basis accidents (DBAs), external events, and natural phenomena for which the plant must be designed to ensure functions identified in 10 CFR 54.4(a)(1)(i) through (iii).

In addition, LRA Section 2.1.4.1.1 states, in part, the following:

> DCPP specific definitions for design and quality classifications in the UFSAR, Q-List, and maintenance rule (MR) program are consistent with the definition of safety-related provided in 10 CFR 54.4(a)(1). The following terms and classification designations are used in DCPP procedures, Q-List, and CLB documents:

- Safety-Related – Those SSCs that are to remain functional during and after a DBE to ensure reactor coolant pressure boundary integrity, assure the capability to shutdown the reactor and maintain it in safe shutdown conditions, or assure the capability to prevent or mitigate the consequences of accidents comparable to 10 CFR 100.11 guidelines for tank rupture accidents or 10 CFR 50.67 for accidents analyzed using alternative source term (AST) methodology….
- Design Class I – Plant features important to safety, including plant features required to assure: (1) the integrity of the RCPB [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 which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100.11 for tank rupture accidents or 10 CFR 50.67 for accidents analyzed using AST methodology….
- [Quality Assurance] QA Class ‘Q’ – Equipment and structures to which the QA provisions of Appendix B to 10 CFR [Part] 50 apply for design, procurement, and construction. All SSCs designated as ‘Q’ are also Design Class I.

The applicant explained that for the purposes of scoping and screening, all SSCs identified as Design Class I, safety-related, or QA Class ‘Q’ have been used to identify SSCs satisfying one or more of the criteria of 10 CFR 54.4(a)(1) and included within the scope of LR.

In addition, LRA Section 2.1.4.1.1 states, in part, the following:

> The UFSAR and procedures governing safety-related and important to safety design classifications refer to “design basis events (DBEs)” while 10 CFR 54.4(a)(1) is more specific referring to DBEs as defined in 10 CFR 50.49(b)(1). DBEs are defined in 10 CFR 50.49(b)(1) as conditions of normal operation, including anticipated operational occurrences, DBAs, external events, and natural phenomena for which the plant must be designed to ensure the functions based on 10 CFR 54.4(a)(1). As part of the scoping methodology, a position paper was prepared to confirm that all applicable DBEs were considered. The UFSAR identifies the DCPP DBEs.

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 upon to remain functional during and following DBEs (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions:

- the integrity of the RCPB;
- the capability to shut down the reactor and maintain it in a safe shutdown condition; or
- 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.

Regarding the identification of DBEs, SRP-LR Section 2.1.3, “Review Procedures,” states, in part, the following:

> The set of [DBEs] as defined in [10 CFR Part 54] is not limited to Chapter 15 (or equivalent) of the UFSAR. Examples of [DBEs] that may not be described in this

> chapter include external events, such as floods, storms, earthquakes, tornadoes, or hurricanes, and internal events, such as a high-energy line break. Information regarding [DBEs] as defined in 10 CFR 50.49(b)(1) may be found in any chapter of the facility UFSAR, the Commission's regulations, NRC orders, exemptions, or license conditions within the CLB. These sources should also be reviewed to identify [SSCs] that are relied upon to remain functional during and following [DBEs] … to ensure the functions described in 10 CFR 54.4(a)(1).

The NRC staff reviewed LRA Section 2.1.4.1.1, the applicant's evaluation of 10 CFR Part 54, and CLB definitions pertaining to 10 CFR 54.4(a)(1) and associated implementing documents. In addition, the staff reviewed the applicant's description of design-basis conditions in the CLB, which address DBEs as defined in 10 CFR 50.49(b)(1). The UFSAR and design-basis documents discuss events such as internal and external flooding, tornadoes, and missiles applicable to DCPP. Based on this review, the staff determined that the applicant's CLB definition of "safety-related" meets the definition of "safety-related" specified in 10 CFR Part 54 and that the applicant's evaluation of DBEs is consistent with the SRP-LR.

2.1.4.1.3 Conclusion

Based on its review of the LRA and the CLB, the NRC staff finds that the applicant'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 LR is in accordance with the requirements of 10 CFR 54.4(a)(1) and, therefore, is acceptable.

2.1.4.2 Application of the Scoping Criteria in 10 CFR 54.4(a)(2) – Nonsafety-Related Systems, Structures, and Components Affecting Safety-Related Systems, Structures, and Components

2.1.4.2.1 Summary of Technical Information in the Application

The applicant addressed the methods used to identify SSCs within the scope of LR, in accordance with the requirements of 10 CFR 54.4(a)(2), in LRA Section 2.1.4.1.2, "Nonsafety-Related Criteria Pursuant to 10 CFR 54.4(a)(2)," which states, in part, the following:

> 10 CFR 54.4(a)(2) states that SSCs within the scope of LR include nonsafety-related SSCs whose failure could prevent satisfactory accomplishment of the functions identified for safety-related SSCs…. The SSCs meeting the scoping criteria for 10 CFR 54.4(a)(2) will fall into three categories:
>
> - nonsafety-related SSCs that have the potential to prevent satisfactory accomplishment of safety functions, typically identified in the CLB
> - nonsafety-related SSCs directly connected to safety-related SSCs (typically piping systems) and are relied upon to provide physical support to the safety-related system up to and including an anchor or equivalent anchor
> - nonsafety-related SSCs that are not directly connected to safety-related SSCs but have the potential to affect safety-related SSCs through spatial interactions

<u>Nonsafety Related SSCs Providing Functional Support for Safety-Related SSCs 10 CFR 54.4(a)(1) Functions</u>

LRA Section 2.1.4.1.2 subheading "Nonsafety-Related SSCs with Potential to Prevent Satisfactory Accomplishment of Safety Functions" states, in part, the following:

> This category addresses nonsafety-related SSCs that are required to function in support of LR intended functions of safety-related SSCs. This functional requirement distinguishes this category from other categories where the nonsafety-related SSCs are only required to maintain adequate integrity to preclude structural failure or spatial interaction.
>
> The UFSAR and other CLB documents were reviewed for every plant system or structure, to determine whether the system or structure was credited with supporting satisfactory accomplishment of a safety-related function. Nonsafety-related systems or structures credited in CLB documents with providing functional or structural support for the accomplishment of a safety-related function were classified as satisfying criterion 10 CFR 54.4(a)(2) and were included within the scope of LR.

<u>Nonsafety Related SSCs Connected and Providing Physical Support to Safety-Related SSCs</u>

LRA Section 2.1.4.1.2 subheading "Nonsafety-Related SSCs Directly Connected to Safety-Related SSCs," states, in part, the following:

> Section 4 of Appendix F of NEI 95-10 states that for nonsafety-related SSCs that are directly connected to safety-related SSCs (typically piping systems), the nonsafety-related piping and supports, up to and including the first equivalent anchor beyond the safety-related/nonsafety-related interface, are within the scope of LR per 10 CFR 54.4(a)(2).
>
> For nonsafety-related SSCs directly connected to safety-related SSCs, the in-scope boundary for LR extends into the nonsafety-related portion of the piping and supports up to and including the first equivalent anchor beyond the safety-related/nonsafety-related interface. In general, equivalent anchors were selected consistent with the pipe analyses of record that demonstrate seismic adequacy of the various configurations. The piping components and supports up to and including the first equivalent anchor are in-scope for LR.
>
> The following apply to the identification of the first seismic or equivalent anchor:
>
> - A base-mounted component (e.g., pump, heat exchanger, tank, etc.) that is a rugged component and is designed not to impose loads on connecting piping was included in-scope as it has a support function for the safety-related piping.
> - A flexible connection that was considered a pipe stress analysis model end point, when the flexible connection effectively decouples the piping systems (i.e., does not support loads or transfer loads across it to connecting piping).
> - A free end of nonsafety-related piping such as a drain pipe that ends at an open floor drain.
> - A point where buried piping exits the ground. The buried portion of the piping is included in the scope of LR.

- Nonsafety-related piping runs that are connected at both ends to safety-related piping include the entire run of nonsafety-related piping.
- A smaller branch line where the moment of inertia ratio of the larger piping to the smaller piping is such that the smaller branch line does not impose loads on the larger piping and does not support the larger piping.
- A combination of restraints or supports such that the nonsafety-related piping and associated structures and components attached to safety-related piping is included in-scope up to a boundary point that encompasses two supports in each of three orthogonal directions.
- A large piece of plant equipment (e.g., a heat exchanger) or a series of supports that have been evaluated as part of a plant-specific design analysis to ensure that forces and moments are restrained in three orthogonal directions.

<u>Nonsafety Related SSCs with the Potential for Spatial Interaction with Safety-Related SSCs</u>

LRA Section 2.1.4.1.2 subheading “Nonsafety-Related SSCs that Have the Potential to Affect Safety-Related SSCs through Spatial Interactions,” states, in part, the following:

> The review for potential age-related spatial interactions utilizes a “spaces” approach for LR scoping of liquid or steam-filled nonsafety-related systems or nonsafety-related portions of safety-related systems with the potential for spatial interaction with safety-related SSCs. This approach is as described in Appendix F to NEI 95-10 and is consistent with other recent applicants for LR … and focuses on the interaction between nonsafety-related and safety-related SSCs that are located in the same space.
>
> A "space" is defined as a room, cubicle or area that is separated from other spaces by substantial objects (such as walls, floors, or ceilings). Areas and rooms within the same building and elevation are considered a “space” unless it is verified that configuration and mitigative features are sufficient to limit communication between areas/rooms or to lower elevations via pipe routing, cable routing, vents, etc.
>
> Welded piping that contains air and gas (non-liquid) is not a hazard to other plant equipment, and has been determined not to have spatial interactions with safety-related SSCs. DCPP and industry operating experience has not identified failures due to aging that have adversely impacted the accomplishment of a safety function….

2.1.4.2.2 Staff Evaluation

The NRC staff reviewed LRA Section 2.1.4.1.2, in which the applicant described the scoping methodology for nonsafety-related SSCs in accordance with 10 CFR 54.4(a)(2) and associated implementing documents. During the review, the staff followed the guidance in SRP-LR Section 2.1.3.1.2, “Nonsafety-Related,” which states that the applicant need not consider hypothetical failures that are not part of the CLB, have not been previously experienced, or are not applicable to its facility but rather, the applicant should base its evaluation on the plant’s CLB, engineering judgment and analyses, and relevant operating experience.

Nonsafety Related SSCs Providing Functional Support for Safety-Related SSCs 10 CFR 54.4(a)(1) Functions

The NRC staff reviewed LRA Section 2.1.4.1.2 subheading “Nonsafety-Related SSCs with Potential to Prevent Satisfactory Accomplishment of Safety Functions,” which describes nonsafety-related SSCs that support safety functions and were included within the scope of LR in accordance with 10 CFR 54.4(a)(2). The staff confirmed that the applicant reviewed the UFSAR, plant drawings, the equipment database, and other CLB documents to identify the nonsafety-related SSCs that function to support a safety-related SSC whose failure could prevent the performance of a safety-related intended function. The staff determined that the applicant accurately identified the nonsafety-related SSCs that perform or support a safety function, and the applicant included those SSCs within the scope of LR in accordance with 10 CFR 54.4(a)(2). The staff determined that the applicant’s methodology for identifying nonsafety-related SSCs that perform or support a safety function for inclusion within the scope of LR is in accordance with the guidance of the SRP-LR and the requirements of 10 CFR 54.4(a)(2).

Nonsafety-Related SSCs Connected and Providing Physical Support to Safety-Related SSCs

The NRC staff reviewed LRA Section 2.1.4.1.2 subheading “Nonsafety-Related SSCs Directly Connected to Safety-Related SSCs,” which describes the method used to identify nonsafety-related SSCs directly connected to safety-related SSCs. LRA Section 2.1.4.1.2 indicates that those nonsafety-related SSCS are required to be included within the scope of LR in accordance with 10 CFR 54.4(a)(2). The staff determined that the applicant used a combination of the following to identify the bounding portion of nonsafety-related piping systems that were included within the scope of LR:

- seismic anchors
- equivalent anchors as defined in the CLB
- bounding conditions identified in NEI 95 10

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

Nonsafety-Related SSCs with the Potential for Spatial Interaction with Safety-Related SSCs

The NRC staff reviewed LRA Section 2.1.4.1.2 subheading “Nonsafety-Related SSCs that Have the Potential to Affect Safety-Related SSCs through Spatial Interactions,” which describes the method used to identify nonsafety-related SSCs with the potential for spatial interaction with safety-related SSCs. LRA Section 2.1.4.1.2 indicates that those nonsafety-related SSCs are required to be included within the scope of LR in accordance with 10 CFR 54.4(a)(2). The staff determined that the applicant used a spaces approach to identify and evaluate the portions of nonsafety-related SSCs 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 in the same space, which the applicant described as a structure that contains safety-related SSCs. The staff determined that the applicant included the nonsafety-related SSCs or mitigative features located within the same space as safety-related SSCs within the scope of LR in accordance with 10 CFR 54.4(a)(2). The staff determined that the applicant’s methodology for identifying and including nonsafety-related SSCs with the potential for spatial interaction with safety-related SSCs within the scope of LR is in accordance with the guidance of the SRP-LR and the requirements of 10 CFR 54.4(a)(2).

2.1.4.2.3 Conclusion

Based on its review of the LRA and the CLB, the NRC staff finds that the applicant'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 LR is in accordance with the requirements of 10 CFR 54.4(a)(2) and, therefore, is acceptable.

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

2.1.4.3.1 Summary of Technical Information in the Application

LRA Section 2.1.4.1.3, "Regulated Events – 10 CFR 54.4(a)(3)," describes the methods used to identify SSCs included within the scope of LR in accordance with the requirements of 10 CFR 54.4(a)(3) and states, in part, the following:

In accordance with 10 CFR 54.4(a)(3), the SSCs within the scope of LR include:

> All systems, structures, and components 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).

LRA Section 2.1.4.1.3 further provides, in part, the following concerning the five regulated events:

(1) *Fire Protection* – NRC guidance, including NUREG-0800 Section 9.5.1, Appendix B states that the scope of 10 CFR 50.48 goes beyond the protection of safety-related equipment, and also includes FP [Fire Protection] SSCs needed to minimize the effects of a fire and to prevent the release of radioactive material to the environment. To identify this equipment, DCPP FP documents were reviewed. The DCPP FP program is described in UFSAR Section 9.5.1. The DCPP FP program has been developed to satisfy the requirements of BTP [Branch Technical Position] APCSB 9.5-1, Appendix A; 10 CFR [Part] 50 Appendix A, Criterion 3 (1971); 10 CFR 50.48; and NFPA [National Fire Protection Association] 805, as documented in the DCPP FPR [Fire Protection Report].

(2) *Environmental Qualification (EQ)* – 10 CFR 50.49 defines electric equipment important to safety that is required to be environmentally qualified to mitigate certain [DBAs] that result in harsh environmental conditions in the plant. UFSAR Section 3.11 states that 10 CFR 50.49 is the governing regulation for the DCPP EQ program. PG&E has certified its compliance with this regulation as required by NRC Generic Letter 84-24, "Certification of Compliance to 10 CFR 50.49, Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants." The scope of the DCPP EQ program is limited to plant areas exposed to harsh environmental conditions following a DBA or during normal operation. Structures providing support, shelter, or protection

to equipment meeting the criterion of 10 CFR 54.4(a)(3) based on the requirements of 10 CFR 50.49 are within the scope of LR based on 10 CFR 54.4(a)(3).

(3) *Pressurized Thermal Shock (PTS)* – The PTS rule, 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against [Pressurized Thermal Shock] Events," requires that licensees of pressurized water reactors evaluate the reactor vessel beltline materials against specific criteria to ensure protection from brittle fracture. PTS is a severe overcooling concurrent with or followed by significant pressure in the reactor vessel (RV). The requirements in 10 CFR 50.61 include specific operational limits for PTS pertaining to the beltline region of the RV (i.e., that surrounds the effective height of the active fuel in the core). 10 CFR 50.61a identifies alternate fracture toughness requirements for protection against PTS events to licensees for pressurized water reactors with construction permit issued before February 3, 2010 that have RVs fabricated to the 1998 edition or earlier of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code.

If these limits are to be exceeded, the licensee shall submit a safety analysis to determine what, if any, modifications to equipment, systems, and operation are necessary to prevent potential failure of the RV as a result of postulated PTS events. Since the only information that is needed to perform the PTS calculation is associated with the RV beltline area, only the reactor vessel is credited for compliance with the PTS rule. The calculation of PTS reference temperature is a TLAA [time-limited aging analysis] as defined by 10 CFR 54.3(a) and is addressed separately in [LRA] Section 4.2. Structures providing support, shelter, or protection to equipment meeting the criterion of 10 CFR 54.4(a)(3) based on the requirements of 10 CFR 50.61 are within the scope of LR based on 10 CFR 54.4(a)(3).

(4) *Anticipated Transient Without Scram (ATWS)* – An ATWS is an anticipated operational occurrence that is accompanied by a failure of the reactor trip system (RTS) to shut down the reactor. The ATWS rule, 10 CFR 50.62, requires specific improvements in the design and operation of commercial nuclear power facilities to reduce the probability of failure to shut down the reactor following anticipated transients and to mitigate the consequences of an ATWS event.

In response to NRC requirements, DCPP Unit 1 and Unit 2 were modified to incorporate features to protect against ATWS. These provisions are the ATWS mitigation system actuation circuitry (AMSAC), described in Section 7.6.2.3 of the UFSAR. The AMSAC system for each unit provides backup to the RTS [Reactor Trip System] and ESF [Engineered Safety Features] Actuation System (ESFAS) for initiating certain functions in the event of an anticipated transient. These initiated functions are turbine trip, auxiliary feedwater initiation, and steam generator blowdown and sample line isolation. The AMSAC system is independent of and diverse from the RTS and the ESFAS with the exception of the analog steam generator level and turbine first stage pressure inputs, and the final actuation devices. Consequently, electrical I&C [instrumentation and controls] equipment that supports the requirements of 10 CFR 50.62 is included in the scope of LR. Structures providing support, shelter or protection to equipment meeting the criterion of 10 CFR 54.4(a)(3) based on the requirements of 10 CFR 50.62 are within the scope of LR based on 10 CFR 54.4(a)(3).

(5) *Station Blackout (SBO)* – 10 CFR 50.63, "Loss of All Alternating Current Power," requires that each light-water-cooled nuclear power plant be able to withstand and recover from an SBO. As defined by 10 CFR 50.2, an SBO event is a complete loss of

> alternating current (AC) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of the offsite electric power system concurrent with generator trip and unavailability of the onsite emergency AC power sources). SBO does not include the loss of available AC power to buses fed by station batteries through inverters or by alternate AC sources, nor does it assume a concurrent single failure or DBA. The objective of this requirement is to assure that nuclear power plants are capable of withstanding an SBO and maintaining adequate reactor core cooling and appropriate containment integrity for a required duration.
>
> The NRC issued a supplemental safety evaluation report (SSER) in 1992 that concluded that PG&E's revised response to the SBO (10 CFR 50.63) for Units 1 and 2 is acceptable. The DCPP SBO analysis is discussed in UFSAR Section 8.3.1.6…. Systems were determined to be in the scope of LR on the basis of their support of 10 CFR 50.63 requirements.

2.1.4.3.2 Staff Evaluation

The NRC staff reviewed LRA Section 2.1.4.1.3, which describes the process used to identify SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the NRC'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"), PTS (10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events"), 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") and associated implementing documents. LRA Section 2.1.4.1.3 indicates that those SSCs are required to be included within the scope of LR in accordance with 10 CFR 54.4(a)(3).

The NRC staff determined that the applicant's scoping process considered information sources used for scoping and screening in order to verify that the appropriate SSCs were included within the scope of LR. The staff further determined that the applicant 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 LR. Based on the review of information contained in the LRA and CLB documents, the staff determined that the applicant's methodology is sufficient for identifying and including SSCs credited in performing functions within the scope of LR in accordance with the requirements of 10 CFR 54.4(a)(3).

2.1.4.3.3 Conclusion

Based on its review of the LRA and the CLB, the NRC staff finds that the applicant's methodology for identifying and including SSCs that are relied upon to remain functional during regulated events within the scope of LR is in accordance with the requirements of 10 CFR 54.4(a)(3) and, therefore, is acceptable.

2.1.5 Scoping Methodology

2.1.5.1 Summary of Technical Information in the Application

2.1.5.1.1 Mechanical

LRA Section 2.1.4.2, "Mechanical Systems," states, in part, the following:

> A list of mechanical systems was developed using the plant equipment database and plant system numbering procedures and is documented in a technical position paper. These mechanical systems were evaluated to each of the criteria of 10 CFR 54.4(a)….
>
> For mechanical systems, mechanical components that support the system intended functions are included within the scope of LR and are depicted on the applicable operating valve identification drawings (OVIDs). These drawings were highlighted to create LRBDs [license renewal boundary drawings] showing the in-scope components that are subject to AMR. Components that are required to support a safety-related function that could prevent satisfactory accomplishment of a safety-related function, or a function that demonstrates compliance with one of the LR regulated events, are identified on the LRBDs by green highlighting. Nonsafety-related components that are connected to safety-related components and are required to provide structural support at the safety-related/nonsafety-related interface, non-commodity nonsafety-related components with a credited nonsafety-related function, and nonsafety-related components whose failure could prevent satisfactory accomplishment of a safety-related function due to spatial interaction with safety-related SSCs are identified on LRBDs by red highlighting.

2.1.5.1.2 Structural

LRA Section 2.1.4.3, “Structures,” states, in part, the following:

> A list of structures was developed through review of site plot drawings and UFSAR descriptions in conjunction with input from site personnel…. The UFSAR was relied upon to identify the safety classifications of structures and structural components. Design Class I structures and structural components were considered safety-related.
>
> For structures, the structural components that are required to support the intended function(s), as described in the CLB, are included within the scope of LR. The structural components are identified from a review of applicable information sources which includes plant design drawings of the structure. Structure evaluation boundaries were determined, including examination of structure interfaces. Structure functions were evaluated against the criteria of 10 CFR 54.4(a)(1), (a)(2) and (a)(3) and the results of this evaluation were documented. Engineers preparing mechanical and electrical LR documents were consulted to ensure that structures and structural components required to support in-scope SSCs were included in the structural scope.
>
> Structural components, such as bolting required to support the structure, is evaluated with the structure. Structural bolting supporting the intended function of a component support or a bulk commodity is evaluated with the component support or bulk commodity.

2.1.5.1.3 Electrical

LRA Section 2.1.4.4, “Electrical,” states, in part, the following:

> A list of electrical and I&C systems was developed, and the systems were scoped against the criteria of 10 CFR 54.4. This is performed on a system level, the same as the mechanical system scoping….
>
> Electrical I&C systems, and electrical components within mechanical systems, did not require further system evaluations to determine which electrical components were required to perform or support the identified intended functions. A bounding scoping approach was used for electrical equipment. Under this approach, all electrical components were included within the scope of LR. This bounding approach is consistent with the electrical scoping results for previous LRAs…. In-scope electrical components were placed into commodity groups and then evaluated as commodities during the screening process.
>
> …The plant one-line diagram schematically shows the portions of the AC electrical distribution system, included in the scope of LR because of the SBO recovery path….

2.1.5.2 Staff Evaluation

The NRC staff reviewed LRA Sections 2.1.4.2, 2.1.4.3, and 2.1.4.4, which describe the applicant’s methodology for identifying SSCs within the scope of LR, to verify that they meet the requirements of 10 CFR 54.4(a) and associated implementing documents. The staff determined that the applicant identified the SSCs within the scope of LR and documented the results of the scoping process in LRA Section 2.3, “Scoping and Screening Results: Mechanical Systems,” LRA Section 2.4, “Scoping and Screening Results: Structures,” and LRA Section 2.5, “Scoping and Screening Results: Electrical and Instrumentation & Controls.” LRA Sections 2.3 through 2.5 include a description of the SSC; a list of functions it performs and identification of intended functions; the 10 CFR 54.4(a) scoping criteria met by the SSC; scoping boundaries; UFSAR references; and component types subject to an AMR. The staff determined that the applicant’s process is consistent with the description provided in LRA Sections 2.1.4.2, 2.1.4.3, and 2.1.4.4.

2.1.5.3 Conclusion

Based on its review of the LRA and the CLB, the NRC staff finds that the applicant’s scoping methodology in LRA Sections 2.1.4.2, 2.1.4.3, and 2.1.4.4 is in accordance with the guidance in the SRP-LR. In addition, the applicant identified those SSCs that are:

- safety-related;
- nonsafety-related whose failure could affect safety-related intended functions; or
- necessary to demonstrate compliance with the NRC regulations for fire protection, EQ, PTS, ATWS, or SBO.

The staff finds that the applicant’s methodology is consistent with the requirements of 10 CFR 54.4(a) and, therefore, is acceptable.

2.1.6 Screening Methodology

2.1.6.1 Summary of Technical Information in the Application

2.1.6.1.1 Mechanical

LRA Section 2.1.5.2, "Mechanical Systems," states, in part, the following:

> The mechanical systems screening process began with the results from the scoping process. For in-scope mechanical systems, system OVIDs were highlighted to create LRBDs. These LRBDs were reviewed to identify passive, long-lived components subject to AMR. Finally, the identified list of passive, long-lived system components was benchmarked against previous LRAs … containing similar systems.
>
> Each component that was identified as subject to an AMR was evaluated to determine its component intended function(s). The component intended function(s) was identified based on an evaluation of the component type and the way(s) in which the component supports the system intended functions. During the screening process, components that were identified as short-lived were eliminated from the AMR process and the basis for the classification as short-lived was documented. Other in-scope passive components were identified as subject to an AMR.

2.1.6.1.2 Structural

LRA Section 2.1.5.3, "Structures," states, in part, the following:

> The structure screening process also began with the results from the scoping process. Structures and structural components typically perform their functions without moving parts and without a change in configuration or properties. If only selected portions of a structure are in scope, the in-scope portions are described in the scoping evaluation and portions of the structure not in-scope are identified and justification provided for its exclusion. The associated structure drawings were reviewed to identify the passive, long-lived structures and components. Plant walkdowns were performed when required for confirmation. Finally, the identified list of passive, long-lived structures and components was benchmarked against previous LRAs….

2.1.6.1.3 Electrical

LRA Section 2.1.5.4, "Electrical Commodities," states, in part, the following:

> The screening of electrical I&C components in electrical I&C and mechanical systems used a bounding approach as described in NEI 95-10. Electrical I&C components for in-scope systems were assigned to commodity groups consistent with Table 2.1-5 of [the SRP-LR]. The commodities subject to an AMR were identified by applying the "passive" screening criteria of 10 CFR 54.21(a)(1). This method provides the most efficient means for determining the electrical commodities subject to an AMR since many electrical and I&C components and commodities are active. Active components and commodities may be eliminated from AMR per 10 CFR 54.21(a)(1).

2.1.6.2 Staff Evaluation

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

The NRC staff reviewed LRA Section 2.1.5, "Screening Methodology," which describes the applicant's methodology for identifying the mechanical, structural, and electrical SCs that are within the scope of LR and that are subject to an AMR, and associated implementing documents. The applicant implemented a process for determining which SCs are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1). LRA Section 2.1.5 describes the screening process by which the applicant evaluated the component types and commodity groups included within the scope of LR to determine which ones are passive and long-lived and, therefore, subject to an AMR.

The NRC staff reviewed the applicant's methodology used for mechanical and structural component screening as described in LRA Section 2.1.5. The staff determined that the applicant used the screening process described in this section, along with the information in NEI 95-10 and the SRP-LR, to identify the mechanical and structural SCs subject to an AMR. The staff determined that the applicant identified the SCs that meet the passive criteria in accordance within NEI 95-10 and, among those SCs, identified those that are not subject to replacement based on a qualified life or specified time period. The applicant determined that the remaining passive, long-lived components are subject to an AMR.

The NRC staff reviewed the applicant's methodology used for electrical component screening as described in LRA Section 2.1.5. The staff determined that the applicant used the screening process as described in this section, along with the information in NEI 95-10 and the SRP-LR, to identify the electrical SCs subject to an AMR. The staff determined that the applicant used a bounding approach to identify electrical commodity groups that meet the passive criteria in accordance with NEI 95-10 and, among those SCs, identified those that are not subject to replacement based on a qualified life or specified time period. The applicant determined that the remaining passive, long-lived components are subject to an AMR.

2.1.6.3 Conclusion

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

2.1.6.4 Summary of Evaluation Findings

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

2.2 Plant Level Scoping Results

2.2.1 Introduction

In LRA Section 2.1, the applicant described its methodology for identifying SSCs within the scope of LR and SCs subject to an AMR. In LRA Section 2.2, "Plant Level Scoping Results," the applicant implemented the scoping methodology to determine which SSCs must be included within the scope of LR. The NRC staff reviewed the applicant's plant level scoping results to determine if the applicant properly identified the following in accordance with the requirements of 10 CFR 54.4(a):

- safety-related SSCs, which are those relied upon to remain functional during and following DBEs (as defined in 10 CFR 50.49(b)(1));
- all nonsafety related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i), (ii), or (iii); and
- all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the NRC's regulations for fire protection (10 CFR 50.48), EQ (10 CFR 50.49), PTS (10 CFR 50.61), ATWS (10 CFR 50.62), and SBO (10 CFR 50.63).

2.2.2 Summary of Technical Information in the Application

LRA Section 2.2, Table 2.2 1, "Plant Level Scoping Report Results," lists the nuclear power plant's mechanical, structural, electrical, and I&C systems and indicates those systems that are within the scope of LR.

2.2.3 Staff Evaluation

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

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

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

2.2.4 Conclusion

Based on the review of the LRA and the CLB, the NRC staff finds that the LRA adequately identifies the SSCs within the scope of LR in accordance with 10 CFR 54.4 and, therefore, is acceptable.

2.3 Scoping and Screening Results: Mechanical Systems

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

- reactor vessel, internals, and reactor coolant system (RCS)
- engineered safety features (ESFs)
- auxiliary systems
- steam and power conversion systems

In accordance with the requirements of 10 CFR 54.21(a)(1), the applicant must list the passive, long-lived SCs that are within the scope of LR and that are subject to an AMR. To verify that the applicant properly implemented its methodology to identify such passive, long-lived SCs, the staff focused its review on the applicant's implementation results. This focus allowed the staff to verify that the applicant identified the mechanical systems 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-LR Section 2.3, "Scoping and Screening Results: Mechanical Systems," and considered the system function(s) as described in the UFSAR. The objective was to determine whether the applicant, in accordance with 10 CFR 54.4, identified components and supporting structures for mechanical systems that meet the scoping criteria for LR. Similarly, the staff evaluated the applicant's screening results to verify that all passive, long-lived SCs are subject to an AMR, as required by 10 CFR 54.21(a)(1).

In its scoping evaluation, the NRC staff reviewed the LRA and applicable sections of the UFSAR, LRBDs, and other licensing basis documents, as appropriate, for each mechanical system within the scope of LR. The staff reviewed relevant licensing basis documents for each mechanical system to confirm that the LRA 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 the applicant may have erroneously omitted from the scoping results.

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

2.3.1 Summary of Technical Information in the Application

LRA 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 subject to an AMR for LR. The applicant described the supporting SCs of the mechanical systems in the following LRA sections:

- Section 2.3.1.1, "Reactor Vessel Internals"
- Section 2.3.1.2, "Reactor Coolant System"
- Section 2.3.1.3, "Pressurizer"
- Section 2.3.1.4, "Steam Generators"
- Section 2.3.1.5, "Reactor Vessel"
- Section 2.3.2.1, "Safety Injection System"
- Section 2.3.2.2, "Containment Spray System"
- Section 2.3.2.3, "Residual Heat Removal System"
- Section 2.3.2.4, "Containment HVAC System"
- Section 2.3.3.1, "Cranes and Fuel Handling System"
- Section 2.3.3.2, "Spent Fuel Pool Cooling System"
- Section 2.3.3.3, "Saltwater and Chlorination System"
- Section 2.3.3.4, "Component Cooling Water System"
- Section 2.3.3.5, "Makeup Water System"
- Section 2.3.3.6, "Nuclear Steam Supply System Sampling System"
- Section 2.3.3.7, "Compressed Air System"
- Section 2.3.3.8, "Chemical and Volume Control System"
- Section 2.3.3.9, "Miscellaneous HVAC Systems"
- Section 2.3.3.10, "Control Room HVAC"
- Section 2.3.3.11, "Auxiliary Building HVAC System"
- Section 2.3.3.12, "Fire Protection System"
- Section 2.3.3.13, "Diesel Generator Fuel Oil System"
- Section 2.3.3.14, "Diesel Generator System"
- Section 2.3.3.15, "Lubricating Oil System"
- Section 2.3.3.16, "Gaseous Radwaste System"
- Section 2.3.3.17, "Liquid Radwaste System"
- Section 2.3.3.18, "Extraction Steam and Heater Drip System"
- Section 2.3.3.19, "Radiation Monitoring System"
- Section 2.3.3.20, "Sanitary Sewage System"
- Section 2.3.3.21, "Secondary Sampling System"
- Section 2.3.3.22, "Service Cooling Water System"

- Section 2.3.3.23, “Solid Radwaste System”
- Section 2.3.3.24, “Turbine Generator Associated Systems”
- Section 2.3.3.25, “Oily Water and Turbine Sump”
- Section 2.3.4.1, “Turbine Steam Supply System”
- Section 2.3.4.2, “Auxiliary Steam System”
- Section 2.3.4.3, “Main Feedwater System”
- Section 2.3.4.4, “Condensate System”
- Section 2.3.4.5, “Auxiliary Feedwater System”

2.3.2 Staff Evaluation

The NRC staff reviewed LRA Sections 2.3.1.1 through 2.3.4.5 and summarizes that review in the following table.

LRA Section 2.3, “Scoping and Screening Results: Mechanical Systems”				
LRA Section	**LRA Section Title**	**Documents Reviewed by the Staff:**		
		LRA Tables	**UFSAR**	**LRA Drawings**
LRA Section 2.3.1, “Reactor Vessel, Internals, and Reactor Coolant System”				
2.3.1.1	Reactor Vessel Internals	Table 2.3.1-1, Reactor Vessel Internals System Components Subject to Aging Management Review Table 3.1.2-1, Reactor Vessel Internals – Summary of Aging Management Evaluation	Section 4.2.2.3	None
2.3.1.2	Reactor Coolant System	Table 2.3.1-2, Reactor Coolant System Components Subject to Aging Management Review Table 3.1.2-2, Reactor Coolant System – Summary of Aging Management Evaluation	Sections 5.1, 5.2, and 6.2.4	LR-DCPP-07-106707-02 LR-DCPP-07-106707-03 LR-DCPP-07-106707-04 LR-DCPP-07-106707-06 LR-DCPP-07-107707-02 LR-DCPP-07-107707-03 LR-DCPP-07-107707-04 LR-DCPP-07-107707-06 LR-DCPP-14-106714-06 LR-DCPP-14-107714-06

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.1.3	Pressurizer	Table 2.3.1-3, Pressurizer System Components Subject to Aging Management Review Table 3.1.2-3, Pressurizer – Summary of Aging Management Evaluation	Sections 5.1 and 5.5.9	None
2.3.1.4	Steam Generators	Table 2.3.1-4, Steam Generators System Components Subject to Aging Management Review Table 3.1.2-4, Steam Generators – Summary of Aging Management Evaluation	Sections 5.1.8.33, 5.5.2, 5.5.4, and 6.5	None
2.3.1.5	Reactor Vessel	Table 2.3.1-5, Reactor Vessel System Components Subject to Aging Management Review Table 3.1.2-5, Reactor Vessel – Summary of Aging Management Evaluation	Sections 5.2.2.1.15.4 and 5.4	None
LRA Section 2.3.2, "Engineered Safety Features"				
2.3.2.1	Safety Injection System	Table 2.3.2-1, Safety Injection Components Subject to Aging Management Review Table 3.2.2-1, Safety Injection System – Summary of Aging Management Evaluation	Section 6.3	LR-DCPP-09-106709-02 LR-DCPP-09-106709-03 LR-DCPP-09-106709-04 LR-DCPP-09-106720-12A LR-DCPP-09-107709-02 LR-DCPP-09-107709-03 LR-DCPP-09-107709-04 LR-DCPP-09-107709-04A LR-DCPP-09-107720-12A
2.3.2.2	Containment Spray System	Table 2.3.2-2, Containment Spray System Components Subject to Aging Management Review Table 3.2.2-2, Containment Spray System – Summary of	Sections 6.2.1, 6.2.2, and 6.2.3	LR-DCPP-12-106712-02 LR-DCPP-12-107712-02

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
		Aging Management Evaluation		
2.3.2.3	Residual Heat Removal System	Table 2.3.2-3, Residual Heat Removal Components Subject to Aging Management Review Table 3.2.2-3, Residual Heat Removal System – Summary of Aging Management Evaluation	Section 5.5.6	LR-DCPP-10-106710-02 LR-DCPP-10-107710-02
2.3.2.4	Containment HVAC System	Table 2.3.2-4, Containment HVAC Components Subject to Aging Management Review Table 3.2.2-4, Containment HVAC System – Summary of Aging Management Evaluation	Sections 6.1.2, 6.2.2, 6.2.3, 6.2.4, 6.2.5, and 9.4.5	LR-DCPP-23A-106723-02 LR-DCPP-23A-106723-03 LR-DCPP-23A-106723-04 LR-DCPP-23A-106723-06 LR-DCPP-23A-107723-02 LR-DCPP-23A-107723-03 LR-DCPP-23A-107723-04 LR-DCPP-23A-107723-06
LRA Section 2.3.3, "Auxiliary Systems"				
2.3.3.1	Cranes and Fuel Handling System	Table 2.3.3-1, Cranes and Fuel Handling System Components Subject to Aging Management Review Table 3.3.2-1, Cranes and Fuel Handling System – Summary of Aging Management Evaluation	Sections 9.1.4, 9.1.4.2, and 9.1.4.3.10	None
2.3.3.2	Spent Fuel Pool Cooling System	Table 2.3.3-2, Spent Fuel Pool Cooling System Components Subject to Aging Management Review Table 3.3.2-2, Spent Fuel Pool Cooling – Summary of Aging Management Evaluation	Sections 9.1.1, 9.1.2, and 9.1.3	LR-DCPP-13-106713-02 LR-DCPP-13-107713-02
2.3.3.3	Saltwater and Chlorination System	Table 2.3.3-3, Saltwater and Chlorination Components Subject to Aging Management Review	Sections 9.2.7 and 10.4.5; Table 9.2-1	LR-DCPP-17-106717-02 LR-DCPP-17-106717-03 LR-DCPP-17-106717-03A LR-DCPP-17-106717-03B LR-DCPP-17-106717-04 LR-DCPP-17-106717-04A LR-DCPP-17-106717-05

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
		Table 3.3.2-3, Saltwater and Chlorination System – Summary of Aging Management Evaluation		LR-DCPP-17-106717-06 LR-DCPP-17-106717-07 LR-DCPP-17-106717-07A LR-DCPP-17-106717-08 LR-DCPP-17-106717-09 LR-DCPP-17-106717-10
2.3.3.4	Component Cooling Water System	Table 2.3.3-4, Component Cooling Water Components Subject to Aging Management Review Table 3.3.2-4, Component Cooling Water System – Summary of Aging Management Evaluation	Section 9.2.2	LR-DCPP-14-106714-02 LR-DCPP-14-106714-03 LR-DCPP-14-106714-04 LR-DCPP-14-106714-05 LR-DCPP-14-106714-06 LR-DCPP-14-106714-07 LR-DCPP-14-106714-08 LR-DCPP-14-106714-09 LR-DCPP-14-107714-02 LR-DCPP-14-107714-03 LR-DCPP-14-107714-04 LR-DCPP-14-107714-05 LR-DCPP-14-107714-06 LR-DCPP-14-107714-07 LR-DCPP-14-107714-08 LR-DCPP-14-107714-09
2.3.3.5	Makeup Water System	Table 2.3.3-5, Makeup Water System Components Subject to Aging Management Review Table 3.3.2-5, Makeup Water System – Summary of Aging Management Evaluation	Sections 9.1.3.2, 9.2.3, and 9.2.6	LR-DCPP-16-106716-03 LR-DCPP-16-106716-11 LR-DCPP-16-106716-14 LR-DCPP-16-106716-16 LR-DCPP-16-106716-17 LR-DCPP-16-106716-18 LR-DCPP-16-106716-19 LR-DCPP-16-106716-20 LR-DCPP-16-106716-21
2.3.3.6	Nuclear Steam Supply System Sampling System	Table 2.3.3-6, Nuclear Steam Supply Sampling Components Subject to Aging Management Review Table 3.3.2-6, Nuclear Steam Supply Sampling System – Summary of Aging Management Evaluation	Sections 6.2.4, 7.3, 9.3.2.1, and 9.3.2.2	LR-DCPP-11-106711-02 LR-DCPP-11-106711-03 LR-DCPP-11-106711-04 LR-DCPP-11-106711-05 LR-DCPP-11-106711-06 LR-DCPP-11-106711-07 LR-DCPP-11-107711-02 LR-DCPP-11-107711-03 LR-DCPP-11-107711-04 LR-DCPP-11-107711-05 LR-DCPP-11-107711-06
2.3.3.7	Compressed Air System	Table 2.3.3-7, Compressed Air System Components Subject to Aging Management Review Table 3.3.2-7, Compressed Air System – Summary of Aging Management Evaluation	Section 9.3.1	LR-DCPP-25-106725-19 LR-DCPP-25-106725-25 LR-DCPP-25-106725-26 LR-DCPP-25-106725-28 LR-DCPP-25-106725-29 LR-DCPP-25-106725-30 LR-DCPP-25-106725-31 LR-DCPP-25-106725-33 LR-DCPP-25-106725-34 LR-DCPP-25-106725-37 LR-DCPP-25-106725-38 LR-DCPP-25-106725-40 LR-DCPP-25-106725-43

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
				LR-DCPP-25-106725-44 LR-DCPP-25-106725-47 LR-DCPP-25-106725-49 LR-DCPP-25-106725-50 LR-DCPP-25-106725-51 LR-DCPP-25-106725-52 LR-DCPP-25-106725-58 LR-DCPP-25-107725-16 LR-DCPP-25-107725-19 LR-DCPP-25-107725-20 LR-DCPP-25-107725-21 LR-DCPP-25-107725-22 LR-DCPP-25-107725-23 LR-DCPP-25-107725-24 LR-DCPP-25-107725-26 LR-DCPP-25-107725-27 LR-DCPP-25-107725-30 LR-DCPP-25-107725-31 LR-DCPP-25-107725-33 LR-DCPP-25-107725-36 LR-DCPP-25-107725-37 LR-DCPP-25-107725-39 LR-DCPP-25-107725-41 LR-DCPP-25-107725-42 LR-DCPP-25-107725-43 LR-DCPP-25-107725-44 LR-DCPP-25-107725-50
2.3.3.8	Chemical and Volume Control System	Table 2.3.3-8, Chemical and Volume Control System Components Subject to Aging Management Review Table 3.3.2-8, Chemical and Volume Control System– Summary of Aging Management Evaluation	Section 9.3.4	LR-DCPP-08-106708-02 LR-DCPP-08-106708-03 LR-DCPP-08-106708-04 LR-DCPP-08-106708-05 LR-DCPP-08-106708-06 LR-DCPP-08-106708-07 LR-DCPP-08-106708-08 LR-DCPP-08-106708-09 LR-DCPP-08-106708-10 LR-DCPP-08-106708-11 LR-DCPP-08-106708-11A LR-DCPP-08-106708-12 LR-DCPP-08-106708-13 LR-DCPP-08-106708-14 LR-DCPP-08-106708-15 LR-DCPP-08-106708-15A LR-DCPP-08-107708-02 LR-DCPP-08-107708-03 LR-DCPP-08-107708-04 LR-DCPP-08-107708-05 LR-DCPP-08-107708-06 LR-DCPP-08-107708-07 LR-DCPP-08-107708-08 LR-DCPP-08-107708-09 LR-DCPP-08-107708-10 LR-DCPP-08-107708-11 LR-DCPP-08-107708-12 LR-DCPP-08-107708-13 LR-DCPP-08-107708-14 LR-DCPP-08-107708-15 LR-DCPP-08-107708-15A
2.3.3.9	Miscellaneous HVAC Systems	Table 2.3.3-9, Miscellaneous HVAC	Sections 9.4.6, 9.4.7, 9.4.8, and 9.4.11	LR-DCPP-23-106723-17 LR-DCPP-23-106723-18

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
		Components Subject to Aging Management Review Table 3.3.2-9, Miscellaneous HVAC Systems – Summary of Aging Management Evaluation		LR-DCPP-23-106723-19 LR-DCPP-23-107723-17 LR-DCPP-23-107723-19
2.3.3.10	Control Room HVAC	Table 2.3.3-10, Control Room HVAC System Components Subject to Aging Management Review Table 3.3.2-10, Control Room HVAC System – Summary of Aging Management Evaluation	Section 9.4.1	LR-DCPP-23F-106723-16 LR-DCPP-23F-107723-16
2.3.3.11	Auxiliary Building HVAC System	Table 2.3.2-11, Auxiliary Building HVAC Components Subject to Aging Management Review Table 3.3.2-11, Auxiliary Building HVAC System – Summary of Aging Management Evaluation	Sections 9.4.2, 9.4.4, 9.4.9, and 9.4.10	LR-DCPP-23B-106723-03 LR-DCPP-23B-106723-05 LR-DCPP-23B-106723-07 LR-DCPP-23B-106723-08 LR-DCPP-23B-106723-09 LR-DCPP-23B-106723-10 LR-DCPP-23B-106723-11 LR-DCPP-23B-106723-12 LR-DCPP-23B-106723-13 LR-DCPP-23B-106723-15 LR-DCPP-23B-107723-03 LR-DCPP-23B-107723-05 LR-DCPP-23B-107723-07 LR-DCPP-23B-107723-08 LR-DCPP-23B-107723-09 LR-DCPP-23B-107723-10 LR-DCPP-23B-107723-11 LR-DCPP-23B-107723-12 LR-DCPP-23B-107723-13
2.3.3.12	Fire Protection System	Table 2.3.3-12, Fire Protection System Components Subject to Aging Management Review Table 2.3.3-17, Liquid Radwaste System Components Subject to Aging Management Review	Section 9.5.1	LR-DCPP-18-106718-02 LR-DCPP-18-106718-03 LR-DCPP-18-106718-05 LR-DCPP-18-106718-06 LR-DCPP-18-106718-07 LR-DCPP-18-106718-08 LR-DCPP-18-106718-09 LR-DCPP-18-106718-10 LR-DCPP-18-106718-11 LR-DCPP-18-106718-12 LR-DCPP-18-106718-13 LR-DCPP-18-106718-14 LR-DCPP-18-106718-15 LR-DCPP-18-106718-16 LR-DCPP-18-106718-17 LR-DCPP-18-106718-18
2.3.3.13	Diesel Generator Fuel Oil System	Table 2.3.2-13, Diesel Generator Fuel Oil	Sections 9.5.4 and 9.5.4.2	LR-DCPP-21B-106721-02

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
		Components Subject to Aging Management Review Table 3.3.2-13, Diesel Generator Fuel Oil System – Summary of Aging Management Evaluation		
2.3.3.14	Diesel Generator System	Table 2.3.2-14, Diesel Generator Components Subject to Aging Management Review Table 3.3.2-14, Diesel Generator System – Summary of Aging Management Evaluation	Sections 8.3.1.1.6, 8.3.1.6.2, 9.5.4, 9.5.5, 9.5.6, and 9.5.7	LR-DCPP-21-106721-02 LR-DCPP-21-106721-03 LR-DCPP-21-106721-04 LR-DCPP-21-106721-05 LR-DCPP-21-106721-06 LR-DCPP-21-106721-07 LR-DCPP-21-106721-08 LR-DCPP-21-106721-09 LR-DCPP-21-106721-10 LR-DCPP-21-106721-11 LR-DCPP-21-106721-12 LR-DCPP-21-106721-13 LR-DCPP-21-106721-14 LR-DCPP-21-106721-15 LR-DCPP-21-106721-16 LR-DCPP-21-106721-17 LR-DCPP-21-107721-03 LR-DCPP-21-107721-04 LR-DCPP-21-107721-05 LR-DCPP-21-107721-06 LR-DCPP-21-107721-07 LR-DCPP-21-107721-08 LR-DCPP-21-107721-09 LR-DCPP-21-107721-10 LR-DCPP-21-107721-11 LR-DCPP-21-107721-12 LR-DCPP-21-107721-13 LR-DCPP-21-107721-14 LR-DCPP-21-107721-15 LR-DCPP-21-107721-16 LR-DCPP-21-107721-17
2.3.3.15	Lubricating Oil System	Table 2.3.2-15, Lubricating Oil Components Subject to Aging Management Review Table 3.3.2-15, Lubricating Oil System – Summary of Aging Management Evaluation	Sections 7.6.1.6, 9.2.2, and 10.2.2.5; Figure 3.2-20	LR-DCPP-20-106720-12 LR-DCPP-20-107720-12
2.3.3.16	Gaseous Radwaste System	Table 2.3.2-16, Gaseous Radwaste Components Subject to Aging Management Review Table 3.3.2-16, Gaseous Radwaste System – Summary of Aging Management Evaluation	Sections 9.2.2 and 11.3; Table 11.3-1	LR-DCPP-24-106724-02 LR-DCPP-24-106724-03 LR-DCPP-24-106724-04 LR-DCPP-24-106724-05 LR-DCPP-24-106724-06

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.3.17	Liquid Radwaste System	Table 2.3.2-17, Liquid Radwaste Components Subject to Aging Management Review Table 3.3.2-17, Liquid Radwaste System – Summary of Aging Management Evaluation	Sections 11.2 and 9.3.3; Table 6.2-39	LR-DCPP-06-106706-07 LR-DCPP-07-106707-04 LR-DCPP-07-107707-04 LR-DCPP-11-106711-07 LR-DCPP-11-107711-04 LR-DCPP-11-107711-05 LR-DCPP-14-106714-06 LR-DCPP-14-107714-07 LR-DCPP-16-106716-18 LR-DCPP-19-106719-02 LR-DCPP-19-106719-03 LR-DCPP-19-106719-04 LR-DCPP-19-106719-05 LR-DCPP-19-106719-06 LR-DCPP-19-106719-07 LR-DCPP-19-106719-08 LR-DCPP-19-106719-09 LR-DCPP-19-106719-10 LR-DCPP-19-106719-11 LR-DCPP-19-106719-12 LR-DCPP-19-106719-13 LR-DCPP-19-106719-14 LR-DCPP-19-106719-17 LR-DCPP-19-106719-18
2.3.3.18	Extraction Steam and Heater Drip System	Table 2.3.2-18, Extraction Steam and Heater Drip Components Subject to Aging Management Review	Sections 10.2.2.1, 10.4.7.2, and 3.6.2.1.2	LR-DCPP-05-106705-02 LR-DCPP-05-106705-03 LR-DCPP-05-106705-04 LR-DCPP-05-106705-05 LR-DCPP-05-106705-06 LR-DCPP-05-106705-07 LR-DCPP-05-107705-02 LR-DCPP-05-107705-03 LR-DCPP-05-107705-04 LR-DCPP-05-107705-05 LR-DCPP-05-107705-06 LR-DCPP-05-107705-07 LR-DCPP-28-106728-04 LR-DCPP-28-106728-05 LR-DCPP-28-107728-04 LR-DCPP-28-107728-05
2.3.3.19	Radiation Monitoring System	Table 2.3.2-19, Radiation Monitoring Components Subject to Aging Management Review Table 3.3.2-19, Radiation Monitoring System – Summary of Aging Management Evaluation	Sections 11.4.1 and 11.4.2.2; Table 11.4-1	LR-DCPP-23A-106723-03 LR-DCPP-23A-107723-03
2.3.3.20	Sanitary Sewage System	Table 2.3.2-20, Extraction Steam and Heater Drip System Components Subject to Aging Management Review Table 3.3.2-20, Extraction Steam and Heater Drip System – Summary of	Section 9.2.8	None

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
		Aging Management Evaluation		
2.3.3.21	Secondary Sampling System	Table 2.3.3-21, Secondary Sampling System Components Subject to Aging Management Review Table 3.3.2-21, Secondary Sampling System – Summary of Aging Management Evaluation	Section 9.3.2.2.3	LR-DCPP-02-106702-02 LR-DCPP-02-106702-03 LR-DCPP-02-106702-04 LR-DCPP-02-106702-05 LR-DCPP-02-106702-08 LR-DCPP-02-107702-02 LR-DCPP-02-107702-03 LR-DCPP-02-107702-05 LR-DCPP-02-107702-08 LR-DCPP-02-107702-14 LR-DCPP-03-106703-02 LR-DCPP-04-106704-02 LR-DCPP-04-106704-03 LR-DCPP-04-106704-05 LR-DCPP-04-106704-06 LR-DCPP-04-106704-14 LR-DCPP-05-106705-02 LR-DCPP-06-106706-05 LR-DCPP-06-106706-07 LR-DCPP-06-106706-08 LR-DCPP-28-106728-02 LR-DCPP-28-106728-03 LR-DCPP-28-106728-04 LR-DCPP-28-106728-05 LR-DCPP-28-106728-07A LR-DCPP-28-107728-02 LR-DCPP-28-107728-03 LR-DCPP-28-107728-04 LR-DCPP-28-107728-05 LR-DCPP-28-107728-07A
2.3.3.22	Service Cooling Water System	Table 2.3.3-22, Service Cooling Water System Components Subject to Aging Management Review Table 3.3.2-22, Service Cooling Water System – Summary of Aging Management Evaluation	Section 9.2.1	LR-DCCP-15-106715-2 LR-DCCP-15-106715-3 LR-DCCP-15-107715-2 LR-DCCP-15-107715-5
2.3.3.23	Solid Radwaste System	Table 2.3.3-23, Solid Radwaste System Components Subject to Aging Management Review Table 3.3.2-23, Solid Radwaste System– Summary of Aging Management Evaluation	Sections 11.2 and 11.5	LR-DCPP-78-106719-15 LR-DCPP-78-106719-16
2.3.3.24	Turbine Generator Associated Systems	Table 2.3.3-24, Turbine Generator Associated Systems Components Subject to Aging Management Review	Sections 3.6.1.2, 10.2.2.6, and 10.4.3	LR-DCPP-22-106722-2 LR-DCPP-22-106722-3 LR-DCPP-22-106722-4 LR-DCPP-22-106722-5 LR-DCPP-22-106722-6 LR-DCPP-22-107722-2 LR-DCPP-22-107722-3

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
		Table 3.3.2-24, Turbine Generator Associated Systems – Summary of Aging Management Evaluation		LR-DCPP-22-107722-4 LR-DCPP-22-107722-5 LR-DCPP-22-107722-6
2.3.3.25	Oily Water and Turbine Sump	Table 2.3.3-25, Oily Water and Turbine Sump System Components Subject to Aging Management Review Table 3.3.2-25, Oily Water and Turbine Sump System – Summary of Aging Management Evaluation	Sections 9.3.7.2 and 11.2.3.13.2.1	LR-DCPP-27-106727-03 LR-DCPP-27-106727-08
LRA Section 2.3.4, "Steam and Power Conversion Systems"				
2.3.4.1	Turbine Steam Supply System	Table 2.3.4-1, Turbine Steam Supply System Components Subject to Aging Management Review Table 3.4.2-1, Turbine Steam Supply System – Summary of Aging Management Evaluation	Sections 3.6.2.1.2, 6.5.2.1.2, 10.2, 10.3, 10.4.4, and 10.4.8	LR-DCPP-04-106704-02 LR-DCPP-04-106704-03 LR-DCPP-04-106704-04 LR-DCPP-04-106704-05 LR-DCPP-04-106704-06 LR-DCPP-04-106704-07 LR-DCPP-04-106704-08 LR-DCPP-04-106704-09 LR-DCPP-04-106704-10 LR-DCPP-04-106704-11 LR-DCPP-04-106704-12 LR-DCPP-04-106704-13 LR-DCPP-04-106704-14 LR-DCPP-04-106704-15 LR-DCPP-04-106704-16 LR-DCPP-04-106704-17 LR-DCPP-04-107704-02 LR-DCPP-04-107704-03 LR-DCPP-04-107704-04 LR-DCPP-04-107704-05 LR-DCPP-04-107704-06 LR-DCPP-04-107704-07 LR-DCPP-04-107704-08 LR-DCPP-04-107704-09 LR-DCPP-04-107704-10 LR-DCPP-04-107704-11 LR-DCPP-04-107704-12 LR-DCPP-04-107704-13 LR-DCPP-04-107704-14 LR-DCPP-04-107704-15 LR-DCPP-04-107704-16
2.3.4.2	Auxiliary Steam System	Table 2.3.4-2, Auxiliary Steam System Components Subject to Aging Management Review Table 3.4.2-2, Auxiliary Steam System – Summary of Aging Management Evaluation	Sections 3.6.2.1.2 and 9.3.7.1	LR-DCPP-06-106706-02 LR-DCPP-06-106706-03 LR-DCPP-06-106706-04 LR-DCPP-06-106706-05 LR-DCPP-06-106706-06 LR-DCPP-06-106706-07 LR-DCPP-06-106706-08

LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems"				
2.3.4.3	Main Feedwater System	Table 2.3.4-3, Main Feedwater System Components Subject to Aging management Review Table 3.4.2, Main Feedwater System – Summary of Aging Management Evaluation	Section 10.4.7	LR-DCPP-03-106703-2 LR-DCPP-03-106703-3 LR-DCPP-03-106703-5 LR-DCPP-03-107703-2 LR-DCPP-03-107703-3 LR-DCPP-03-107703-5
2.3.4.4	Condensate System	Table 2.3.4-4, Condensate System Components Subject to Aging Management Review Table 3.4.2-4, Condensate System – Summary of Aging Management Evaluation	Sections 3.6.2.1.2, 6.5.2.1.1, 9.5.1.2.3, 10.4.1, 10.4.6, 10.4.7, and 10.4.9	LR-DCPP-02-106702-02 LR-DCPP-02-106702-03 LR-DCPP-02-106702-04 LR-DCPP-02-106702-05 LR-DCPP-02-106702-06 LR-DCPP-02-106702-07 LR-DCPP-02-106702-08 LR-DCPP-02-106702-10 LR-DCPP-02-106702-11 LR-DCPP-02-106702-12 LR-DCPP-02-106702-14 LR-DCPP-02-107702-02 LR-DCPP-02-107702-03 LR-DCPP-02-107702-04 LR-DCPP-02-107702-05 LR-DCPP-02-107702-06 LR-DCPP-02-107702-07 LR-DCPP-02-107702-08 LR-DCPP-02-107702-10 LR-DCPP-02-107702-11 LR-DCPP-02-107702-12 LR-DCPP-02-107702-14 LR-DCPP-16-106716-16
2.3.4.5	Auxiliary Feedwater System	Table 2.3.4-5, Auxiliary Feedwater System Components Subject to Aging Management Review Table 3.4.2-5, Auxiliary Feedwater System – Summary of Aging Management Evaluation	Section 6.5	LR-DCPP-03-106703-03 LR-DCPP-03-106703-04 LR-DCPP-03-106703-04A LR-DCPP-03-107703-03 LR-DCPP-03-107703-04 LR-DCPP-03-107703-04A

2.3.3 Conclusion

Based on its review of the LRA, UFSAR, LRBDs, and other licensing basis documents, as appropriate, the NRC staff concludes that the applicant identified the mechanical SSCs within the scope of LR as required by 10 CFR 54.4. The staff also concludes that the applicant identified the mechanical SCs 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 the applicant's scoping and screening results for structures.

2.4.1 Summary of Technical Information in the Application

LRA Sections 2.4.1 through 2.4.14, as listed below, describe the structures and structural components within the scope of LR and subject to an AMR and the boundaries of the structures:

- LRA Section 2.4.1, “Containment Building”
- LRA Section 2.4.2, “Control Room (Located in Auxiliary Building)”
- LRA Section 2.4.3, “Auxiliary Building”
- LRA Section 2.4.4, “Turbine Building”
- LRA Section 2.4.5, “Radwaste Storage Facilities”
- LRA Section 2.4.6, “Pipeway Structure”
- LRA Section 2.4.7, “Diesel Fuel Oil Pump Vaults and Structures”
- LRA Section 2.4.8, “230 kV Switchyard, 500 kV Switchyard, and Electrical Foundation and Structures”
- LRA Section 2.4.9, “Fuel Handling Building”
- LRA Section 2.4.10, “Intake Structure and Intake Control Building”
- LRA Section 2.4.11, “Earthwork and Yard Structures”
- LRA Section 2.4.12, “Discharge Structure”
- LRA Section 2.4.13, “Outdoor Water Storage Tank Foundations and Encasements”
- LRA Section 2.4.14, “Supports and Structural Commodities”

LRA Tables 2.4-1 through 2.4-14 list the structures and structural component types subject to an AMR and their intended functions. LRA Tables 3.5.2-1 through 3.5.2-14 provide the results of the applicant’s AMR for structures and structural components.

2.4.2 Staff Evaluation

The NRC staff evaluated the system functions described in the LRA and applicable sections of the UFSAR, LRBDs, and other licensing basis documents, as appropriate, to verify that the applicant has included within the scope of LR all SSCs with intended functions defined by 10 CFR 54.4(a). The staff then reviewed those SSCs that the applicant identified as within the scope of LR to verify that the applicant has included all passive, long-lived SCs subject to an AMR, in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.3 Conclusion

Based on its review of the LRA, UFSAR, LRBDs, and other licensing basis documents, as appropriate, the NRC staff concludes that the applicant identified the structures and structural components within the scope of LR as required by 10 CFR 54.4. The staff also concludes that the applicant identified the structural 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 Control Systems

This section documents the NRC staff's review of the applicant's scoping and screening results for electrical and I&C systems. Specifically, this section discusses electrical and I&C component commodity groups.

In accordance with the requirements of 10 CFR 54.21(a)(1), the applicant must list the passive, long-lived SCs that are within the scope of LR and that are subject to an AMR. To verify that the applicant properly implemented its methodology to identify such passive, long-lived SCs, the NRC staff focused its review on the applicant's implementation results. This focus allowed the staff to verify 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 LRA was the same for all electrical and I&C components. The objective was to determine whether the applicant, in accordance with 10 CFR 54.4, identified components that meet the scoping criteria for LR. Similarly, the staff evaluated the applicant's screening results to verify that all passive, long-lived SCs are subject to an AMR, as required by 10 CFR 54.21(a)(1).

In its scoping evaluation, the NRC staff reviewed the LRA and applicable sections of the UFSAR, LRBDs, and other licensing basis documents, as appropriate, focusing on components that had not been identified as within the scope of LR. The staff reviewed relevant licensing basis documents for each component to determine whether the applicant omitted from the scope of LR components with intended functions defined by 10 CFR 54.4(a). The staff also reviewed the licensing basis documents to determine whether the LRA specified all intended functions defined by 10 CFR 54.4(a).

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

2.5.1 Summary of Technical Information in the Application

LRA Section 2.5.1 describes the electrical and I&C system components that were evaluated and determined to be subject to an AMR. LRA Table 2.5-2, "Electrical and I&C System Commodity Groups Subject to Aging Management Review," lists the electrical and I&C system components subject to an AMR and their intended functions. LRA Table 3.6.2-1 provides the results of the applicant's AMR for electrical and I&C system components.

2.5.2 Staff Evaluation

The NRC staff evaluated the system functions described in the LRA and applicable sections of the UFSAR LRBDs, and other licensing basis documents, as appropriate, to verify that the applicant has included within the scope of LR all SSCs with intended functions defined by 10 CFR 54.4(a). The staff then reviewed those SSCs that the applicant identified as within the scope of LR to verify that the applicant has included all passive, long-lived SCs subject to an

AMR, in accordance with the requirements of 10 CFR 54.21(a)(1). The staff performed this review using the guidance in the SRP-LR and RG 1.188.

2.5.2.1 Components within the Scope of License Renewal

Plant SSCs that perform specific functions within the scope of LR are identified in accordance with 10 CFR 54.4(a). The SRP-LR and RG 1.188 provide guidance on the scoping of electrical and I&C SSCs based on the LR-related functions identified in 10 CFR 54.4(a). In addition, SRP-LR, Section 2.5.2.1.1, "Components within the Scope of SBO (10 CFR 50.63)," provides the guidance for identifying electrical components in the onsite and offsite power systems that meet the requirements under 10 CFR 54.4(a)(3) and are relied upon to satisfy the requirements of 10 CFR 50.63 (SBO) for LR. The electrical components used to meet the requirements of 10 CFR 50.63 include 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, which meets the requirements under 10 CFR 54.4(a)(3).

The applicant performed a system-level scoping of the nuclear power plant's electrical and I&C systems per the scoping criteria in 10 CFR 54.4 using the scoping methodology described in LRA Section 2.1.3.2, "License Renewal Scoping." The applicant evaluated the electrical and I&C system-level functions against the criteria of 10 CFR 54.4(a)(1), (a)(2), and (a)(3) and the supporting systems needed to maintain the in-scope system intended functions against the criteria in 10 CFR 54.4(a)(2). The results of the applicant's system-level scoping for electrical and I&C systems are provided in the LRA Table 2.2-1, "Plant Level Scoping Results." The NRC staff's evaluation of 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.

In LRA Section 2.1.3, "Technical Reports," the applicant stated that the electrical and I&C components that are part of in-scope electrical and I&C systems and in-scope mechanical systems were included within the scope of LR. The applicant also included in the scope of LR the plant system portion of the offsite power system that is used to restore the plant to offsite power, including the switchyard electrical distribution equipment out to the first circuit breaker within the offsite distribution system, to demonstrate compliance with 10 CFR 50.63 (SBO) based on the guidance in the SRP-LR.

LRA Section 2.5.1.4, "Application of Screening Criteria 10 CFR 54.21(a)(1)(ii) to Electrical and I&C Commodity Groups," states, in part, that "[t]he switchyard commodities of switchyard bus and connections, high-voltage electrical insulators, transmission conductors and connections, metal enclosed bus, and inaccessible medium voltage cables perform an intended function for restoration of offsite power following an SBO event." LRA Figure 2.5-1, "Restoration of Offsite Power Following an SBO Event," shows the electrical interconnection between DCPP and the offsite transmission network and the offsite power recovery paths following an SBO. LRA Section 2.5.1.4 also includes the control circuits associated with the components in the portion of the offsite power system used for restoration of SBO.

The NRC staff reviewed in-scope electrical systems in LRA Section 2.1.1.3.5 and Figure 2.1-1 and UFSAR Appendix H, "Station Blackout (SBO)," Section 8.2, "Offsite Power System," and Figure 8.3-1, "Main One Line Diagram, 13.8 KV and 4.16 KV," to confirm that the applicant did not omit any equipment required to comply with 10 CFR 50.63 for LR in accordance with the guidance in the SRP-LR. Based on its review, the staff finds that the electrical components provided for the restoration of offsite power following an SBO conform to the guidance in the SRP-LR for meeting 10 CFR 50.63 and, therefore, are acceptable. In addition, since all electrical and I&C components within the in-scope systems in LRA Table 2.2-3 were included within the scope of LR, the staff finds that the applicant has identified all electrical and I&C components within the scope of LR 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 SCs subject to an AMR, which encompass those SCs that:

- perform an LR intended function without moving parts or without a change in configuration or properties (10 CFR 54.21(a)(1)(i)); and
- are not subject to replacement based on a qualified life or specified time period (10 CFR 54.21(a)(1)(ii)).

The SRP-LR and RG 1.188 provide guidance regarding 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-LR Table 2.1-5, “Typical Structures, Components, and Commodity Groups, and 10 CFR 54.21(a)(1)(i) Determinations for Integrated Plant Assessment,” includes electrical and I&C components and commodity groups that are typically within the scope of LR.

The applicant’s screening methodology for the in-scope electrical and I&C systems is described in the LRA section 2.1.5.4, “Electrical Commodities.” The applicant used a component commodity group approach, as described in the SRP-LR and RG 1.188, to screen the electrical and I&C components subject to AMR. The applicant stated that electrical I&C components for in-scope systems were assigned to commodity groups consistent with SRP-LR Table 2.1-5. In LRA Section 2.5.1.1, “Identification of Electrical and I&C Components,” the applicant noted that this commodity-based approach, whereby component types with similar design and/or functional characteristics are grouped together, is consistent with guidance in the SRP-LR and NEI 95-10, which the NRC endorsed in RG 1.888. In addition, LRA Table 2.5-1, “Electrical and I&C Component Commodity Groups Installed at DCPP for In-Scope Systems,” identifies the in-scope electrical and I&C component commodity groups identified at DCPP.

In LRA Section 2.5.1.3, “Elimination of Electrical and I&C Commodity Groups Not Applicable to DCPP,” the applicant eliminated the following passive electrical and I&C commodity groups that are not applicable to DCPP:

- *Cable Tie Wraps*. The applicant noted that cable tie wraps at DCPP have no CLB requirements to remain functional during and following DBEs; they do not function as cable supports in raceway support analyses, and their installation and inspection criteria are limited to the application of standard practices in providing quality cable bundles and cable placement; their seismic qualification does not credit the use of electrical cable tie wraps; they are not credited in the DCPP design basis; and they have no LR intended functions as defined in 10 CFR 54.4(a). The NRC staff reviewed the UFSAR and confirmed that cable tie wraps are not credited in the DCPP design basis and have no requirements associated with them. Therefore, the staff finds it acceptable to eliminate cable tie wraps from the scope of LR because they have no LR intended function as described in 10 CFR 54.4.
- *Uninsulated ground conductors*. The applicant noted that uninsulated ground conductors are not classified as safety-related nor are they relied upon for safety-related equipment to perform their intended function as identified in 10 CFR 54.4; their failure will not prevent

the satisfactory accomplishment of any functions identified in 10 CFR 54.4(a)(1); they are not relied upon in safety analyses or plant calculations to perform a function related to any regulated events identified in 10 CFR 54.4(a)(3); and the operating experience review did not show any significant adverse industry experience associated with them. The NRC staff reviewed the UFSAR and confirmed that uninsulated ground conductors are not credited in the DCPP design basis and have no requirements associated with them. Therefore, the staff finds it acceptable to eliminate uninsulated ground conductors from the scope of LR because they have no LR intended function as described in 10 CFR 54.4.

The SRP-LR and RG 1.188 indicate that some active components or commodity groups such as resistance temperature detectors (RTDs), sensors, thermocouples, transducers, and elements, and electric heaters meet the passive component screening criterion of 10 CFR 54.21(a)(1)(i) if they have a pressure boundary function. In LRA Section 2.1.5.4, the applicant stated that these components are addressed in the mechanical review. The NRC staff's evaluation for these mechanical systems is provided in Section 2.3 of this SE.

LRA Table 2.5-2, "Electrical and I&C System Commodity Groups Subject to Aging Management Review," provides a list of electrical and I&C commodity groups that require AMR. LRA Table 2.5-2 includes electrical equipment subject to EQ (10 CFR 50.49). The NRC staff noted that although the screening criteria of 10 CFR 54.21(a)(1)(ii) exclude the electrical equipment subject to 10 CFR 50.49 from AMR because it is subject to replacement based on a qualified life or specified time period, the criteria in 10 CFR 54.21(c)(1)(iii) require the applicant to demonstrate that the effects of aging on the intended functions of electrical equipment subject to 10 CFR 50.49 will be adequately managed for the period of extended operation. Therefore, the staff finds it acceptable to include the electrical equipment subject to 10 CFR 50.49 in Table 2.5-2 because it is subject to an AMR in accordance with 10 CFR 54.21(c)(1)(iii).

The NRC staff safety evaluation report (SER) Section 2.5.1.1, "Summary of Technical Information in the Application," dated June 2011 (ML11153A103), identified a list of electrical and I&C component commodity groups including terminal blocks and lightning rods that would require an AMR. But LRA Table 2.5-2 does not include terminal blocks and lightning rods. The staff reviewed the LRA and UFSAR to determine if these two commodity groups were appropriately excluded from AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

- *Terminal Blocks*: In LRA Section 2.5.1.4, "Application of Screening Criteria 10 CFR 54.21(a)(1)(ii) to Electrical and I&C Commodity Groups," the applicant noted that the metallic portions of the terminal blocks are included in the cable connections (metallic parts) commodity group and that the insulating portions of terminal blocks are included in the insulated electrical cables and connections commodity group. The applicant also noted that these commodity groups including the terminal blocks (metallic and insulating portions) that perform an intended function within the scope of LR but are not included in the DCPP Environmental Qualification of Electric Equipment Aging Management Program (AMP) meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to AMR. The NRC staff finds that since the terminal blocks (metallic and insulating portions) are included in electrical commodities that are subject to AMR, the exclusion of terminal blocks from LRA Table 2.5-2 is acceptable.
- *Lightning Rods*: The NRC staff 2011 SER Section 3.0.3.2.5, "Fire Protection," noted that lightning rods were managed by the DCPP Fire Protection AMP. However, LRA Section B.2.3.14, "Fire Protection," provides that the current DCPP Fire Protection AMP does not manage lightning rods. In addition, based on SRP-LR Table 2.1-5, lightning arrestors do not meet the screening criteria of 10 CFR 54.21(a)(1)(i). Therefore, the staff

finds that the exclusion of lightning rods from LRA Table 2.5-2 is acceptable because they do not perform LR intended functions without moving parts or without a change in configuration or properties according to 10 CFR 54.21(a)(1)(i).

LRA Table 2.5-2 provides the following electrical and I&C commodity groups that required an AMR and their associated component intended functions:

- Cable Connections (Metallic Parts) – Electrical Continuity
- Conductor Insulation for Inaccessible Power Cables Greater Than or Equal to 400 Volts – Electrical Continuity, Insulate (Electrical)
- Connector – Electrical Continuity
- Electrical Equipment Subject to 10 CFR 50.49 EQ – Electrical Continuity, Insulate (Electrical)
- Fuse Holders – Electrical Continuity, Insulate (Electrical)
- High-Voltage Insulator – Insulate (Electrical), Structural Support
- Insulated Cable and Connections – Electrical Continuity, Insulate (Electrical)
- Insulated Cable and Connections used in Sensitive Instrument Circuits – Electrical Continuity, Insulate (Electrical)
- Metal Enclosed Bus – Electrical Continuity, Expansion/Separation, Insulate (Electrical), Structural Support
    - Bus and Connections
    - Enclosure
    - Insulation and Insulators
- Switchyard Bus and Connections – Electrical Continuity
- Transmission Conductors and Connections – Electrical Continuity

The NRC staff reviewed the electrical and I&C commodities subject to AMR in LRA Table 2.5-2 to verify that the applicant did not omit any passive, long-lived SCs that meet the screening criteria of 10 CFR 54.21(a)(1). The staff finds that the electrical and I&C commodities subject to an AMR identified in LRA Table 2.5-2 include commodities specified in SRP-LR Table 2.1-5 and meet the criteria in 10 CFR 54.21(a)(1)(i) and 10 CFR 54.21(a)(1)(ii). Therefore, the staff concludes that the applicant identified the electrical and I&C components subject to an AMR in accordance with the requirements in 10 CFR 54.21(a)(1).

2.5.3 Conclusion

Based on its review of the LRA, UFSAR, and other licensing basis documents, as appropriate, the NRC staff concludes that the applicant identified the electrical and I&C SSCs within the scope of LR as required by 10 CFR 54.4(a). The staff also concludes that the applicant identified the electrical and I&C passive, long-lived SCs subject to an AMR in accordance with the requirements in 10 CFR 54.21(a)(1).

2.6 Conclusion for Scoping and Screening

The NRC staff reviewed the information in LRA Section 2. The staff determined that the applicant's scoping and screening methodology is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). Based on its review, the staff finds that the applicant has adequately identified those SSCs within the scope of LR, as required by 10 CFR 54.4(a), and those 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) of the license renewal application (LRA) for the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 summarizes the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff's evaluation of the Pacific Gas and Electric Company (PG&E, the applicant) aging management reviews (AMRs) and aging management programs (AMPs) for DCPP.

LRA Section 3, "Aging Management Review Results," provides the results of the applicant's AMRs for those structures and components (SCs) identified in LRA Section 2, "Scoping and Screening Methodology and Results," as within the scope of license renewal and subject to an AMR. LRA Appendix B lists the 44 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 SCs 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 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 Report

In preparing its LRA, the applicant credited NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report" (GALL-LR Report), dated December 2010 (ML103490041), for AMPs and AMR items. In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 54.29(a)(1), the Commission may issue a renewed license if, in part, the Commission finds that the applicant has or will take actions 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-LR Report summarizes generic AMPs that the NRC has determined would be adequate to manage the effects of aging on the functionality of SCs subject to an AMR.

The GALL-LR Report identifies the following related to AMPs:

- structures, systems, and components (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 License Renewal Application

The applicant's LRA is based on the guidance in NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), issued December 2010 (ML103490036), and in Nuclear Energy Institute (NEI) 95-10, Revision 6, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," issued June 2005 (ML051860406). The NRC endorsed the latter as acceptable for use in performing AMRs and drafting LRAs in Regulatory Guide (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 LRA Section 3 follows the recommendations in NEI 95-10 and parallels the section structure of SRP-LR Section 3. LRA Section 3 presents the results of the applicant's AMRs in the following two table types:

1. Table 1's: Table 3.x.1, where "3" indicates the LRA section number, "x" indicates the subsection number from the GALL-LR Report, and "1" indicates that this is the first table type in LRA Section 3.
2. Table 2's: Table 3.x.2-y, where "3" indicates the LRA section number, "x" indicates the subsection number from the GALL-LR Report, "2" indicates that this is the second table type in LRA Section 3, and "y" indicates the table number for a specific system.

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

In its Table 2's, the applicant provided the detailed results of the AMR for those SCs identified in LRA 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 **NRC Staff's Review Process**

The NRC staff conducted three types of evaluations of the AMR items and the AMPs listed in LRA 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-LR Report, the staff conducted either an audit or a technical review of the item to determine consistency. GALL-LR Report AMPs and AMR analyses are one acceptable method for managing the effects of aging; thus, the staff did not reevaluate those AMPs and AMR items that were determined to be consistent with the GALL-LR Report.
2. For items that the applicant stated are consistent with the GALL-LR Report with exceptions, enhancements, or both, the staff conducted either an audit or a technical review of the item to determine consistency. Additionally, 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. The SRP-LR states that an applicant may take one or more exceptions to specific GALL-LR Report AMP elements; however, any exception to the GALL-LR Report

AMP should be described and justified. Therefore, the staff considers exceptions as being portions of the GALL-LR Report AMP that the applicant does not intend to implement.

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

As part of its LRA review, the NRC staff conducted a regulatory audit from February 12, 2024, to August 20, 2024, in accordance with the Audit Plan dated January 29, 2024 (ML24002B180) and as detailed in the Audit Report dated November 14, 2024 (ML24311A123).

The NRC staff audits and technical reviews were conducted to determine if the Commission can make the findings of 10 CFR 54.29(a)(1) such that there is reasonable assurance that activities authorized by the renewed licenses will continue to be conducted in accordance with the current licensing basis (CLB); that is, specific to this section of the SE, if the applicant has taken or will be taking actions with respect to managing the effects of aging during the period of extended operation on the functionality of SCs that have been 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-LR Report AMPs, the NRC staff conducted either an audit or a technical review to confirm that the applicant's AMPs are consistent with the GALL-LR Report. 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 is credited. For AMPs that are not addressed in the GALL-LR Report, the staff performed a full review to determine their adequacy. The staff evaluated the AMPs against the following 10 program elements identified in Table A.1-1, "Elements of an Aging Management Program for License Renewal," of the SRP-LR:

(1) "scope of program"—should include the specific SCs subject to an AMR for license renewal (LR)

(2) "preventive actions"—should prevent or mitigate aging degradation

(3) "parameters monitored or inspected"—should be linked to the degradation of the particular SC-intended function(s)

(4) "detection of aging effects"—should occur before there is a loss of SC-intended function(s); includes aspects such as method or technique (e.g., visual, volumetric, surface inspection), frequency, sample size, data collection, and timing of new or one-time inspections to ensure timely detection of aging effects

(5) "monitoring and trending"—should provide predictability of the extent of degradation, as well as timely corrective or mitigative actions

(6) "acceptance criteria"—criteria against which the need for corrective action will be evaluated; should ensure that the SC-intended function(s) are maintained under all CLB design conditions during the period of extended operation

(7) "corrective actions"—should include root cause determination and prevention of recurrence and should be timely

(8) "confirmation process"—should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective

(9) "administrative controls"—should provide a formal review and approval process

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

OE with existing programs should be discussed. In addition, the ongoing review of both plant-specific and industry 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 NRC staff's audit evaluation of program elements 1 through 7 and 10 are documented in the Audit Report and summarized in SE Section 3.0.3. The staff reviewed the applicant's quality assurance (QA) program and documented its evaluations in SE Section 3.0.4. The staff's evaluation of the QA program included an assessment of the "corrective actions," "confirmation process," and "administrative controls" program elements (i.e., program elements 7, 8, and 9). The staff reviewed the information on the "OE" program element (i.e., program element 10) and documented the evaluation in SE Sections 3.0.3 and 3.0.5.

3.0.2.2 Review of Aging Management Review Results

Each LRA Table 2 contains information concerning whether the AMRs noted by the applicant align with the GALL-LR Report AMRs. For a given AMR in a Table 2, the NRC staff reviewed the intended function, material, environment, aging effect requiring management (AERM), and AMP combination for a particular system component type. Item numbers in column seven, "NUREG-1801 Item," of each LRA Table 2 correlate to an AMR combination as identified in the GALL-LR Report. The staff also conducted onsite audits to verify these correlations. A blank in column seven indicates that the applicant was unable to find an appropriate correlation in the GALL-LR Report. The staff also conducted a technical review of combinations not consistent with the GALL-LR Report. Column eight, "Table 1 Item," refers to a number indicating the correlating row in the LRA Table 1.

For component groups evaluated in the GALL-LR Report for which the applicant claimed consistency with the report and for which it does not recommend further evaluation, the NRC staff's audit and review determined if the plant-specific components of these GALL-LR Report component groups were bounded by the GALL-LR Report evaluation.

The applicant noted for each AMR item how the information in Table 2 aligns with the information in the GALL-LR Report. The NRC staff audited those AMRs with notes A through E, which indicate how the AMR is consistent with the GALL-LR Report.

Note A indicates that the AMR item is consistent with the GALL-LR Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the GALL-LR Report AMP. The NRC staff audited these items to verify consistency with the GALL-LR Report and validity of the AMR for the site-specific conditions.

Note B indicates that the AMR item is consistent with the GALL-LR Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the GALL-LR Report AMP. The NRC staff audited these items to verify consistency with the GALL-LR Report and verified that the identified exceptions to the GALL-LR Report AMPs have been reviewed and accepted. The staff also determined if the applicant's AMP was consistent with the GALL-LR Report AMP and if the AMR was valid for the site-specific conditions.

Note C indicates that the component for the AMR item, although different from, is consistent with the GALL-LR Report for material, environment, and aging effect. In addition, the AMP is consistent with the GALL-LR Report AMP. This note indicates that the applicant was unable to find a listing of some system components in the GALL-LR Report; however, the applicant noted in the GALL-LR Report a different component with the same material, environment, aging effect, and AMP as the component under review. The NRC staff audited these items to verify consistency with the GALL-LR Report. The staff also determined if the AMR item of the different component was applicable to the component under review and if the AMR was valid for the site-specific conditions.

Note D indicates that the component for the AMR item, although different from, is consistent with the GALL-LR Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the GALL-LR Report AMP. The NRC staff audited these items to verify consistency with the GALL-LR Report. The staff determined if the AMR item of the different component was applicable to the component under review and if the identified exceptions to the GALL-LR Report AMPs have been reviewed and accepted. The staff also determined if the applicant's AMP was consistent with the GALL-LR Report AMP and if the AMR was valid for the site-specific conditions.

Note E indicates that the AMR item is consistent with the GALL-LR Report for material, environment, and aging effect, but credits a different AMP. The staff audited these items to verify consistency with the GALL-LR Report. The staff also determined if the credited AMP would manage the aging effect(s) consistently with the GALL-LR Report AMP and if the AMR was valid for the site-specific conditions.

The applicant also indicated, through note H, that the combination of component type, material, environment, and AERM does not correspond to any item in the GALL-LR Report. The NRC staff reviewed additional details of the AMR results for material, environment, AERM, and AMP combinations that are not consistent with or are not addressed in the GALL-LR Report

Note H indicates that the aging effect is not in the GALL-LR Report for the applicant's AMR item component, material, and environment combination.

3.0.2.3 Updated Final Safety Analysis Report Supplement

Per 10 CFR 54.21(d), the NRC requires that each LR application must 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 (TLAAs) for the period of extended operation determined by the integrated plant assessment and the evaluation of TLAAs, respectively. Consistent with the SRP-LR, the NRC staff reviewed the DCPP UFSAR supplement.

3.0.2.4 Documentation and Documents Reviewed

In performing its review, the NRC staff used the LRA, LRA supplements, SRP-LR, GALL-LR Report, as well as the applicant's responses to requests for additional information (RAIs) and requests for confirmation of information (RCIs). Additionally, although the LRA is for an initial LR, the staff also used NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report" (GALL-SLR Report), dated July 2017 (ML17187A031), and other subsequent license renewal (SLR) guidance in performing its review. This is consistent with the statement in the GALL-SLR Report that applicants for initial LR (40–60 years) may use aging management guidance for SLR (60–80 years) in their applications.

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 LR 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 LRA Appendix B, "Aging Management Programs." The table also indicates (1) whether the AMP is an existing or a new program, (2) the NRC staff's disposition of the AMP, (3) the GALL-LR 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 DCPP Aging Management Programs

AMP	LRA Section(s)	New or Existing AMP	GALL-LR Report Comparison	Corresponding GALL-LR Report AMP	SE Section
Fatigue Monitoring	A.2.1.1 B.2.2.1	Existing	Consistent with enhancements	X.M1, "Fatigue Monitoring"	3.0.3.2.1
Environmental Qualification (EQ) of Electric Components	A.2.1.2 B.2.2.2	Existing	Consistent	X.E1, "Environmental Qualification (EQ) of Electric Components"	3.0.3.1.1
American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	A.2.2.1 B.2.3.1	Existing	Consistent with enhancements	XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	3.0.3.2.2
Water Chemistry	A.2.2.2 B.2.3.2	Existing	Consistent	XI.M2, "Water Chemistry"	3.0.3.1.2
Reactor Head Closure Stud Bolting	A.2.2.3 B.2.3.3	Existing	Consistent with exceptions and enhancement	XI.M3, "Reactor Head Closure Stud Bolting"	3.0.3.2.3

AMP	LRA Section(s)	New or Existing AMP	GALL-LR Report Comparison	Corresponding GALL-LR Report AMP	SE Section
Boric Acid Corrosion	A.2.2.4 B.2.3.4	Existing	Consistent	XI.M10, "Boric Acid Corrosion"	3.0.3.1.3
Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Boundary Components	A.2.2.5 B.2.3.5	Existing	Consistent	XI.M11B, "Cracking of Nickel-Alloy Components and loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Boundary Components"	3.0.3.1.4
Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	A.2.2.6 B.2.3.6	New	Consistent	XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	3.0.3.1.5
Pressurized-Water Reactor (PWR) Vessel Internals	A.2.2.7 B.2.3.7	New	Consistent	XI.M16A, "PWR Vessel Internals"	3.0.3.1.6
Flow-Accelerated Corrosion	A.2.2.8 B.2.3.8	Existing	Consistent with exceptions and enhancements	XI.M17, "Flow-Accelerated Corrosion"	3.0.3.2.4
Bolting Integrity	A.2.2.9 B.2.3.9	Existing	Consistent with exceptions and enhancements	XI.M18, "Bolting Integrity"	3.0.3.2.5
Steam Generators	A.2.2.10 B.2.3.10	Existing	Consistent with exception	XI.M19, "Steam Generators"	3.0.3.2.6
Open-Cycle Cooling Water System	A.2.2.11 B.2.3.11	Existing	Consistent	XI.M20, "Open-Cycle Cooling Water System"	3.0.3.1.7
Closed Treated Water Systems	A.2.2.12 B.2.3.12	Existing	Consistent with exceptions and 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.2.2.13 B.2.3.13	Existing	Consistent with enhancements	XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	3.0.3.2.8
Fire Protection	A.2.2.14 B.2.3.14	Existing	Consistent with exceptions and enhancement	XI.M26, "Fire Protection"	3.0.3.2.9
Fire Water System	A.2.2.15 B.2.3.15	Existing	Consistent with exceptions and enhancements	XI.M27, "Fire Water System"	3.0.3.2.10
Aboveground Metallic Tanks	A.2.2.16 B.2.3.16	Existing	Consistent with exceptions	XI.M29, "Aboveground Metallic Tanks"	3.0.3.2.11

AMP	LRA Section(s)	New or Existing AMP	GALL-LR Report Comparison	Corresponding GALL-LR Report AMP	SE Section
Fuel Oil Chemistry	A.2.2.17 B.2.3.17	Existing	Consistent with exceptions and enhancements	XI.M30, "Fuel Oil Chemistry"	3.0.3.2.12
Reactor Vessel Surveillance	A.2.2.18 B.2.3.18	Existing	Consistent with exceptions	XI.M31, "Reactor Vessel Surveillance"	3.0.3.2.13
One-Time Inspection	A.2.2.19 B.2.3.19	New	Consistent	XI.M32, "One-Time Inspection"	3.0.3.1.8
Selective Leaching	A.2.2.20 B.2.3.20	New	Consistent	XI.M33, "Selective Leaching"	3.0.3.1.9
One-Time Inspection of ASME Code Class 1 Small-Bore Piping	A.2.2.12 B.2.3.21	New	Consistent	XI.M35, "One-Time Inspection of ASME Code Class 1 Small-Bore Piping"	3.0.3.1.10
External Surfaces Monitoring of Mechanical Components	A.2.2.22 B.2.3.22	New	Consistent	XI.M36, "External Surfaces Monitoring of Mechanical Components"	3.0.3.1.11
Flux Thimble Tube Inspection	A.2.2.23 B.2.3.23	Existing	Consistent	XI.M37, "Flux Thimble Tube Inspection"	3.0.3.1.12
Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	A.2.2.24 B.2.3.24	New	Consistent with exceptions	XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	3.0.3.2.14
Lubricating Oil Analysis	A.2.2.25 B.2.3.25	Existing	Consistent with enhancements	XI.M39, "Lubricating Oil Analysis Program"	3.0.3.2.15
Buried and Underground Piping and Tanks	A.2.2.26 B.2.3.26	New	Consistent with exceptions and enhancements	XI.M34, "Buried Piping and Tanks Inspection"	3.0.3.2.16
Internal Coating/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks	A.2.2.27 B.2.3.27	New	Consistent with exceptions	XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers and Tanks"	3.0.3.2.17
ASME Section XI, Subsection IWE	A.2.2.28 B.2.3.28	Existing	Consistent with enhancement	XI.S1, "ASME Section XI, Subsection IWE"	3.0.3.2.18
ASME Section XI, Subsection IWL	A.2.2.29 B.2.3.29	Existing	Consistent with enhancement	XI.S2, "ASME Section XI, Subsection IWL"	3.0.3.2.19
ASME Section XI, Subsection IWF	A.2.2.30 B.2.3.30	Existing	Consistent with exceptions and enhancement	XI.S3, "ASME Section XI, Subsection IWF"	3.0.3.2.20

AMP	LRA Section(s)	New or Existing AMP	GALL-LR Report Comparison	Corresponding GALL-LR Report AMP	SE Section
10 CFR Part 50, Appendix J	A.2.2.31 B.2.3.31	Existing	Consistent	XI.S4, “10 CFR Part 50, Appendix J”	3.0.3.1.13
Masonry Walls	A.2.2.32 B.2.3.32	Existing	Consistent with enhancement	XI.S5, “Masonry Wall Program”	3.0.3.2.21
Structures Monitoring	A2.2.33 B2.2.33	Existing	Consistent with enhancement	XI.S6, “Structures Monitoring Program”	3.0.3.1.22
RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	A.2.2.34 B.2.3.34	Existing	Consistent with enhancement	XI.S7, “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants”	3.0.3.2.23
Protective Coating Monitoring and Maintenance	A.2.235 B.2.3.35	Existing	Consistent with enhancement	XI.S8, “Protective Coating Monitoring and Maintenance”	3.0.3.2.24
Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.2.36 B.2.3.36	New	Consistent	XI.E1, “Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”	3.0.3.1.14
Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	A.2.2.37 B.2.3.37	Existing	Consistent with Enhancement	XI.E2, “Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits”	3.0.3.2.25
Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.2.38 B.2.3.38	Existing	Consistent with exceptions and enhancement	XI.E3, “Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification requirements”	3.0.3.2.26
Metal-Enclosed Bus	A.2.2.39 B.2.3.39	Existing	Consistent with exceptions and enhancement	XI.E4, “Metal Enclosed Bus”	3.0.3.2.27
Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	A.2.2.40 B.2.3.40	New	Consistent	XI.E6, “Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”	3.0.3.1.15
Periodic	A.2.2.41	New	Plant-specific	None	3.0.3.3.1

AMP	LRA Section(s)	New or Existing AMP	GALL-LR Report Comparison	Corresponding GALL-LR Report AMP	SE Section
Inspections for Selective Leaching	B.2.3.41				
Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators	A.2.2.42 B.2.3.42	Existing	Plant-specific	None	3.0.3.3.2

3.0.3.1 Aging Management Programs Consistent with the Generic Aging Lessons Learned Report

In LRA Appendix B, the applicant identified and listed the following AMPs as consistent with the GALL-LR Report:

- Environmental Qualification (EQ) of Electric Components
- Water Chemistry
- Boric Acid Corrosion
- Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Boundary Components
- Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)
- Pressurized-Water Reactors (PWR) Vessel Internals
- Open-Cycle Cooling Water System
- One-Time Inspection
- Selective Leaching
- One-Time Inspection of ASME Code Class 1 Small-Bore Piping
- External Surfaces Monitoring of Mechanical Components
- Flux Thimble Tube Inspection
- 10 CFR Part 50, Appendix J
- Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements
- Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

3.0.3.1.1 Environmental Qualification (EQ) of Electric Components

Summary of Technical Information in the Application

LRA Section B.2.2.2 describes the existing Environmental Qualification (EQ) of Electric Components program as consistent with GALL-LR Report AMP X.E1, “Environmental Qualification (EQ) of Electric Components.”

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP X.E1. The staff also conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on that and its review of the LRA, 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 X.E1.

Operating Experience

LRA Section B.2.2.2 summarizes OE related to the Environmental Qualification (EQ) of Electric Components program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Environmental Qualification (EQ) of Electric Components program was evaluated.

UFSAR Supplement

LRA Section A.2.1.2 provides the UFSAR supplement for the Environmental Qualification (EQ) of Electric Components program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The NRC staff also noted that the applicant committed (Commitment No. 2) to ongoing implementation of the existing Environmental Qualification (EQ) of Electric Components program by November 2, 2024, for DCPP Unit 1 and by August 26, 2025, for DCPP Unit 2 for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 (EQ) of Electric Components program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.2 Water Chemistry

Summary of Technical Information in the Application.

LRA Section B.2.3.2 describes the existing Water Chemistry program as consistent with GALL-LR Report AMP XI.M2, "Water Chemistry."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M2. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on that and its review of the LRA, 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.M2.

The NRC staff notes that its finding of consistency considered the use of later revisions of industry guidance. Specifically, the DCPP Water Chemistry program is based on guidance contained in the Electric Power Research Institute (EPRI) reports "Pressurized Water Reactor Primary Water Chemistry Guidelines," Revision 7, and "Pressurized Water Reactor Secondary Water Chemistry Guidelines," Revision 8. These reports are more recent revisions compared to what is discussed in GALL-LR Report AMP XI.M2. However, these more recent revisions were referenced in SLR-ISG-2021-02-MECHANICAL, "Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance," dated February 2021 (ML20181A434). Therefore, the staff determined that the applicant's program is consistent with the GALL-LR Report because, as discussed in the GALL-SLR Report, applicants for initial LR (40–60 years) may use aging management guidance for SLR (60–80 years) in their applications. The use of these revisions of the EPRI reports makes the applicant's program consistent with the staff's current guidance for license renewal and the current EPRI water chemistry guidance.

Operating Experience

LRA Section B.2.3.2 summarizes OE related to the Water Chemistry program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.2 provides the UFSAR supplement for the Water Chemistry program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Water Chemistry program by November 2, 2024, for DCPP Unit 1 and by August 26, 2025, for DCPP Unit 2. The staff notes that although the applicant's letter dated March 6, 2025 (ML25069A508), states that this commitment was completed, the staff was unable to verify completion; therefore, verification will need to be performed during future license renewal inspection activities. 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.3 Boric Acid Corrosion

Summary of Technical Information in the Application

LRA Section B.2.3.4 describes the existing Boric Acid Corrosion program as consistent with GALL-LR Report AMP XI.M10, "Boric Acid Corrosion."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M10. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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.M10.

Operating Experience

LRA Section B.2.3.4 summarizes OE related to the Boric Acid Corrosion program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Boric Acid Corrosion program was evaluated.

UFSAR Supplement

LRA Section A.2.2.4 provides the UFSAR supplement for the Boric Acid Corrosion program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Boric Acid Corrosion program for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 Boric Acid Corrosion program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.4 Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Boundary Components

Summary of Technical Information in the Application

LRA Section B.2.3.5 describes the existing Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components program as consistent with GALL-LR Report AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M11B. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on the audit and its review of the LRA, 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.M11B.

Operating Experience

LRA Section B.2.3.5 summarizes OE related to the Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components program. The NRC staff reviewed OE information in the application and during the audit. As discussed in the Audit Report, the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components program was evaluated.

UFSAR Supplement

LRA Section A.2.2.5 provides the UFSAR supplement for the Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components program for managing the effects of aging for applicable components during the period of extended operation. Therefore, the staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

Conclusion

Based on its review of applicant's Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.5 Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)

Summary of Technical Information in the Application

LRA Section B.2.3.6 describes the new Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program as consistent with GALL-LR Report AMP XI.M12 “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS).”

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M12. For the “detection of aging effects,” program element, the applicant chose a flaw tolerance evaluation approach to demonstrate that the CASS piping and pipe fittings susceptible to thermal aging embrittlement have tolerance for large flaws for the duration of the period of extended operation. In its review of proprietary report WCAP-18892-P, Revision 0, “Flaw Tolerance Evaluation for Susceptible Reactor Coolant Loop Cast Austenitic Stainless Steel Piping Components for Diablo Canyon Units 1 and 2 60 Year License Renewal,” the staff noticed discrepancies regarding piping material in the report. The staff observed that the applicant had screened out the centrifugally cast straight piping components as not susceptible to thermal aging embrittlement based solely on the casting method without consideration of their ferrite contents. The staff requested that the applicant clarify the discrepancies in WCAP-18892-P, Revision 0. During the audit interview, the applicant acknowledged that these straight piping components were incorrectly designated as centrifugally cast materials. The applicant stated that the corrected piping material is seamless forged stainless steel. The applicant revised the report and made WCAP-18892-P, Revision 1 available to the staff. The staff determined that WCAP-18892-P, Revision 1 cites the correct material of seamless forged stainless steel for the straight piping components, which is consistent with the pipe material specified in the DCPP UFSAR.

The NRC staff also conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on the audit and its review of the LRA, 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.M12.

Operating Experience

LRA Section B.2.3.6 summarizes OE related to the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report, the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.6 provides the UFSAR supplement for the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the new Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program prior to the period of extended operation for managing the effects of aging for applicable components. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.6 Pressurized-Water Reactor Vessel Internals

Summary of Technical Information in the Application

LRA Section B.2.3.7 describes the new PWR Vessel Internals program as consistent with GALL-LR Report AMP XI.M16A, "PWR Vessel Internals" as modified by Interim Staff Guidance (ISG) SLR-ISG-2021-01-PWRVI, "Updated Aging Management Criteria for Reactor Vessel Internal Components for Pressurized-Water Reactors," dated January 2021. The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

The applicant stated that the PWR Vessel Internals program, in accordance with NEI 03-08, "Guideline for the Management of Materials Issues" (ML19079A256), will implement EPRI Report MRP-227, Revision 1-A, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines" (ML19339G350), or the latest NRC-approved revision of MRP-227, which will be applied through the use of MRP-228, Revision 3, "Materials Reliability Program: Inspection Standard for Pressurized Water Reactor Internals" (non-publicly available), or the latest NRC-approved revision of MRP-228. The applicant stated that MRP-227, Revision 1-A was written for an operating period of 60 years; therefore, a gap analysis to identify program enhancements that are needed to address an 80-year operating period are not relevant to the DCPP LRA.

The applicant further stated that LRA Section B.2.3.7 takes no exceptions to the GALL-LR Report and has no enhancements.

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR Report as modified by SLR-ISG-2021-01-PWRVI. 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M16A as modified by SLR-ISG-2021-01-PWRVI. As discussed in the GALL-SLR Report, applicants for initial LR (40–60 years) may use aging management guidance for SLR (60–80 years) in their applications. In its review, the staff used the acceptance criteria in MRP-227, Revision 1-A, including inspection and evaluation methodology criteria as discussed in SLR-ISG-2021-01-PWRVI. The staff also used review procedures given in SRP-LR Sections 3.1.3.2.9 and 3.1.3.2.10, as updated in SLR-ISG-2021-01 PWRVI.

The NRC staff noted that its SE dated April 25, 2019 (ML19081A001), for MRP-227, Revision 1, specified a license renewal applicant action item, A/LAI 1, for applicants or licensees that find degradation of baffle-former bolts. The action item referred to guidance in MRP 2017-009, “Transmittal of NEI-03-08 “Needed” Interim Guidance Regarding Baffle Former Bolt Inspections for PWR Plants as Defined in Westinghouse NSAL 16-01 Rev. 1” (ML17087A106) which was subsequently supplemented by MRP 2018-002, “Transmittal of NEI-03-08 “Needed” Interim Guidance Regarding MRP-227-A and MRP-227, Revision 1 Baffle-Former Bolt Expansion Inspection Requirements for PWR Plants” (ML24101A187). For this action item, the applicant stated in LRA Section B.2.3.7 that baseline volumetric inspections of DCPP Unit 1 in 2017 did not reveal significant clustering degradation; therefore, the additional expansion criteria in MRP 2018-002 are not currently applicable for Unit 1. Applicability for Unit 1 will be reevaluated during the next 10-year inspection of baffle-former bolts. The applicant also stated that the baseline volumetric inspections of DCPP Unit 2 are scheduled for 2025, prior to reaching 35 effective full-power years (EFPY). The staff noted that LRA Section B.2.3.7 states that the PWR Vessel Internals AMP will be consistent with MRP-227, Revision 1-A, which includes the staff’s SE (ML19081A001). As stated in A/LAI 1, to credit MRP-227, Revision 1, for its PWR Vessel Internals program, the applicant needs to follow the guidance in MRP 2018-002 in the inspection of baffle-former bolts. The applicant did not take exception to the A/LAI 1 action item in the staff’s SE for MRP-227, Revision 1-A. As such, the applicant will follow the A/LAI 1 action item. Therefore, the staff finds that the applicant has adequately addressed the A/LAI 1 action item.

The NRC staff also conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report as modified by SLR-ISG-2021-01-PWRVI. Based on its audit and its review of the LRA, as supplemented, the staff finds that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “acceptance criteria,” and “corrective actions” program elements are consistent with the corresponding program elements of GALL-LR Report AMP XI.M16A as modified by SLR-ISG-2021-01-PWRVI.

Operating Experience

LRA Section B.2.3.7 summarizes OE related to the PWR Vessel Internals program. In this section, the applicant stated that a search of the corrective action program returned no age-related findings for the reactor vessel internals from January 2013 through February 2023. The NRC staff reviewed OE information in the application and during its audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the period of extended operation.

The NRC staff noted that the PWR Vessel Internals program addresses industry OE beyond the currently approved MRP-227, Revision 1-A. Specifically:

- *Aging management of the clevis insert bolts* – Item Number W14 of Table 4-9 of MRP-227, Revision 1-A was supplemented by the guidance of Pressurized Water Reactor Owners Group (PWROG) Letter OG-21-160. The applicant has responded to the industry guidance of PWROG Letter OG-21-160 regarding degradation of clevis insert bolts by performing ultrasonic inspections.
- *Aging management of the baffle-former bolts* – Item Number W6 of Table 4-3 of MRP-227, Revision 1-A was supplemented by the guidance of Westinghouse Letter NSAL-16-1 (ML16202A063). DCPP Units 1 and 2 are Tier 1 and Tier 3 units, respectively. The full population of baffle-former bolts in Unit 1 were volumetrically inspected during the 2017 refueling outage (1R20). One indication was found, and 61 bolts were replaced with bolts made from a material less susceptible to irradiation-assisted stress corrosion cracking (IASCC). The baseline volumetric examinations for the Unit 2 baffle-former bolts are scheduled for the 2025 refueling outage (2R25).
- *Aging management of the control rod guide tube (CRGT) guide plates (cards)* – Item Number W1 of Table 4-3 of MRP-227, Revision 1-A was supplemented by the guidance of Westinghouse Letter NSAL 17-1. Baseline inspections for the full population of CRGT guide cards at DCPP Units 1 and 2 were completed during the 2017 refueling outage (1R20) and the 2016 refueling outage (2R19), respectively. Both units contained assemblies that required mitigating actions. Because of the required mitigation, the applicant plans re-inspection activities for both units during the period of extended operation in accordance with the guidance of NSAL 17-1.
- *Aging management of the thermal sleeve flanges supplemented by guidance provided in Westinghouse Letter NSAL-20-01* – The applicant reviewed this guidance and determined that it is not applicable to DCPP because neither unit has thermal sleeve collar regions in their reactor vessel heads.
- *Aging management of the core support barrel* – Item Numbers W3 and W4 of Tables 4-3 and 4-6 of MRP-227, Revision 1-A were supplemented by the guidance of EPRI Letters MRP 2019-009 and MRP 2023-005 as supplemented by MRP 2024-004. The applicant has noted that it will incorporate this guidance into the inspection schedules of the relevant welds.
- *Aging management of the thermal shield support block bolts* – Item Number W9 of Table 5-3 of MRP-227, Revision 1-A was supplemented by Westinghouse Letter TB 19-5. The applicant has reviewed the guidance and determined it only applies to DCPP Unit 1. Guidance from Revision 0 of TB 19-5 is incorporated into site procedures. The applicant is currently evaluating the updated guidance issued in Revision 1 of TB 19-5.

In addition to the plant-specific OE noted above in the applicant's response to industry OE, the NRC staff notes that the applicant's PWR Vessel Internals program also addresses plant-specific OE. Specifically:

- The originally installed Alloy X-750 guide tube support pins (split pins) were proactively replaced with strain hardened (cold worked) Type 316 stainless steel pins in 1999 and in 2006 for DCPP Units 1 and 2, respectively.
- The effectiveness of the applicant's PWR Vessel Internals program will be assessed at least every 5 years in accordance with NEI 14-12, "Aging Management Program Effectiveness" (ML15090A665).

The NRC staff did not identify any OE indicating that the applicant should modify its proposed program beyond that incorporated during the development of and/or the staff review of the LRA. Based on its audit and its review of the LRA, as supplemented, the staff finds that the conditions and OE at the plant are bounded by those for which the PWR Vessel Internals program was evaluated.

UFSAR Supplement

LRA Section A.2.2.7 provides the UFSAR supplement for the PWR Vessel Internals program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the new PWR Vessel Internals program by November 2, 2024, for DCPP Unit 1 and by August 26, 2025, for DCPP Unit 2 for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 PWR Vessel Internals program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report, as modified by SLR-ISG-2021-01-PWRVI, are consistent. Thus, 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).

3.0.3.1.7 Open-Cycle Cooling Water System

Summary of Technical Information in the Application

LRA Section B.2.3.11 describes the existing Open-Cycle Cooling Water System program as consistent with GALL-LR Report AMP XI.M20, "Open-Cycle Cooling Water System."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M20. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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.M20.

Operating Experience

LRA Section B.2.3.11 summarizes OE related to the Open-Cycle Cooling Water program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 beyond that incorporated during the development of and/or the staff review of the LRA. Based on its audit and its review of the LRA, 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

LRA Section A.2.2.11 provides the UFSAR supplement for the Open-Cycle Cooling Water System program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Open-Cycle Cooling Water System program for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.8 One-Time Inspection

Summary of Technical Information in the Application

LRA Section B.2.3.19 describes the new One-Time Inspection program as consistent with GALL-LR Report AMP XI.M32, "One-Time Inspection."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M32. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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.M32.

Operating Experience

LRA Section B.2.3.19 summarizes OE related to the One-Time Inspection program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the One-Time Inspection program was evaluated.

UFSAR Supplement

LRA Section A.2.2.19 provides the UFSAR supplement for the One-Time Inspection program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the new One-Time Inspection program no later than November 2, 2024, for DCPP Unit 1 and no later than August 26, 2025, for DCPP Unit 2 for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.9 Selective Leaching

Summary of Technical Information in the Application

LRA Section B.2.3.20 describes the new Selective Leaching program as consistent with GALL-LR Report AMP XI.M33, “Selective Leaching,” as modified by LR-ISG-2015-01, “Changes to Buried and Underground Piping and Tank Recommendations” (ML15125A377). The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M33. The staff also conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as supplemented, 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.M33.

Operating Experience

LRA Section B.2.3.20 summarizes OE related to the Selective Leaching program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.20, as supplemented, provides the UFSAR supplement for the Selective Leaching program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the new Selective Leaching program by March 31, 2026, for managing the effects of aging for applicable components during the period of extended operation. Although this is approximately 17 months after the start of the period of extended operation for DCPP Unit 1 and approximately 7 months after the start of the period of extended operation for DCPP Unit 2, the staff finds the proposed timeline to be reasonable based on the timing of the LRA submittal. In addition, the staff noted that the applicant committed to complete follow-up or expansion inspections by December 1, 2028. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.10 One-Time Inspection of ASME Code Class 1 Small-Bore Piping

Summary of Technical Information in the Application

LRA Section B.2.3.21 states that the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is a new condition monitoring program that will be consistent with the program elements in GALL-LR Report AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small-Bore Piping."

Staff Evaluation

The staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M35. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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.M35.

Operating Experience

LRA Section B.2.3.21 summarizes OE related to the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- 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.

By letter dated October 14, 2024, the applicant revised the program's small-bore butt weld sample size for DCPP Unit 1 from 17 to 18 to reflect 10 percent of the total number of welds. The NRC staff reviewed this revision and determined that it is consistent with the GALL-LR Report guidance and, therefore, is acceptable.

By letter dated March 6, 2025, the applicant provided two cases of recent plant-specific OE related to its socket welds. As a result of these cases, the applicant provided an enhancement to its ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program. The NRC staff reviewed this revision and its review is documented in Section 3.0.3.2.2 of this SE.

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

UFSAR Supplement

LRA Section A.2.2.21 provides the UFSAR supplement for the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LRA Table 3.0-1. The staff also noted that the applicant committed to implementing the One-Time Inspection of 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. Therefore, 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 of ASME Code Class 1 Small-Bore Piping program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.11 External Surfaces Monitoring of Mechanical Components

Summary of Technical Information in the Application

LRA Section B.2.3.22 describes the new External Surfaces Monitoring of Mechanical Components program as consistent with GALL-LR Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," as modified by LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation" (ML13227A361). The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M36 as modified by LR-ISG-2012-02. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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.M36 as modified by LR-ISG-2012-02.

Operating Experience

LRA Section B.2.3.22 summarizes OE related to the External Surfaces Monitoring of Mechanical Components program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.22, as revised by letter dated October 14, 2024 (ML24289A118), provides the UFSAR supplement for the External Surfaces Monitoring of Mechanical Components program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1 as modified by LR-ISG-2012-02. The staff also noted, based on the letter dated October 14, 2024, that the applicant had completed its implementation of the new External Surfaces Monitoring of Mechanical Components program and that the applicant will initiate inspections consistent with the implementation schedule in LR-ISG-2012-02. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.12 Flux Thimble Tube Inspection

Summary of Technical Information in the Application

LRA Section B.2.3.23 describes the existing Flux Thimble Tube Inspection program as consistent with GALL-LR Report AMP XI.M37, “Flux Thimble Tube Inspection.” The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M37.

By letter dated October 14, 2024 (ML24289A118), the applicant revised the description of the inspection frequency for the Flux Thimble Tube Inspection program by removing reference to the flux thimble tubes being inspected every refueling outage. Specifically, the applicant’s revision indicates that the flux tubes are inspected based on intervals determined by wall thickness measurements and trending. The NRC staff finds this acceptable because the acceptance criteria for flux thimble tube wall thickness provide adequate margin against pressure boundary leakage through conservative projections and is consistent with the recommendations in the “monitoring and trending” program element of GALL-LR Report AMP XI.M37.

The NRC staff also conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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.M37.

Operating Experience

LRA Section B.2.3.23 summarizes OE related to the Flux Thimble Tube Inspection program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Flux Thimble Tube Inspection program was evaluated.

UFSAR Supplement

LRA Section A.2.2.23 provides the UFSAR supplement for the Flux Thimble Tube Inspection program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Flux Thimble Tube Inspection program (Commitment No. 25) for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 Flux Thimble Tube Inspection program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.13 10 CFR Part 50, Appendix J

Summary of Technical Information in the Application

LRA Section B.2.3.31 describes the existing 10 CFR Part 50, Appendix J program as consistent with GALL-LR Report AMP XI.S4, "10 CFR Part 50, Appendix J."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.S4. The staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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.S4

Operating Experience

LRA Section B.2.3.31 summarizes OE related to the 10 CFR Part 50, Appendix J program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.31 provides the UFSAR supplement for the 10 CFR Part 50, Appendix J program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. 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 period of extended operation. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

3.0.3.1.14 Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Technical Information in the Application

LRA Section B.2.3.36 describes the new Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program as consistent with GALL-LR Report AMP XI.E1, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The applicant revised this LRA section by letters dated October 14, 2024 (ML24289A118), and January 2, 2025 (ML25002A050) (Amendment 2).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.E1. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, including the applicant's response to RAI B.2.3.36, 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.E1.

Operating Experience

LRA Section B.2.3.36 summarizes OE related to the Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Equipment Qualification Requirements program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the period of extended operation.

The staff identified OE for which it determined the need for additional information, which resulted in the issuance of an RAI. The Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program description, as revised by the applicant's response to RAI B.2.3.36, is acceptable because the proposed AMP will provide reasonable assurance that the effects of aging will be adequately managed so that the intended function(s) of the insulation material for electrical cables and connections not subject to 10 CFR 50.49 environmental qualification requirements within the scope of the AMP will be maintained consistent with the CLB.

Based on its audit and its review of the LRA, as well as its review of the applicant's response to RAI B.2.3.36, the NRC staff finds that the conditions and OE at the plant are bounded by those for which the Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program was evaluated.

UFSAR Supplement

LRA Section A.2.2.36 provides the UFSAR supplement for the Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the new Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Equipment Qualification Requirements program for managing the effects of aging for applicable components during the period of extended operation by November 2, 2024, for DCPP Unit 1 and by August 26, 2025, for DCPP Unit 2. The staff further noted that the applicant committed (Commitment No. 38) to implement a solution to prevent or divert oil from the cables affected by oil residue prior to December 31, 2025. Therefore, 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 Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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).

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

Summary of Technical Information in the Application

LRA Section B.2.3.40 describes the new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements as consistent with GALL-LR Report AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.E6. The staff also conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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.E6.

Operating Experience

LRA Section B.2.3.40 summarizes OE related to the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the period of extended operation.

The NRC staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and its review of the LRA, 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 program was evaluated.

UFSAR Supplement

LRA Section A.2.2.40 provides the UFSAR supplement for the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program by November 2, 2024, and by August 26, 2025, for DCPP Units 1 and 2, respectively, for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. Thus, 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 Aging Management Programs Consistent with the Generic Aging Lessons Learned Report with Exceptions or Enhancements

In LRA Appendix B, the applicant stated that the following AMPs are, or will be, consistent with the GALL-LR Report with exceptions or enhancements:

- Fatigue Monitoring
- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Reactor Head Closure Stud Bolting
- Flow-Accelerated Corrosion
- Bolting Integrity
- Steam Generators
- Closed Treated Water Systems
- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems
- Fire Protection
- Fire Water System
- Aboveground Metallic Tanks
- Fuel Oil Chemistry
- Reactor Vessel Surveillance
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components
- Lubricating Oil Analysis
- Buried Piping and Tanks Inspection
- Internal Coatings/linings for In-Scope Piping, Piping Components, Heat Exchanges, and Tanks
- ASME Section XI, Subsection IWE
- ASME Section XI, Subsection IWL
- ASME Section XI, Subsection IWF
- Masonry Wall

- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants
- Protective Coating Monitoring and Maintenance
- Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits
- Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification requirements
- Metal Enclosed Bus

For AMPs that the applicant claimed are consistent with the GALL-LR Report with exception(s) and/or enhancement(s), 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-LR Report, were indeed consistent. The staff also reviewed the exception(s) and/or enhancement(s) to the GALL-LR Report to determine if they were acceptable and adequate. The following sections document the results of the staff's audits and reviews.

3.0.3.2.1 Fatigue Monitoring

Summary of Technical Information in the Application

LRA Section B.2.2.1, as revised by the applicant's RAI response dated October 3, 2024, and letter dated October 14, 2024 (ML24277A067 and ML24289A118, respectively), states that the Fatigue Monitoring AMP is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP X.M1, "Fatigue Monitoring."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP X.M1. For the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements not associated with the program enhancements, the staff found that these program elements are consistent with the corresponding program elements of GALL-LR Report AMP X.M1.

The NRC staff also reviewed the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "acceptance criteria," and "corrective actions" 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 is documented below.

Enhancement 1. LRA Section B.2.2.1 includes an enhancement to the "scope of program," "preventive actions," and "parameters monitored or inspected" program elements. The enhancement relates to including additional analyses and critical thermal and pressure transients for components that have been identified to have a fatigue TLAA, which are not covered by the current program. In this enhancement, the additional analyses will include the environmentally assisted fatigue analyses for the components specified in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant

Components," dated March 1995, and the components identified to be more limiting than the components specified in NUREG/CR-6260.

The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, it will ensure that the program includes the locations subject to the fatigue TLAAs, including the environmentally assisted fatigue locations described in NUREG/CR-6260 and additional plant-specific limiting locations, consistent with GALL-LR Report AMP X.M1.

Enhancement 2. LRA Section B.2.2.1 includes an enhancement to the "detection of aging effects" program element. The enhancement relates to specifying the frequency of periodic reviews of the monitored cycle count and cumulative usage factor data at least once per fuel cycle. The LRA also indicates that this review will determine whether updates to fatigue analyses are needed if:

- an allowable cycle limit is approached;
- where a transient definition has been changed;
- unanticipated new thermal events are discovered; or
- the geometry of components has been modified.

The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, it will ensure the following two conditions:

1. The actual transient cycles and cumulative usage factors are reviewed periodically at least once per fuel cycle to initiate corrective actions, to consider revised transient definitions, and to evaluate unanticipated new thermal events and geometry modifications of components.
2. Based on the periodic reviews, the fatigue analyses (e.g., cumulative usage factor and crack growth analyses) are updated in a timely manner as needed to maintain the validity of fatigue analyses.

Enhancement 3. LRA Section B.2.2.1 includes an enhancement to the "preventive actions" and "acceptance criteria" program elements. The enhancement relates to enhancing the Fatigue Monitoring AMP to include acceptance criteria for transient definitions, cycle counts action limits, and cumulative usage factor (CUF) action limits, which will invoke appropriate corrective actions if a component reaches a cycle count action limit or a CUF action limit. The LRA explains that the action limits will permit completion of corrective actions before the fatigue design limits are exceeded.

The NRC staff finds that the applicant's discussion of the action limits, as revised by its response to RAI B.2.2.1-1 dated October 3, 2024, and its letter dated October 14, 2024 (ML24277A067 and ML24289A118, respectively), is acceptable for the following reasons:

1. The enhancement addresses the action limit for environmentally adjusted CUF (CUFen) as well as the action limit for CUF.

2. Corrective actions are taken based on the action limits to ensure that the fatigue design limit (e.g., 1.0 for CUF_{en}) is not exceeded and that crack growth analyses continue to be valid.
3. The action limit for transient cycles is 90 percent of the limiting (lowest) analyzed cycles of transients.
4. The action limit for CUF and CUF_{en} is when the CUF or CUF_{en} value is projected to reach the fatigue design limit within the next three fuel cycles (i.e., 4.5 years).
5. These action limits provide sufficient time to implement corrective actions.

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

1. Acceptance criteria for transient definitions are included in the implementing procedure.
2. Action limits on transient cycles, CUF and CUF_{en} are specified to perform timely corrective actions to maintain the validity of fatigue analyses (e.g., reevaluation of CUF_{en} and crack growth analyses and repair/replacement activities for affected components).

Enhancement 4. LRA Section B.2.2.1 includes an enhancement to the “corrective actions” program element. The enhancement relates to enhancing the procedures of the program to include appropriate corrective actions if a component reaches a cycle count action limit or a fatigue usage action limit. The LRA also explains that the corrective action options for a component that has reached action limits include a revised fatigue analysis, repair, or replacement of the component. The LRA further indicates that corrective actions for approaching fatigue crack growth analysis action limits include re-analyzing the fatigue crack growth analysis consistent with, or reconciled to, the original analysis.

The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP X.M1. The staff finds the enhancement acceptable because, when implemented, it will ensure that effective corrective actions are performed when a component reaches a cycle count action limit or a fatigue usage action limit so that the fatigue design limits are not exceeded and that the fatigue analyses remain valid for the extended period of operation.

Operating Experience

LRA Section B.2.2.1 summarizes OE related to the Fatigue Monitoring AMP. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Fatigue Monitoring AMP was evaluated.

UFSAR Supplement

LRA Section A.2.1.1 provides the UFSAR supplement of the Fatigue Monitoring AMP. The NRC staff reviewed this UFSAR supplement description of the program and finds that the information in the UFSAR supplement is an adequate summary description of the program, consistent with the guidance in SRP-LR Section 3.1.2.5.

Conclusion

Based on its review of the applicant's Fatigue Monitoring Program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

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

Summary of Technical Information in the Application

LRA Section B.2.3.1 states that the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is an existing program with enhancements that is consistent with the program elements in the GALL-LR Report AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD." The applicant revised this LRA section by letter dated March 6, 2025 (ML25069A508).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M1. The staff also reviewed the portions of the "scope of program" 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 these enhancements is documented below.

Enhancement 1. LRA Section B.2.3.1, includes an enhancement to the "corrective actions" program element which relates to re-examination of the DCPP Unit 1 Pressurizer Spray Line Pipe Weld WIB-378 for three inservice inspection (ISI) periods after the identification of the weld flaw in 2015, in accordance with ASME Code Section XI, paragraph IWB-2420 for successive inspections. As documented in the Audit Report, the NRC staff determined that the applicant had successfully completed the three successive examinations of Weld WIB-378. Additionally, the applicant stated that it will reanalyze the current acceptability and projected flaw growth rate for the reminder of the period of extended operation and continue monitoring the weld on a periodic basis. The staff reviewed this enhancement and finds it acceptable because the successive examinations confirmed that the flaw is stable, and the continued periodic monitoring will provide adequate assurance of the structural integrity of Weld WIB-378 during the period of extended operation.

Enhancement 2. LRA Sections B.2.3.1 and B.2.3.21, discuss an enhancement to the "scope of program" element for this AMP, which is related to performing a plant-specific small-bore piping inspection on the outside diameter of 10 percent of the susceptible ASME Code Class 1 socket weld population greater than or equal to nominal pipe size (NPS) 1 inch and less than NPS 4 inches with a maximum of 25 welds per unit. These small-bore piping inspections will consist of using visual and penetrant examinations in each ISI interval during the period of extended operation. As discussed in LRA Section B.2.3.21, during the 2024 implementation of the applicant's One-Time Inspection of ASME Code Class1 Small-Bore Piping program, a flaw was identified on the exterior of a DCPP Unit 2 reactor coolant pump injection seal line socket weld. The destructive examinations of the weld identified that the flaw was caused by SCC on the outside diameter of the socket weld. The NRC staff finds this enhancement acceptable because: (1) the visual and penetrant examinations are well suited for the detection of flaws initiated on the outside diameter, and (2) the sampling plan is consistent with the recommendations in GALL-LR Report AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small-Bore Piping."

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M1. In addition, the staff reviewed the enhancements associated with the "scope of program," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.1 summarizes OE related to the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information:

- to identify any age-related degradation, as documented in the applicant's corrective action program database; and
- to provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the period of extended operation.

The NRC staff did not identify any OE indicating that the applicant should modify its proposed program. Based on its audit and its review of the LRA, 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

LRA Section A.2.2.1 provides the UFSAR supplement for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. 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 all applicable components during the period of extended operation. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the enhancements and finds that, with the enhancements as implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.3 Reactor Head Closure Stud Bolting

Summary of Technical Information in the Application

LRA Section B.2.3.3 states that the Reactor Head Closure Stud Bolting program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.M3, "Reactor Head Closure Stud Bolting," except for the exception identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M3. The staff also reviewed the portions of the "preventive actions" and "corrective actions" program elements associated with exceptions 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 these exceptions and enhancements is documented below.

Exception 1. LRA Section B.2.3.3 includes an exception to the "preventive actions" program element related to the suggestion to limit the yield strength of the reactor head closure studs to less than 150 kilopounds per square inch (ksi). GALL-LR Report AMP XI.M3 places limits on the yield strength values of the reactor head closure studs to reduce susceptibility of the studs to SCC or intergranular stress corrosion cracking (IGSCC), which is more likely to occur as material strength increases. The applicant stated that many existing reactor head closure studs have yield strengths greater than 150 ksi because they were fabricated before RG 1.65, "Materials and Inspections for Reactor Vessel Closure Studs," was issued. The applicant is, therefore, taking exception to the recommendation in the GALL-LR Report AMP XI.M3 that specifies an upper limit value on the yield strength of the existing reactor head closure studs.

The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M3 and finds it acceptable for the following reasons:

- There were no relevant indications identified by ISI program examinations of the reactor head closure stud bolting components. The closure studs are volumetrically examined per ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, which is an effective examination for detecting degradation due to SCC or IGSCC.
- Other preventive measures in the GALL-LR Report AMP XI.M3 regarding not using metal-plated studs, using acceptable stud surface treatments, and using stable lubricants are met.
- Implementation of the enhancement (discussed in the following paragraphs) will ensure that any replacements bolts will have the yield strength necessary to be consistent with the recommendations in GALL-LR Report AMP XI.M3.

Enhancement 1. LRA Section B.2.3.3 includes an enhancement to the “preventive actions” and “corrective actions” program elements that relates to the procurement of new reactor head closure studs to limit measured yield strength to less than 150 ksi. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M3 and finds it acceptable because, when implemented, it will be consistent with the recommendation in the “preventive actions” GALL-LR Report program element to use bolting material with a measured yield strength less than 150 ksi to prevent SCC and IGSCC.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M3. The staff also reviewed the exception associated with the “preventive actions” 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 enhancement associated with the “preventive actions” and “corrective actions” program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.3 summarizes OE related to the Reactor Head Closure Stud Bolting program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Reactor Head Closure Stud Bolting program was evaluated.

UFSAR Supplement

LRA Section A.2.2.3 provides the UFSAR supplement for the Reactor Head Closure Stud Bolting program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Reactor Head Closure Stud Bolting program, including an enhancement to ensure that the actual measured yield strength of replacement reactor head closure stud material purchased in the future is limited to less than 150 ksi (Commitment No. 5), for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.4 Flow-Accelerated Corrosion

Summary of Technical Information in the Application

LRA Section B.2.3.8 states that the Flow-Accelerated Corrosion program is an existing program with enhancements that, excluding one exception, will be consistent with the program elements in the GALL-LR Report AMP XI.M17, "Flow-Accelerated Corrosion," as modified by LR-ISG-2012-01, "Wall Thinning Due to Erosion Mechanisms" (ML12352A057).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M17, as amended by LR-ISG-2012-01. The staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "corrective actions" program elements associated with exceptions 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 five enhancements is documented below.

Exception 1. LRA Section B.2.3.8 includes an exception to the "scope of program" and "detection of aging effects" program elements related to the use of EPRI Report NSAC-202L Revision 4 instead of the earlier revisions of this report for a flow-accelerated corrosion program. The NRC staff reviewed this exception and notes that subsequent revisions to AMP

XI.M17 have endorsed Revision 4 of NSAC-202L and, therefore, finds this exception acceptable based on the staff's prior determinations.

Enhancement 1. LRA Section B.2.3.8 includes an enhancement to the "scope of program" and "parameters monitored or inspected" program elements relating to the inclusion of erosion mechanisms and wall thickness measurements for components susceptible to various wall-thinning mechanisms. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M17, as modified by LR-ISG-2012-01, and finds it acceptable because, when implemented, it will manage various erosion mechanisms during the period of extended operation consistent with the guidance provided in LR-ISG-2012-01.

Enhancement 2. LRA Section B.2.3.8 includes an enhancement to the "detection of aging effects" program element relating to the identification of locations susceptible to erosion based on plant-specific and industry OE and various industry guidance documents. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M17, as modified by LR-ISG-2012-01, and finds it acceptable. When implemented, the applicant's enhanced program will consider locations using the approach and industry guidance for various erosion mechanisms provided in the "detection of aging effects" program element of LR-ISG-2012-01.

Enhancement 3. LRA Section B.2.3.8 includes an enhancement to the "monitoring and trending" program element relating to trending wall thickness measurement for locations susceptible to erosion mechanisms and adjusting the inspection frequencies and repair or replacement determinations based on the component's predicted remaining service life. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M17, as modified by LR-ISG-2012-01, and finds it acceptable because it is consistent with the license renewal guidance against which it was reviewed. Adjustments to the timing of inspections or replacements based on periodic wall thickness measurements can provide assurance that degradation will be identified prior to a loss of intended function, consistent with the license renewal guidance.

Enhancement 4. LRA Section B.2.3.8 includes an enhancement to the "monitoring and trending" program element relating to the control and review of plant predictive model updates using a second qualified flow-accelerated corrosion engineer. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M17 and finds it acceptable because independent reviews by qualified engineers is consistent with the industry guidance in EPRI Report NSAC-202L.

Enhancement 5. LRA Section B.2.3.8 includes an enhancement to the "corrective actions" program element relating to erosion mechanism elimination through changes to operating parameters or component designs and the continuation of monitoring activities for corrective actions including material substitutions. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M17, as modified by LR-ISG-2012-01, and finds it acceptable. When implemented, the applicant's enhanced program will be consistent with the guidance in LR-ISG-2012-01 by verifying the effectiveness of erosion elimination actions and by continuing to monitor components that have been replaced with alternate materials.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M17, as modified by LR-ISG-2012-01. The staff also reviewed the exception associated with the "scope of program" and "parameters monitored or inspected" program elements and its justifications 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," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.8 summarizes OE related to the Flow-Accelerated Corrosion program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search results of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.8 provides the UFSAR supplement for the Flow-Accelerated Corrosion program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Flow-Accelerated Corrosion program as well as implementing the noted enhancements by November 2, 2024. Therefore, 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 Flow-Accelerated Corrosion program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exception and the enhancements and finds that, with the exception and the enhancements, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.5 Bolting Integrity

Summary of Technical Information in the Application

LRA Section B.2.3.9 states that the Bolting Integrity program is an existing program with exceptions and enhancements that will be consistent with the program elements in GALL-LR Report AMP XI.M18, “Bolting Integrity.” In Letter DCL-24-092 (ML24289A118), the applicant stated that the exception to the “parameters monitored or inspected,” program element of the Bolting Integrity AMP was deleted because it was determined that the AMP complies with GALL-LR Report AMP XI.M18. Therefore, changes were made throughout LRA Section 3 where the Bolting Integrity AMP is cited to reflect consistency with the GALL-LR Report.

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M18. The staff also reviewed the portions of the “preventive actions,” “parameters monitored or inspected,” “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 these eight enhancements is documented below.

Enhancement 1. LRA Section B.2.3.9 includes an enhancement to the “preventive actions” program element to minimize any future use of bolting material greater than 2 inches with an actual yield strength greater than or equal to 150 ksi in portions of systems within the scope of the Bolting Integrity program. If bolting greater than 2 inches with an actual yield strength greater than or equal to 150 ksi is used, the bolting will be monitored for cracking, with volumetric examinations performed in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendations to include preventive measures and examinations for high-strength closure bolting (i.e., actual yield strength greater than or equal to 150 ksi) known to be more susceptible to SCC.

Enhancement 2. LRA Section B.2.3.9 includes an enhancement to the “preventive actions” program element, which explicitly bans the use of molybdenum disulfide (MoS_2) as a lubricant on bolts. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendations to ensure that lubricants known to be a potential contributor to SCC are not used.

Enhancement 3. LRA Section B.2.3.9 includes an enhancement to the “preventive actions,” “detection of aging effects,” and “corrective actions” program elements to incorporate the applicable guidance of EPRI NP-5769 and EPRI Report 104213, and the additional recommendations of NUREG-1339, “Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants,” dated June 1990, to prevent or mitigate degradation and failure of closure bolting. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendations to include preventive, detection, and corrective measures and examinations for degradation and failure of closure bolting.

Enhancement 4. LRA Section B.2.3.9 includes an enhancement to the “parameters monitored or inspected” and “detection of aging effects” elements wherein the Bolting Integrity AMP implementing procedures will be enhanced, or a new procedure will be issued, to perform inspections of pressure-retaining closure bolting in piping systems that contain air or gas for which leakage is difficult to detect during the period of extended operation. Integrity of the bolted joint will be demonstrated by one of the following methods:

1. Inspections are performed consistent with that of submerged closure bolting;
2. A visual inspection for discoloration is conducted when leakage of the environment inside the piping systems would discolor the external surfaces;
3. Monitoring and trending of pressure decay are performed when the bolted connection is located within an isolated boundary;
4. Soap bubble testing is performed;
5. When the temperature of the fluid is higher than ambient conditions, thermography testing is performed; or
6. Inspection methods capable of detecting leakage for systems containing air or gas are used.

At a minimum, in each 10-year ISI during the period of extended operation, inspections shall be completed on a representative sample of at least 20 percent of the population of bolt heads and threads (defined as bolts with the same material and environmental combination) at each DCPP unit, up to a maximum of 19 for each unit, for each material/environment combination. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendations to ensure that the effects of aging on the intended function of closure bolting will be inspected for loss of intended functions.

Enhancement 5. LRA Section B.2.3.9 includes an enhancement to the “parameters monitored or inspected” and “detection of aging effects” program elements that relates to enhancing procedures or developing new procedures to ensure that submerged closure bolting is visually inspected for loss of material during period of extended operation maintenance activities. Bolt heads will be inspected when made accessible, and bolt threads will be inspected when joints are disassembled. In each 10-year ISI during the period of extended operation, a representative sample of bolt heads and threads will be inspected. If opportunistic maintenance activities will not provide access to 20 percent of the population (for a material/environment combination) up to a maximum of 19 bolt heads and threads over a 10-year period, then it will be documented how the integrity of the bolted joint will be demonstrated. Examples follow:

1. Periodic pump vibration measurements are taken and trended.
2. Sump pump operator walkdowns are performed demonstrating that the pumps are appropriately maintaining sump levels.

The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendations to ensure that the effects of aging on the intended function of closure bolting will be inspected for loss of intended functions.

Enhancement 6. LRA Section B.2.3.9 includes an enhancement to the “detection of aging effects” program element that relates to the Bolting Integrity AMP implementing procedures which will be enhanced, or a new procedure will be issued, to ensure that the high-strength closure bolting identified for the Reactor Coolant Pump main flange bolting is managed. Volumetric examinations will be performed for this bolting and any additional bolting greater than 2 inches in diameter with an actual yield strength greater than or equal to 150 ksi that is identified. Volumetric examinations will be performed in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1 (e.g., acceptance standards, extent, and frequency of examination). Specified bolting material properties (e.g., design and procurement specifications, fabrication and vendor drawings, material test reports) may be used to determine if identified bolting exceeds the threshold to be classified as high-strength. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendation to ensure that bolting greater than 2 inches in diameter with an actual yield strength greater than or equal to 150 ksi is classified as high-strength bolting.

Enhancement 7. LRA Section B.2.3.9 includes an enhancement to the “acceptance criteria” program element, which will be established when alternative inspections or testing is conducted for submerged closure bolting or closure bolting where the piping systems contain air or gas for which leakage is difficult to detect. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M18 and finds it acceptable because, when it is implemented, it will make the program consistent with the corresponding GALL-LR Report recommendation. The applicant revised this LRA Enhancement section to add “submerged closure bolting or closure bolting where” by letter dated March 6, 2025 (ML25069A508).

Enhancement 8. LRA Section B.2.3.9 includes an enhancement to the “corrective actions” program element that relates to enhancing the procedures for sampling-based inspections. If the cause of the aging effect for each applicable material and environment is not corrected by repair or replacement for all components constructed of the same material and exposed to the same environment, additional inspections will be conducted if the results for one of the inspections does not meet acceptance criteria. The number of increased inspections will be determined in accordance with the DCPP corrective action program; however, there will be no fewer than five additional inspections for each inspection result that did not meet acceptance criteria, or 20 percent of each applicable material, environment, and aging effect combination will be inspected, whichever is less. If the results of subsequent inspections do not meet the acceptance criteria, an extent of condition and extent of cause analysis will be conducted to determine the further extent of inspections. Additional samples will be inspected for any recurring degradation to ensure that corrective actions appropriately address the associated causes. Additional inspections will include inspections at both DCPP units with the same material, environment, and aging effect combination. The additional inspections will be completed within the interval (e.g., refueling outage interval, 10-year ISI interval) in which the original inspection was conducted. If any projected inspection results will not meet the acceptance criteria prior to the next scheduled inspection, sampling frequencies will be adjusted as determined by the DCPP corrective action program. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M18 and finds it acceptable because, when implemented, it will make the program consistent with the GALL-LR Report recommendation to ensure that identified leaking bolted connections will be monitored at an increased frequency in accordance with the corrective action process.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M18. In addition, the staff reviewed the enhancements associated with the "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.9 summarizes OE related to the Bolting Integrity program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.9 provides the UFSAR supplement for the Bolting Integrity program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that in LRA Table A-3, the applicant committed (LRA Commitment No. 11) to ongoing implementation of the existing Bolting Integrity program for managing the effects of aging for applicable components during the period of extended operation. The staff further noted that the applicant committed to implementing the enhancements no later than November 2, 2024, for DCPP Unit 1 and no later than August 26, 2025, for DCPP Unit 2. Therefore, 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, as revised, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.6 Steam Generators

Summary of Technical Information in the Application

LRA Section B.2.3.10 states that the Steam Generators program is an existing program that will be consistent with the program elements in the GALL-LR Report AMP XI.M19, "Steam Generators," as modified by LR-ISG-2016-01, "Changes to Aging Management Guidance for Various Steam Generator Components" (ML16237A383), except for the exceptions identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M19, as modified by LR-ISG-2016-01. The staff also reviewed the portions of the "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria," program elements associated with the exceptions 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 is documented below.

Exception 1. LRA Section B.2.3.10 includes an exception to the "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements related to referencing EPRI Report 3002018267, Revision 5 of the EPRI primary-to-secondary leakage guidelines, EPRI Report 3002007856, Revision 5 of the EPRI in-situ pressure testing guidelines, and EPRI Report 3002020909, Revision 5 of the EPRI steam generator integrity assessment guidelines. This is an exception because GALL-LR Report AMP XI.M19, as modified by LR-ISG-2016-01, references Revision 4 of these three guidelines. As stated in GALL-LR Report AMP XI.M19, the Steam Generators program at every PWR is modeled after NEI 97-06, "Steam Generator Program Guidelines." The NEI 97-06 framework requires licensees to implement the latest version of the referenced EPRI guidelines. For each of these three guidelines, Revision 5 has been incorporated into the applicant's steam generator management program. The NRC staff finds the exception acceptable because referencing Revision 5 of the EPRI primary-to-secondary leakage guidelines, in-situ pressure testing guidelines, and integrity assessment guidelines in the Steam Generators program is consistent with the current programmatic guidelines in NEI 97-06.

Exception 2. LRA Section B.2.3.10 includes an exception to the "parameters monitored or inspected" program element related to the frequency of visual inspections of the steam generator head interior surfaces and tubesheets. The steam generator head interior surfaces are defined in the Steam Generators AMP description as the divider plates, channel head interior surfaces, tubesheets, and tube-to-tubesheet welds, which is consistent with the description in GALL-LR Report AMP XI.M19, as modified by LR-ISG-2016-01. The inspection interval proposed in the Steam Generators AMP is at least every 96 effective full-power months (EFPM) for both DCPP units. This is an exception because in GALL-LR Report AMP XI.M19, as modified by LR-ISG-2016-01, the inspection interval is at least every 72 EFPM or every third refueling outage, whichever results in more frequent inspections. The NRC staff finds the exception acceptable because the proposed intervals are consistent with the applicant's current technical specifications, as revised by NRC letter dated September 6, 2022 (ML22221A168). These intervals are based on Technical Specifications Task Force Traveler 577 (TSTF-577)

(ML21098A188) and are incorporated into Revision 5 of the Standard Technical Specifications for Westinghouse plants (ML21259A1550).

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, the staff finds that the "scope of program," "preventive actions," "monitoring and trending," and "corrective actions" program elements for which the applicant claimed consistency with the GALL-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M19, as modified by LR-ISG-2016-01. 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 Steam Generators AMP, with the exceptions, is adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.10 summarizes OE related to the Steam Generators program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- 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 beyond that incorporated during the staff review of the LRA. Based on its audit and its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Steam Generators program was evaluated.

UFSAR Supplement

LRA Section A.2.2.10 provides the UFSAR supplement for the Steam Generators program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Steam Generators program for managing the effects of aging for applicable components during the period of extended operation. The staff notes that although the applicant's letter dated March 6, 2025 (ML25069A508), states that the implementation discussed above was completed, the staff was unable to verify completion; therefore, verification will need to be performed during future license renewal inspection activities. Therefore, 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 Steam Generators program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and finds that, with the exceptions when implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.7 Closed Treated Water Systems

Summary of Technical Information in the Application

LRA Section B.2.3.12 states that the Closed Treated Water Systems program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.M21A, "Closed Treated Water Systems," except for the exceptions identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M21A. The staff also reviewed the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements associated with exceptions 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 these three exceptions and two enhancements is documented below.

Exception 1. LRA Section B.2.3.12 includes an exception to the "parameters monitored or inspected" program element related to monitoring the chloride, fluoride, and sulfate levels in the cooling water of the Diesel Engine Jacket Water System in accordance with EPRI Report 3002000590, Closed Cooling Water Chemistry Guideline, Table 5-4. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M21A and finds that the staff's previous acceptance determination is still applicable, and details are included in the DCPP LR safety evaluation report, dated January 2011 (ML110100796), Section 3.0.3.2.4, Exception 1.

Exception 2. LRA Section B.2.3.12 includes an exception to the "detection of aging effects" program element related to establishing a monthly monitoring frequency for Diesel Engine Jacket Water System control parameters under stable condition in accordance with EPRI Report 302000590, Closed Cooling Water Chemistry Guideline, Table 5-4. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M21A and finds it acceptable because even though the applicant is not complying with the EPRI guidelines for monthly monitoring, the applicant is complying with GALL-LR Report AMP XI.M21A, which recommends performing quarterly monitoring.

Exception 3. LRA Section B.2.3.12 includes an exception to the "acceptance criteria" program element related to maintaining the Azole parameter in accordance with EPRI Report 302000590, Closed Cooling Water Chemistry Guideline, Table 5-3 within the normal operating range, which is more than 25 parts per million (ppm) if pH is in the range of 10.5-11. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M21A and finds it acceptable because the GALL-LR Report water chemistry concentrations are maintained within the limits specified in the selected industry standard documents, and the applicant will comply with the water discharge requirements of its National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit requires that the applicant maintain the target pH ranges within the limits specified in NPDES Permit No. CA0003751. Target pH ranges for Nitrate/Molybdate Systems at DCPP are 9.0-10.0 for the CCW system and 9.0-10.3 for the service cooling water (SCW) and the intake cooling water (ICW) systems.

Enhancement 1. LRA Section B.2.3.12 includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” and “monitoring and trending” program elements that relates to performing a periodic inspection of corrosion coupons installed in CCW, SCW, and ICW systems and evaluating their condition to detect corrosion occurring in the systems. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M21A and finds it acceptable because, when they are implemented, the periodic inspection of corrosion coupons will be consistent with the recommendations in the GALL-LR Report.

Enhancement 2. LRA Section B.2.3.12 includes an enhancement to the “parameters monitored or inspected,” “detection of aging effects,” and “monitoring and trending” program elements that relates to enhancing procedures to include inspection of surfaces exposed to the closed treated water environment for evidence of loss of material, cracking, fouling, corrosion, or identify adverse condition whenever the system boundary is opened. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M21A and finds it acceptable because, when they are implemented, the program’s procedures will be consistent with the recommendations in the GALL-LR Report.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M21A. 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 Closed Treated Water Systems 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,” and “monitoring and trending,” program elements and finds that, when implemented, they will make the Closed Treated Water Systems AMP adequate to manage the applicable aging effects.

Operating Experience

LRA Section B2.3.12 summarizes OE related to the Closed Treated Water Systems program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 beyond that incorporated during the development of and/or staff review of the LRA. Based on its audit and its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Closed Treated Water Systems program was evaluated.

UFSAR Supplement

LRA Section A.2.2.11 provides the UFSAR supplement for the Closed Treated Water Systems program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Closed Treated Water Systems program for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 Systems program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and the enhancements and finds that, when the exceptions and enhancements are implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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 10CFR54.21(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 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

Summary of Technical Information in the Application

LRA Section B2.3.13 states that the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP is an existing program, with enhancements, that will be consistent with the program elements in the GALL-LR Report AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M23. The staff also reviewed the portions of the "parameters monitored or inspected," "detection of aging effects," "acceptance criteria," and "corrective action" 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 four enhancements is documented below.

Enhancement 1: LRA Section B.2.3.13 includes an enhancement to the "parameters monitored or inspected" program element that relates to revising procedure(s) to specify visual inspections for loose bolts, missing or loose nuts, or other indications of loss of preload and cracking for bolted connections of the containment dome service crane. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M23 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendation for performing visual inspections to provide reasonable assurance that loose bolts, missing or loose nuts, or other indications of loss of preload and cracking for bolted connections of the containment dome service crane will be captured.

Enhancement 2: LRA Section B.2.3.13 includes an enhancement to the “detection of aging effects” program element that relates to revising procedure(s) to specify that visual inspection frequencies are in accordance with ASME B30.2, “Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist),” 2005 Edition, or other appropriate standards in the ASME B30 series. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M23 and finds it acceptable because, when implemented, it will be consistent with GALL-LR Report recommendations, in addition to Code and Standards requirements.

Enhancement 3: LRA Section B.2.3.13 includes an enhancement to the “acceptance criteria” program element that relates to revising procedure(s) to specify that all visual indications of aging are evaluated for associated system/component adjustment, repair, or replacement, as necessary, in accordance with ASME B30.2, 2005 Edition, or other appropriate standards in the ASME B30 series. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M23 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendation to perform visual inspections of aging to provide reasonable assurance that all adjustments, repairs, or replacements, as necessary, are evaluated for associated systems/components, in addition to Code and Standards requirements.

Enhancement 4: LRA Section B.2.3.13 includes an enhancement to the “corrective actions” program element that relates to revising procedure(s) to specify that system/component repairs are performed in accordance with ASME B30.2, 2005 Edition, or other appropriate standards in the ASME B30 series. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M23 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendation that system/component repairs are performed in accordance with the Code and Standards requirements.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M23. 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, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects

Operating Experience

LRA Section B.2.3.13 summarizes OE related to the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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 AMP was evaluated.

UFSAR Supplement

LRA Section A.2.2.13 provides the UFSAR supplement for the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-LR Report Table XI-01. The staff also noted that the applicant committed (Commitment No. 15) to implement the program enhancements by November 2, 2024. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the enhancements and finds that, with the enhancements as implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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 USAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.9 Fire Protection

Summary of Technical Information in the Application

LRA Section B.2.3.14 states that the Fire Protection program is an existing program with an enhancement that, excluding one exception, will be consistent with the program elements in the GALL-LR Report AMP XI.M26, "Fire Protection." The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M26. The staff also reviewed the portions of the "parameters monitored or inspected" and "detection of aging effects" 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 evaluation of the exception and enhancement is documented below.

Exception 1. LRA Section B.2.3.14 includes an exception to the "parameters monitored or inspected" and "detection of aging effects" program elements that relates to penetration seal inspections. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M26 and finds it acceptable because, even though the actual percentage of each penetration seal type inspected during each inspection cycle will vary between 7 and 13 percent, 100 percent of the penetration seals will be inspected over a 15-year period, which is more frequent than the intent of the penetration seal inspection frequency recommended in GALL-LR Report AMP XI.M26 (i.e., 100 percent over the 20-year period of extended operation) as noted in Table II-21 of NUREG-1950, "Disposition of Public Comments and Technical Bases for Changes in the License Renewal Guidance Documents NUREG-1801 and NUREG-1800" (ML11116A062).

Enhancement 1. LRA Section B.2.3.14 includes an enhancement to the "detection of aging effects" program element that relates to updating procedures to include qualification for individuals performing inspection of fire dampers and fire doors. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when implemented, personnel qualifications for fire damper and fire door inspectors will be consistent with the GALL-LR Report AMP XI.M26.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report AMP XI.M26. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of the GALL-LR Report AMP XI.M26. The staff also reviewed the exception associated with the "parameters monitored or inspected" 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 enhancement associated with the "detection of aging effects" program element and finds that, when implemented, it will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.14 summarizes OE related to the Fire Protection program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Fire Protection program was evaluated.

<u>UFSAR Supplement</u>

As revised by letter dated October 14, 2024 (ML24289A118), LRA Section A.2.2.14 provides the UFSAR supplement for the Fire Protection program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-LR Report Table 3.0-1. The staff also noted that in LRA Table A-3 the applicant committed to implement the enhancement discussed above by November 2, 2024. Therefore, the staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

The NRC staff notes that although the applicant's letter dated March 6, 2025 (ML25069A508), states that the enhancement discussed above was completed, the staff was unable to verify completion; therefore, verification will need to be performed during future license renewal inspection activities.

<u>Conclusion</u>

Based on its review of the applicant's Fire Protection program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.10 Fire Water System

<u>Summary of Technical Information in the Application</u>

LRA Section B.2.3.15 states that the Fire Water System program is an existing program with enhancements that, excluding eight exceptions, will be consistent with the program elements in the GALL-LR Report AMP XI.M27, "Fire Water System," as modified by LR-ISG-2012-02 (ML13227A361), LR-ISG-2013-01, "Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers and Tanks" (ML14225A059), and LR-ISG-2015-01 (ML15308A018). The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

<u>Staff Evaluation</u>

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M27.

For the "scope of program" program element, the NRC staff needed additional information regarding the applicable aging effects for asbestos cement exposed internally to raw water. The staff's request and the applicant's response are documented in RAI 10465-R1 (ML25056A500). In its response to RAI 10465-R1, the applicant revised AMR item 3.3-1, 032 in LRA Table 3.3-1 and LRA Table 3.3.2-12 to include flow blockage, along with cracking and loss of material, as an applicable aging effect for asbestos cement piping exposed internally to raw water. The staff finds the response acceptable because it is consistent with the guidance in NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (ML17188A158), that cites cracking, loss of material, and flow blockage as applicable aging effects for asbestos cement piping and piping components exposed to raw water.

The NRC staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements associated with exceptions and enhancements to determine whether the program will be adequate to manage the aging effects for which it is credited. Because the program's enhancements are not numbered in the LRA, the enhancement numbering below reflects its appearance in LRA Table A-3 in the letter dated March 6, 2025 (ML25069A508), and the associated commitment letters in LRA Table A-3 are provided after each enhancement discussion. The staff's evaluation of these exceptions and enhancements is documented below.

<u>*Exception 1*</u>. LRA Section B.2.3.15 includes an exception to the "scope of program" program element related to managing the effects of aging for asbestos concrete piping. The NRC staff reviewed this exception and finds it acceptable because, consistent with the guidance in NUREG-2192, the Fire Water System program will manage cracking, loss of material, and flow blockage of the asbestos cement piping exposed internally to raw water, and the inspections and tests required by the Fire Water System program are capable of detecting the effects of aging prior to a loss of intended function. For additional information, see the discussion of RAI 10465-R1 above.

<u>*Exception 2*</u>. LRA Section B.2.3.15 includes an exception to the "detection of aging effects" program element related to the frequency of sprinkler inspections. Section 5.2.1.1 of the 2011 Edition of National Fire Protection Association (NFPA) 25 specifies that sprinklers will be inspected from the floor annually. The NRC staff notes that Footnote 10 for Table XI.M27-1 in Volume 2 of the GALL-SLR Report would allow these inspections 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. The staff reviewed this exception and finds it acceptable because sprinklers outside containment will be inspected every 18 months, which does not exceed DCPP's refueling outage interval, and sprinklers inside containment will be inspected every refueling outage. In addition, plant-specific OE did not identify the need to increase the periodicity of sprinkler inspections to annually.

Exception 3. LRA Section B.2.3.15 includes an exception to the “detection of aging effects” program element related to flow testing of an automatic standpipe system at each zone and testing the automatic water supply on each riser. The applicant stated that it has an integrated fire water system that is not divided into zones. NFPA 25 Section 6.3.1.1 states that, “A flow test shall be conducted every 5 years at the hydraulically most remote hose connections of each zone of an automatic standpipe system to verify the water supply still provides the design pressure at the required flow.” The applicant stated that it will conduct 13 flow tests in accordance with Section 6.3.1 of the 2011 Edition of NFPA 25 consisting of eight in the turbine building (including testing at all four elevations), two in the auxiliary building (including the fuel handling buildings), two in the containment buildings, and one in the common intake structure. The testing will measure flow, static pressure, and residual pressure. By letter dated October 21, 2015 (ML15294A437), the applicant stated that the functional testing of the 86 in-scope hose stations in the turbine building, auxiliary building, containment buildings, and intake structure and the testing of branch lines at the end of sprinkler piping during flow alarm testing provides qualitative evidence that they are free-flowing with no flow blockage.

The NRC staff notes that LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to flow tests at hydraulically most remote locations (*Enhancement 3* (Ref Commitment No. 17.(c))). The staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, there will be a new procedure to conduct the flow tests as described above.

The NRC staff reviewed this exception and finds it acceptable because the proposed alternative testing is sufficient to establish reasonable assurance that flow blockage will be detected prior to a CLB intended function not being met. The staff based this conclusion on: (1) the flow testing, both in number and breadth of location, which provides insights concerning potential accumulation of corrosion products that are comparable to insights gained from the test recommended in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02; (2) the frequency of testing, which is consistent with Section 6.3.1 of the 2011 Edition of NFPA 25; (3) in regard to the number of tests, there are 13 flow tests, which will be performed with quantifiable data in addition to qualitative flow observations associated with testing the 86 in-scope flow stations and all branch lines; (4) in regard to the breadth of locations, the testing encompasses all four of the buildings containing in-scope fire water system piping; and (5) a new procedure to perform the flow tests as described will be developed.

Exception 4. LRA Section B.2.3.15 includes an exception to the “detection of aging effects” program element related to conducting main drain tests every 18 months instead of annually in accordance with Section 13.2.5 of the 2011 Edition of NFPA 25. The NRC staff reviewed this exception and finds it acceptable because Footnote 10 for Table XI.M27-1 in Volume 2 of the GALL-SLR Report would allow the tests to be performed on a refueling outage interval if: (1) plant-specific OE has shown no loss of intended function of the specific component due to the aging effects being managed; (2) the 18-month frequency does not exceed DCPP’s refueling outage interval; and (3) plant-specific OE does not identify the need to increase the periodicity of the main drain tests to annually.

Exception 5. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an exception to the “detection of aging effects” program element related to cleaning and inspecting strainers STR-97 and STR-98 in the makeup water system that support the fire water system every two years instead of annually or on a refueling outage basis. The NRC staff notes that the applicant committed to cleaning and inspecting the strainers in the makeup water system that supports firewater inventory every two years prior to the period of extended operation as discussed in the 2011 safety evaluation report (SER) (ML11153A103). The staff reviewed this exception and finds it acceptable because strainers STR-97 and STR-98 with a function of long-term cooling will be cleaned and inspected during the period of extended operation by the Fire Water System program which is capable of identifying the effects of aging prior to a loss of intended function, and plant-specific OE did not identify the need to increase the inspections to a refueling outage basis.

Exception 6. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an exception to the “detection of aging effects” program element related to entering any degradation of steel tanks into the corrective action program and performing an engineering evaluation to determine follow-up actions instead of testing steel tanks exhibiting signs of interior pitting, corrosion, or coating failure in accordance with Section 9.2.7 of the 2011 Edition of NFPA 25. In addition, instead of performing vacuum box testing in accordance with Section 9.2.7.6 of the 2011 Edition of NFPA 25, a variety of nondestructive evaluation methods as discussed in the table of AMP XI.M32 in the GALL-LR Report will be used. The applicant stated that the fire water storage tank is inside the transfer tank; therefore, the external and internal inspections are on a five-year frequency consistent with Section 9.2.6 of the 2011 Edition of NFPA 25.

Additional information regarding this exception was provided by letter dated October 21, 2015 (ML15294A437), where the applicant stated:

> During fire water storage tank (FWST) inspections, degradation (holidays, corrosion, nodules, etc.) is documented via camera, nodule measurements and corrosion depth are recorded, and degradation findings are documented and trended in the CAP [Corrective Action Program]. Using the inspection documentation and recorded data, engineering evaluations will be conducted using the CAP to determine if augmented inspections are necessary or inspection intervals need to be changed (increased in frequency) to monitor degradation. If adverse wall thickness trends are identified during routine inspections such that minimum wall thickness is projected to be reached prior to the next scheduled inspection (currently every 5 years), then the tank will be drained down, the 6 tests specified in NFPA-25, Section 9.2.7 will be performed, corroded base metal will be restored, and degraded coatings will be repaired.

Further information regarding this exception was provided by letter dated February 25, 2016 (ML16056A636), where the applicant stated that “PG&E will perform diver inspections of the fire water storage tank every 5 years” and that “diver inspections will include use of tools necessary to adequately conduct inspection for aging mechanisms (e.g., adequate lighting will be provided).”

The NRC staff notes that LRA Section B.2.3.15, as revised by letter dated October 14, 2024 (ML24289A118), includes an enhancement to the “detection of aging effects,” “acceptance criteria,” and “corrective actions” program elements related to updating procedures for interior and exterior surface inspections of the FWST (*Enhancement* 7 (Ref Commitment No. 17.(g))). The staff reviewed this enhancement against the corresponding program elements in the associated AMP and finds it acceptable because when it is implemented: (1) periodic inspections of the internal and external surfaces of the FWST will be conducted consistent with the periodicity in the 2011 Edition of NFPA 25 (i.e., every five years); (2) the corrective action program will determine further actions in accordance with Section 9.2.7 of the 2011 Edition of NFPA 25, note 4 in Table 4a of LR-ISG-2012-02, and Appendix C of LR-ISG-2013-01; (3) the nondestructive evaluation methods in the table of AMP XI.M32 in the LR-GALL Report are capable of monitoring surface condition, wall thickness, and cracking; (4) the periodic inspections will be capable, including tools necessary to perform the inspections (e.g., adequate lighting), of detecting the effects of aging before a loss of intended function; (5) the training and qualification of personnel, acceptance criteria, and corrective actions for the FWST coatings will be consistent with Appendix C of LR-ISG-2013-01; and (6) a one-time ultrasonic testing (UT) inspection of the tank bottom will be performed prior to November 2, 2024.

The NRC staff reviewed this exception and finds it acceptable because: (1) the periodic inspections of the internal and external surfaces of the FWST will be conducted every five years, consistent with the 2011 Edition of NFPA 25; (2) degradation will be documented by camera, physical measurements will be taken, and the inspection findings will be entered into the corrective action program for evaluation; (3) the tank will be drained and tested per Section 9.2.7 of the 2011 Edition of NFPA 25, note 4 in Table 4a of LR-ISG-2012-02, and Appendix C of LR-ISG-2013-01 when the minimum wall thickness is projected to be reached prior to the next inspection; (4) corroded base metal will be restored and degraded coatings will be repaired following Appendix C of LR-ISG-2013-01; (5) follow-up actions may include augmented inspections or increased inspection frequency; (5) the nondestructive evaluation methods in the table of AMP XI.M32 in the LR-GALL Report are capable of monitoring surface condition, wall thickness, and cracking; and (6) the Fire Water System program will be enhanced as noted above.

Exception 7. LRA Section B.2.3.15 includes an exception to the “detection of aging effects” program element related to testing deluge systems via manual pull boxes instead of using automatic actuation. The NRC staff notes that this exception was not necessary given that it is related to the active function of flow testing deluge systems, which is not within the scope of license renewal. The staff’s recommendation in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02, related to flow testing deluge systems is to monitor for flow blockage. Whether the system is activated using automatic actuation or manual pull boxes, the flow test of the deluge system would provide insights into whether the system is experiencing flow blockage.

Exception 8. LRA Section B.2.3.15 includes an exception to the “detection of aging effects” program element related to testing the turbine building deluge valves every 18 months at minimal flow through a system drain to prevent water flowing to the spray nozzles instead of annually testing the valves with water. In addition, every three years, dry piping downstream of the turbine building deluge valves will be tested with air, smoke, or other medium to ensure piping and nozzles are clear. The staff reviewed this exception and finds it acceptable because: (1) every 18 months the nozzles are visually inspected to verify that spray patterns are unobstructed and that the nozzles are not blocked; (2) plant-specific OE did not identify the need to increase the inspections to annually; (3) use of alternative test medium is consistent with GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02, and the 2011 Edition of NFPA 25 and is capable of detecting flow blockage; (4) if the turbine building deluge system piping becomes wetted, then an inspection will be performed to determine if any portions cannot be drained or allow water to collect, and if such portions are identified, then augmented tests and inspections on portions of the water-based fire protection system components that are wetted, but are normally dry, will apply (see the discussion below for *Enhancement 11*); and (5) the Fire Water System program will be enhanced by updating procedures to require testing of the turbine building deluge valves and testing of the dry pipe downstream of the deluge valves with alternative medium (see the discussion below for *Enhancement 8* (Ref Commitment No. 17.(h))).

Enhancement 1. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the "parameters monitored or inspected" and "detection of aging effects" program elements related to updating preventive maintenance activities to require strainers STR-97 and STR-98 in the makeup water system that support the fire water system to be cleaned and inspected every 24 months. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, strainers STR-97 and STR-98 with a function of long-term cooling will be cleaned and inspected during the period of extended operation by the Fire Water System program which is capable of identifying the effects of aging prior to a loss of intended function. For additional information, see the discussion above of *Exception* 5. (Ref. Commitment No. 17.(a))

Enhancement 2. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to replacing and testing sprinkler heads in accordance with Section 5.3.1 of the 2011 Edition of NFPA 25. In addition, the enhancement states, "Sprinklers that have been in service for greater than 50 years prior to the program implementation date will be replaced or tested consistent with NFPA 25 prior to the program being implemented." The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, sprinkler head replacement and testing will be consistent with the recommendations in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. In addition, sprinklers that have been in service for greater than 50 years prior to the program implementation date will be replaced or tested prior to program implementation. (Ref Commitment No. 17.(b))

Enhancement 3. LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to flow tests at hydraulically most remote locations. The NRC staff's evaluation of this enhancement is documented above in *Exception* 3. (Ref Commitment No. 17.(c))

Enhancement 4. LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to updating main drain testing procedures to include the 10 percent reduction in full flow pressure acceptance criteria in Section 13.2.5.2 of the 2011 Edition of NFPA 25 and to track/trend the test results. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, the main drain test acceptance criteria and tracking/trending the main drain test results will be consistent with the recommendations in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02 (Ref Commitment No. 17.(d))

Enhancement 5. LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to updating procedures to maintain hydrant flow for not less than one minute in accordance with Section 7.3.2.2 of the 2011 Edition of NFPA 25. The NRC 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 for hydrant test flow in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. (Ref Commitment No. 17.(e))

Enhancement 6. LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to updating procedures to perform periodic flow tests of buried portions of the fire water system in accordance with Section 7.3 of the 2011 Edition of NFPA 25 on a frequency of one test per year. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because performing a flow test in accordance with Section 7.3 of the 2011 Edition of NFPA 25 on a frequency of one test per year is an acceptable alternative to visual examination of buried piping as indicated in LR-ISG-2015-01. (Ref Commitment No. 17.(f))

Enhancement 7. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects,” “acceptance criteria,” and “corrective actions” program elements related to updating procedures for interior and exterior surface inspections of the FWST. The NRC staff’s evaluation of this enhancement is documented above in *Exception* 6. (Ref Commitment No. 17.(g))

Enhancement 8. LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to updating procedures for testing the turbine building deluge valves in accordance with the 2011 Edition of NFPA 25 every 18 months and testing of dry piping downstream of the deluge valves with air, smoke, or other medium every three years. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, turbine building deluge valves will be tested in accordance with the 2011 Edition of NFPA 25 every 18 months and the dry piping downstream of the deluge values will be tested every three years with air, smoke, or other medium. For additional information see the discussion above of *Exception* 8. (Ref Commitment No. 17.(h))

Enhancement 9. LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to updating procedures to clean deluge system nozzles and retest the system when obstructions are identified during flow testing. The NRC 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-LR Report AMP XI.M27, as modified by LR-ISG-2012-02, associated with Section 10.3.4.3.2 of the 2011 Edition of NFPA 25. (Ref Commitment No. 17.(i))

Enhancement 10. LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to updating procedures for internal inspection of wet sprinkler systems, obstruction investigations, and not using external wall thickness measurements in lieu of internal visual examinations or flow tests to manage flow blockage. The NRC 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-LR Report AMP XI.M27, as modified by LR-ISG-2012-02, for internal inspection of piping, obstruction investigations, and managing flow blockage. (Ref Commitment No. 17.(j))

Enhancement 11. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to creating a new procedure for augmented tests and inspections on portions of the water-based fire protection system components that are wetted, but are normally dry. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, the augmented tests and inspections on portions of the water-based fire protection system components that are wetted, but are normally dry, will be consistent with the recommendations in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. In addition, the augmented tests and inspections will be applied to the turbine building deluge system’s spray piping if, after it becomes wetted, an inspection determines that it can’t drain or it allows water to collect. (Ref Commitment No. 17.(k))

Enhancement 12. LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to monitoring for recurring internal corrosion, as discussed in in the 2011 SER Section 3.3.2.2.8. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, consistent with the recommendations in GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02, recurring internal corrosion will be managed and the enhancements to the Fire Water System program will be capable of managing recurring internal corrosion before a loss of intended function. Specifically, the Fire Water System program will manage recurring internal corrosion by: (1) selecting inspection sites based on pipe configuration, flow conditions, and operating history; (2) updating inspection sites periodically based on OE; (3) comparing ultrasonic measurements to nominal pipe wall thickness or previous thickness measurements to determine rates of corrosion to estimate the time to reach minimum wall thickness; (4) entering into the corrective action program ultrasonic results indicating that the component did not meet site-established acceptance criteria or a reduction in wall thickness greater than 50 percent; (5) considering multiple recurring internal corrosion locations in the structural integrity technical evaluation of pipe; (6) evaluating the effectiveness of corrective actions to address recurring internal corrosion; (7) performing a minimum of five ultrasonic examinations per year to monitor loss of material; (8) performing an additional five ultrasonic examinations over the following year with the amount of inspections not to exceed 25 per year if more than one leak caused by recurring internal corrosion or wall thickness less than minimum allowable wall thickness are identified; (9) entering into the corrective action program the cause of any newly identified recurring internal corrosion; and (10) performing opportunistic internal visual inspections. (Ref Commitment No. 17.(l))

Enhancement 13. LRA Section B.2.3.15 includes an enhancement to the “monitoring and trending” program elements related to updating inspection and test procedures to require trending of data. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, the inspection and test data will be trended consistent with GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. (Ref Commitment No. 17.(m))

Enhancement 14. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects,” “acceptance criteria,” and “corrective actions” program elements related to updating procedures to ensure that visual inspections for loss of material are capable of detecting surface irregularities and that when surface irregularities are detected, follow-up volumetric wall thickness examinations are performed. The NRC staff reviewed this enhancement against the corresponding program elements in the associated AMP and finds it acceptable because, when it is implemented, the visual inspection technique used to detect loss of material as well as performing follow-up volumetric wall thickness examinations when surface irregularities are detected will be consistent with GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. (Ref Commitment No. 17.(n))

Enhancement 15. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the “detection of aging effects” program element related to creating a new procedure or revising preventive maintenance activities to remove and inspect mainline strainers every five years in accordance with Sections 10.2.1.7, 10.2.7.3, and 10.2.7.4 of the 2011 Edition of NFPA 25. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, removal and inspection of mainline strainers will be consistent with GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. (Ref Commitment No. 17.(o))

Enhancement 16. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to updating procedures to require mainline strainer flushing after each operation or flow test in accordance with Section 10.2.7.1 of the 2011 Edition of NFPA 25. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, mainline strainer flushing will be consistent with GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. (Ref Commitment 17.(p))

Enhancement 17. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the "detection of aging effects" program element related to updating procedures to ensure that performance-based inspection, testing, and maintenance frequencies will not be applied to the fire water storage tank inspections/tests, underground flow tests, and inspections of normally dry but periodically wetted piping that do not drain. By letter dated February 25, 2016 (ML16056A636), the applicant stated that it would not make performance-based frequency modifications for the inspections and tests noted above because there is not sufficient industry OE to support doing so. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, performance-based inspection, testing, and maintenance frequencies will not be applied to the inspections and tests noted above. (Ref Commitment No. 17.(q))

Enhancement 18. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section B.2.3.15 includes an enhancement to the "acceptance criteria" program element related to updating the acceptance criteria in existing procedures. The NRC staff reviewed this enhancement against the corresponding program element in the associated AMP and finds it acceptable because, when it is implemented, the acceptance criteria will be consistent with GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02. (Ref Commitment No. 17.(r))

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, and the applicant's response to RAI 10465-R1, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M27, as modified by LR-ISG-2012-02, LR-ISG-2013-01, and LR-ISG-2015-01. The staff also reviewed the exceptions associated with the "scope of program" and "detection of aging effects" 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," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

<u>Operating Experience</u>. LRA Section B.2.3.15 summarizes OE related to the Fire Water System program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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. As revised by letter dated October 14, 2024 (ML24289A118), LRA Section A.2.2.15 provides the UFSAR supplement for the Fire Water System program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in Table 3.0-1 of LR-ISG-2012-02. The staff also noted that in LRA Table A-3, as revised by letter dated March 6, 2025 (ML25069A508), the applicant committed to enhance the Fire Water System program by implementing the enhancements discussed above, except 17.(g)(1), 17.(g)(3), 17.(h), 17.(n), 17.(o), 17.(p), 17.(q), and 17.(r), by November 2, 2024. Enhancements 17.(g)(1), 17.(g)(3), 17.(n), 17.(o), 17.(p), 17.(q), and 17.(r) will be implemented by January 30, 2025. Enhancement 17.(h) will be implemented by March 30, 2025. Augmented inspections for recurring internal corrosion and identification, visual inspections, and flow testing of wetted, but normally dry, piping will begin prior to November 2, 2024, for DCPP Unit 1, and prior to August 26, 2025, for DCPP Unit 2. Volumetric inspections of wetted, but normally dry, piping will begin after November 2, 2024, for DCPP Unit 1, and after August 26, 2025, for DCPP Unit 2. Internal lining baseline inspections will begin no later than November 2, 2024, for DCPP Unit 1, and no later than August 26, 2025, for DCPP Unit 2. The remaining inspections begin after November 2, 2024, for DCPP Unit 1, and after August 26, 2025, for DCPP Unit 2. Therefore, the staff finds that the information in the UFSAR supplement is an adequate summary description of the program.

The NRC staff notes that the applicant's letter dated March 6, 2025 (ML25069A508), states that all of the enhancements discussed above, except 17.(h), were completed, including: augmented inspection for recurring internal corrosion; identification, visual inspections, and flow testing of wetted, but normally dry, piping; DCPP Unit 1 volumetric inspections of wetted, but normally dry, piping; internal lining baseline inspections; and DCPP Unit 1 remaining inspections. However, the staff was unable to verify the completion of these enhancements; therefore, verification will need to be performed during future license renewal inspection activities.

Conclusion

Based on its review of the applicant's Fire Water System program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and enhancements and finds that, with the exceptions and the enhancements when implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.11 Aboveground Metallic Tanks

Summary of Technical Information in the Application

LRA Section B.2.3.16 states that the Aboveground Metallic Tanks program is a new program that will be consistent with the program elements in the GALL-LR Report AMP XI.M29, "Aboveground Metallic Tanks," except for the exceptions identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M29. The staff also reviewed the portions of the "parameters monitored or inspected" and "detection of aging effects" program elements associated with exceptions to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff evaluation of these two exceptions is documented below.

Exception 1. LRA Section B.2.3.16 includes an exception to the "parameters monitored and inspection" program element related to the guidance in LR-ISG-2012-02 which recommends a periodic volumetric inspection from the inside to identify degradation of external surfaces of tanks bottoms and shells. The new Aboveground Metallic Tanks AMP procedure will include a one-time inspection of the internal surfaces of tanks bottoms and shells on the condensate storage tanks (CSTs), refueling water storage tanks (RWSTs), and transfer tank encased in concrete to verify that there is no loss of material on the external surfaces of the tank portions enclosed with concrete. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M29 and finds it acceptable because, as stated in GALL-LR Report AMP XI.M29, certain tank configurations may minimize the amount of water and moisture penetrating these interfaces by design. There is no gap between the concrete and the tank to allow for water intrusion between the external surfaces of the steel/stainless tank and interior surface of the concrete enclosures. There are no aging effects requiring management where there is no water intrusion, such as carbon steel or stainless steel exposed to a concrete environment. One-time volumetric inspections are required for the tank bottoms and 20 percent of the tank shell internal surfaces to confirm that recurring inspections are not required for those portions enclosed with concrete. The Structures Monitoring AMP (B.2.3.33) will confirm continued adequacy of the CSTs', RWSTs', and transfer tank's external concrete surfaces, flexible seals, and applicable coatings. If degradation is confirmed, the program will be revised to perform periodic inspections at a frequency determined by evaluation of the degradation, not to exceed the 10-year interval during the period of extended operation. Then, there is no need for a periodic volumetric inspection from the inside to identify degradation of external surfaces of tank bottoms and shells.

Exception 2. Subsequent license renewal application Section B.2.3.16 includes an exception to the "detection of aging effects" program element related to the guidance in LR-ISG-2012-02, Section XI.M29, Table 4a, note 7, to specify volumetrically inspecting a minimum of 25 percent of a tank's internal surfaces. The Aboveground Metallic Tanks program will direct volumetric inspection of a minimum of 20 percent of the tanks' external surfaces exposed to concrete from the internal surface. The NRC staff review this exception against the corresponding program element and finds it acceptable because the Aboveground Metallic Tanks program will follow the guidance of GALL-SLR Report Section XI.M29, Table XI.M29-1, Note 7. This Note 7 recommends inspecting a minimum of 20 percent of the tank's internal surface in lieu of 25 percent. Per NUREG-2221, "Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG–2191 and NUREG–2192," the inspection percentage was revised to 20 percent to be consistent with other AMPs.

Operating Experience

LRA Section B.2.2.16 summarizes OE related to the Aboveground Metallic Tanks program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the 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 LRA. Based on its audit and its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Aboveground Metallic Tanks program were evaluated.

UFSAR Supplement

LRA Appendix A Section A.2.2.16 provides the UFSAR supplement for the Aboveground Metallic Tanks program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implementation of the Aboveground Metallic Tanks program for managing the effects of aging for applicable components prior to the period of extended operation. Therefore, 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 Aboveground Metallic Tanks program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and finds that, with the exceptions when implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.12 Fuel Oil Chemistry

Summary of Technical Information in the Application

LRA Section B.2.3.17 states that the Fuel Oil Chemistry program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.M30, "Fuel Oil Chemistry," except for the exceptions identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M30. 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 exceptions 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 these exceptions and enhancements is documented below.

Exception 1. LRA Section B.2.3.17 includes an exception to the "preventive actions" program element such that water is not removed from the portable caddy fuel oil tanks or the emergency diesel fuel oil pump head (priming) tanks. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because the fuel oil contained in the tanks is consumed on a regular basis by surveillance tests. The frequent addition of fuel oil and new fuel oil sampling obviates the need for periodic water removal. The emergency diesel fuel oil pump head (priming) tanks are replenished on a daily basis with fuel oil from the day tanks. During this process, the excess fuel oil from the emergency diesel fuel oil pump head (priming) tanks returns to the day tanks, then the fuel oil day tanks are checked for accumulated water every 31 days. The absence of water from the fuel oil supply ensures that water is not being introduced into, or accumulating in, the emergency diesel fuel oil pump head (priming) tanks.

Exception 2. LRA Section B.2.3.17 includes an exception to the "parameters monitored and inspected" program element such that the emergency diesel fuel oil pump head (priming) tanks will not be periodically sampled. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because the emergency diesel fuel oil pump head (priming) tanks are filled with fuel oil from the diesel fuel oil day tanks. The fuel oil from the diesel fuel oil day tanks is analyzed quarterly for total particulate concentration and for levels of microbiological organisms in accordance with ASTM Standards and using the limits specified in the Diesel Fuel Oil Testing AMP.

Exception 3. LRA Section B.2.3.17 includes an exception to the "parameters monitored and inspected" program element such that the new fuel for the emergency diesel generator (EDG) diesel fuel oil storage tanks (DFOSTs), the portable diesel generators, portable fire water pumps, and portable caddies are not tested for microbiological organisms prior to new fuel oil introduction into these components. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because sampling of the EDG DFOSTs, EDG diesel fuel oil day tanks, non-emergency portable diesel electric generators, portable fire water pumps, and portable caddies for microbiological organisms is performed annually using an offsite laboratory for analysis since DCPP does not have the onsite capability to perform the analysis for microbiological organisms. Plant procedures provide for biocide to be added to new emergency diesel fuel oil for the EDG DFOSTs and non-emergency portable diesel electric generators, portable diesel fire water pumps, and caddies. The DCPP OE has shown that the use of biocide and other preventative measures have been effective to prevent microbiological organism contamination of the diesel fuel oil. The portable diesel electric generators and portable diesel fire water pumps have filtration devices that capture water. Plant procedures will be enhanced to check and drain water from the portable diesel electric generators and portable diesel-driven fire water pumps prior to use, which will minimize any water entry.

Exception 4. LRA Section B.2.3.17 includes an exception to the "detection of aging effects" program element such that two of the portable diesel electric generator fuel oil tanks follow-up volumetric inspections (required based on findings from the pre-PEO internal visual inspections) will be performed in the period of extended operation instead of prior to the period of extended operation. The NRC staff reviewed this exception against the corresponding program elements in GALL-LR Report AMP XI.M30 and finds it acceptable because the applicant conducted a volumetric inspection of one of three portable diesel electric generator fuel tanks that had evidence of degradation, and the volumetric inspection did not detect any measurable material loss due to corrosion. The volumetric inspections of two others with evidence of degradation did not have follow-up volumetric inspections conducted prior to the Unit 1 period of extended operation in accordance with GALL-LR, Section XI.M30, element 4 and the inspections were delayed due to accessibility difficulties based on the design of the portable diesel electric generators. Also, the applicant confirmed that the three portable diesel electric generators (with findings from the pre-period of extended operation internal visual inspections) were installed during the same period, operate in a similar manner, and are in the same environment. These similarities, along with the results of the UT inspection conducted on one of the three tanks prior to the period of extended operation and the applicant commitment to perform inspections for the two others during the period of extended operation, provide reasonable assurance that the fuel tanks for the portable diesel electric generators will continue to perform their intended function during the period of extended operation.

Enhancement 1. LRA Section B.2.3.17 includes an enhancement to the "scope of program" program element that relates to enhancing procedures to include the diesel fuel oil day tanks, portable diesel electric generator fuel oil tanks, portable diesel-driven fire water pump tanks, emergency diesel fuel oil pump head (priming) tanks, and portable caddy fuel oil tanks. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 2. LRA Section B.2.3.17 includes an enhancement to the "preventive actions" and "detection of aging effects" program elements that relates to enhancing procedures or developing new procedures to drain, clean, and visually inspect the internal surfaces of the emergency diesel generator fuel oil day tanks, portable diesel-driven fire water pump fuel oil tanks, portable diesel electric generator fuel oil tanks, emergency diesel fuel oil pump head (priming) tanks, and portable caddy fuel oil tanks every 10 years. Volumetric inspections of the tanks will be performed if evidence of degradation is observed during visual inspection or if visual inspection is not possible. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 3. LRA Section B.2.3.17 includes an enhancement to the “preventive actions” program element that relates to enhancing procedures to include the portable diesel electric generator fuel oil tanks and the portable caddy fuel oil tanks for the addition of biocide. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 4. LRA Section B.2.3.17 includes an enhancement to the “preventive actions,” “parameters monitored and inspected,” and “acceptance criteria” program elements that relates to enhancing procedures to sample non-emergency diesel fuel oil prior to introduction into the portable diesel-driven fire water pump tanks, the portable diesel electric generator fuel oil tanks, and the portable caddy fuel oil tanks. Parameters monitored and trended will include water and sediment content, total particulate concentration, and levels of microbiological organisms. Acceptance criteria will be in accordance with industry standards and equipment manufacturer or fuel oil supplier recommendations. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 5. LRA Section B.2.3.17 includes an enhancement to the “detection of aging effects” program element that relates to enhancing procedures to credit the fuel oil storage tank inspections for the one-time inspection of the fuel oil system components, if the material and environment are the same. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 6. LRA Section B.2.3.17 includes an enhancement to the “monitoring and trending” program element that relates to enhancing procedures to state that trending of water and particulate levels is controlled in accordance with DCPP Technical Specifications and plant procedures for the diesel fuel oil storage tanks and the emergency diesel fuel oil day tanks. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 7. LRA Section B.2.3.17 includes an enhancement to the “parameters monitored and inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements that relates to enhancing procedures or developing new procedures to periodically sample the fuel oil stored in the portable diesel-driven fire water pump fuel oil tanks, the portable diesel electric generator fuel oil tanks, and the portable fuel oil caddy tanks. Parameters monitored will include water and sediment content, total particulate concentration, and levels of microbiological organisms. The periodic samples will be multi-level samples or, if tank design features do not allow for multi-level sampling, a representative sample from the lowest point in the tank will be used. The results will be monitored and trended at least annually. Acceptance criteria will be in accordance with industry standards and equipment manufacturer or fuel oil supplier recommendations. If accumulated water is found in one of the fuel oil tanks, it will be promptly removed via the corrective action program. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M30 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, the staff finds that the "corrective actions" program element for which applicant claimed consistency with the GALL-LR Report is consistent with the corresponding program elements of GALL-LR Report AMP XI.M30. The staff also reviewed the exceptions associated with the "preventive actions" and "parameters monitored or inspected" 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 "scope of the program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.17 summarizes OE related to the Fuel Oil Chemistry program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the 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 LRA. Based on its audit and its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Fuel Oil Chemistry program was evaluated.

UFSAR Supplement

LRA Appendix A Section A.2.2.17 provides the UFSAR supplement for the Fuel Oil Chemistry program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Report 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 period of extended operation. Therefore, 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 Fuel Oil Chemistry program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the enhancements and exceptions and determined that, with the exceptions and enhancements implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.13 Reactor Vessel Surveillance

Summary of Technical Information in the Application

LRA Section B.2.3.18 states that the Reactor Vessel Surveillance program is an existing program that will be consistent with the program elements in the GALL-LR Report AMP XI.M31, “Reactor Vessel Surveillance,” except for the exception identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M31.

The “detection of aging effects” program element of GALL-LR Report AMP XI.M31 states, in part:

> The plant-specific or integrated surveillance program shall have at least one capsule with a projected neutron fluence equal to or exceeding the 60-year peak reactor vessel wall neutron fluence prior to the end of the period of extended operation. The program withdraws one capsule at an outage in which the capsule receives a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation and tests the capsule in accordance with the requirements of ASTM E 185-82.

Unit 1 – Supplemental Capsule B

LRA Section B.2.3.18 indicates that for DCPP Unit 1, Supplemental Capsule B is expected to be the last capsule withdrawn and tested having accumulated one to two times the peak reactor vessel neutron fluence at 60 years of operation. The applicant further explained that there are four standby capsules in DCPP Unit 1 with low lead factors that will remain inside the reactor pressure vessel and will be available for future testing. By letter dated July 20, 2024 (ML23199A312), the NRC staff approved a revision to the reactor vessel material surveillance capsule withdrawal schedule for DCPP Unit 1. Specifically, the staff approved Supplemental Capsule B to be withdrawn during refueling outage 1R24 or 1R25 (2023 or 2025, respectively), which would equate to the capsule being exposed to either a neutron fluence of 3.39×10^{19} n/cm^2 or 3.56×10^{19} n/cm^2, respectively. LRA Table 4.2.1-1 indicates that the maximum fast neutron fluence projections at shells and welds at DCPP Unit 1 is projected to be at the intermediate shell plate (B4106-1, B4106-2, and B4106-3) with a neutron fluence of 2.02×10^{19} n/cm^2 at 54 EFPY.

The NRC staff finds that the testing of Supplemental Capsule B, consistent with the previously NRC-approved schedule, satisfies: (1) the recommendation in GALL-LR XI.M31 for withdrawal and testing of one capsule at an outage in which the capsule receives a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation; and (2) serves the underlying purpose of Appendix H to 10 CFR Part 50 (i.e., to monitor changes in the fracture toughness properties of the reactor pressure vessel) during the period of extended operation.

Unit 2 – Capsule V

LRA Section B.2.3.18 states that there are no capsules remaining in the DCPP Unit 2 reactor pressure vessel and that all DCPP Unit 2 capsules were removed because high lead factors produced exposures comparable to the fluences expected at the end of the period of extended operation.

The NRC staff noted that the latest surveillance capsule to be withdrawn from DCPP Unit 2 was Capsule V, which was withdrawn and tested in 1999/2000, with the results documented in WCAP-15423, Revision 0, "Analysis of Capsule V from Pacific Gas and Electric Company Diablo Canyon Unit 2 Reactor Vessel Radiation Surveillance Program" (ML010180432). UFSAR Table 5.2-22 indicates that Capsule V was withdrawn and tested during refueling outage 2R9 with a capsule neutron fluence of 2.38×10^{19} n/cm^2. LRA Table 4.2.1-1 indicates that the maximum fast neutron fluence projections at shells and welds at DCPP Unit 2 is projected to be at the intermediate shell plate (B5454-1 B5454-2, and B5454-3) with a neutron fluence of 2.25×10^{19} n/cm^2 at 54 EFPY.

LRA Section B.2.3.18 states that DCPP Units 1 and 2 currently use ex-vessel monitoring dosimetry that consists of four gradient chains with activation foils outside the reactor vessel, which will be used to monitor the neutron fluence environment within the beltline region. Because all the surveillance capsules in DCPP Unit 2 have been removed, the NRC staff finds that the applicant's use of ex-vessel monitoring dosimetry satisfies the recommendation in GALL-LR XI.M31 to have an Alternative Neutron Monitoring Program (i.e., ex-vessel monitoring dosimetry) as an alternative dosimetry to using in-vessel capsules to monitor neutron fluence during the period of extended operation.

The NRC staff finds that the completed testing of Capsule V in accordance with Appendix H to 10 CFR Part 50: (1) satisfies the recommendation in GALL-LR XI.M31 for withdrawal and testing of one capsule at an outage in which the capsule receives a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation; and (2) serves the underlying purpose of Appendix H to 10 CFR Part 50 (i.e., to monitor changes in the fracture toughness properties of the reactor pressure vessel) during period of extended operation.

The NRC staff also reviewed the portions of the "detection of aging effects" 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 one exception is documented below.

Exception 1. LRA Section B.2.3.18 includes an exception to the "detection of aging effects" program element related to the licensee not placing all pulled and tested capsules in storage in order to participate in the EPRI PWR Supplemental Surveillance Program. In particular, several Charpy V-Notch specimens from DCPP Unit 2 Capsule V have been donated to the EPRI research program and these donated specimens will no longer be available for future use at DCPP. The applicant explained that if the DCPP Unit 2 surveillance program were to be reestablished, the remaining available Charpy V-Notch specimens within DCPP Unit 2 Capsule V could be used. Further, two other DCPP Unit 2 capsules of similar exposure are available to reestablish the surveillance program.

The NRC staff noted that the "detection of aging effects" program element recommends placing standby capsules and previously tested specimens in storage for possible future reinsertion and reconstitution use, respectively, if, for example, the data from the testing of surveillance capsules turns out to be invalid or in preparation for operation beyond 60 years. Based on its review of UFSAR Section 5.2.2.4.4.2 and UFSAR Table 5.2-22, the staff confirmed that all six surveillance capsules from DCPP Unit 2 had the same contents (i.e., reactor pressure vessel (RPV) materials, specimen type, and specimen numbers) and that Capsules W and Z (currently in storage) received a similar neutron fluence exposure as Capsule V. Therefore, even though the applicant donated the contents of Capsule V to the EPRI research program, the staff finds this exception acceptable because of:

- the availability of the Charpy specimens from Capsules U, X, and Y for future reconstitution, if needed; and
- the availability of Capsules W and Z, which have the same contents and similar neutron exposure as Capsule V, for possible reinsertion to reestablish the Reactor Vessel Surveillance Program (for DCPP Unit 2), to achieve the underlying purpose of this recommendation in GALL-LR XI.M31 (i.e., to have adequate availability of specimens or capsules for future use).

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M31. The staff also reviewed the exception associated with the "detection of aging effects" program element and its justification and finds that the Reactor Vessel Surveillance program, with the exception, is adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.18 summarizes OE related to the Reactor Vessel Surveillance program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Reactor Vessel Surveillance program was evaluated.

UFSAR Supplement

LRA Section A.2.2.18 provides the UFSAR supplement for the Reactor Vessel Surveillance program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed (Commitment No. 20) to ongoing implementation of the existing Reactor Vessel Surveillance program for managing the effects of aging for applicable components during the period of extended operation. Therefore, 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 Surveillance program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff finds that, with the exception, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.14 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

Summary of Technical Information in the Application

LRA Section B.2.3.24 states that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program that, excluding two exceptions, will be consistent with the program elements in the GALL-LR Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," as modified by LR-ISG-2012-02. The applicant revised this LRA section by letters dated October 14, 2024 (ML289A117), and January 02, 2025 (ML25002A050).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA to the corresponding program elements of GALL-LR Report AMP XI.M38. Although the applicant defined this program as a new, consistent program, LRA Sections A.2.2.24 and B.2.3.24 note that the program is augmented to address specific instances of recurring internal corrosion, as discussed in LRA Section 3.3.2.2.8. The staff notes that Commitment No. 26 in LRA Table A-3 includes discussions about performing additional sample-based inspections when acceptance criteria are not met and increasing the number of inspections in accordance with the DCPP corrective action program, with no fewer than five additional inspections for each inspection that does not meet acceptance criteria.

The NRC staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," and "detection of aging effects" program elements associated with the exceptions 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 is discussed below.

Exception 1. LRA Section B.2.3.24 includes an exception to the "scope of program" program element related to delaying the implementation of modifications, until December 1, 2028, that address potentially adverse spatial interactions of leaking in-scope copper alloy domestic water system piping by either replacement with more corrosion-resistant material, or installation of pipe shielding. The NRC staff reviewed this exception and finds it acceptable because the staff's review of plant-specific OE showed that the applicant was tracking degradation in the copper alloy portions of the domestic water system and had not identified any loss of intended function due to adverse spatial interactions caused by leakage in the system. In addition, other AMPs (e.g., Water Chemistry, Open-Cycle Cooling Water System, and Closed Treated Water Systems) and routine plant walkdowns are used to maintain and monitor the domestic water system until piping replacement is completed or pipe shielding is installed.

Exception 2. LRA Section B.2.3.24 includes an exception to the “parameters monitored or inspected” and “detection of aging effects” program elements related to (1) performing VT-1 or surface examinations of stainless steel, aluminum, and copper alloy (with greater than 15 percent zinc or 8 percent aluminum) components and (2) discontinuing the opportunistic inspections of stainless steel and aluminum components once the minimum sample size of inspections is completed. The NRC staff reviewed this exception against the corresponding program elements in GALL-LR Report AMP XI.M38 and finds it acceptable because (1) NUREG-2191 (the GALL-SLR) recommends that XI.M38 be used to manage cracking in stainless steel and aluminum components and (2) NUREG-2191 recommends cessation of opportunistic inspections in stainless steel and aluminum components once the minimum sample size of inspections has been met. Furthermore, as noted in the LRA, the NRC has previously found that VT-1 and surfaces examinations are also acceptable for managing cracking in copper alloy components.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M38. The staff also reviewed the exceptions associated with the “scope of program,” “parameters monitored or inspected,” and “detection of aging effects” program elements and their justifications and finds that the AMP, with the exceptions, is adequate to manage the applicable aging effects. The staff also finds that the augmented inspections and sample expansion discussed in Commitment No. 26 in Table A-3 are capable of managing recurring internal corrosion as recommended in LR-ISG-2012-02 Section A. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects.

<u>Operating Experience</u>

LRA Section B.2.3.24 summarizes OE related to the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, 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.

<u>UFSAR Supplement</u>.

LRA Section A.2.2.24, as revised by letter dated October 14, 2024, provides the UFSAR supplement for the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted the applicant committed to implement the new Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program by May 2, 2024, for managing the effects of aging for applicable components during the period of extended operation. The staff further noted that the applicant committed to complete DCPP Unit 1 inspections by November 2, 2024, and DCPP Unit 2 inspections by August 26, 2025. In addition, the applicant committed to replace the copper piping of the domestic water system that is in-scope for license renewal with a material that is more corrosion resistant or install pipe shielding prior to December 1, 2028. Therefore, 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 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and finds that, with the exceptions, the AMP will be adequate to manage the applicable aging effects. Thus, 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 description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.15 Lubricating Oil Analysis

<u>Summary of Technical Information in the Application</u>

LRA Section B.2.3.25 states that the Lubricating Oil Analysis program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.M39, "Lubricating Oil Analysis."

<u>Staff Evaluation</u>

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M39. The staff also reviewed the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," 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 these six enhancements is documented below.

<u>*Enhancement 1*</u>. LRA Section B.2.3.25 includes an enhancement to the "scope of program" and "preventive actions" program elements that relates to including periodic sampling and analysis to maintain lubricating and hydraulic oil contaminants, primarily water and particulates, within acceptable limits. The NRC staff reviewed this enhancement against the corresponding program

elements in GALL-LR Report AMP XI.M39 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 2. LRA Section B.2.3.25 includes an enhancement to the “parameters monitored or inspected” program element that relates to sampling for water, particle count, and other parameters to detect evidence of contamination by moisture or excessive corrosion. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M39 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 3. LRA Section B.2.3.25 includes an enhancement to the “detection of aging effects” and “acceptance criteria” program elements that relates to including acceptance criteria for lubricating and hydraulic oil analysis associated with the equipment within the scope of the Lubricating Oil Analysis AMP. The acceptance criteria for lubricating and hydraulic oil analysis will be derived from original equipment manufacturer vendor manuals, industry guidance ASTM D 6224-02, and plant-specific OE. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.M39 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 4. LRA Section B.2.3.25 includes an enhancement to the “monitoring and trending” program element that relates to monitoring the lubricating and hydraulic oil for water and particle concentration and checking for unusual trends. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M39 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

Enhancement 5. LRA Section B.2.3.25 includes an enhancement to the “acceptance criteria” program element that relates to clarifying that phase-separated water in any amount is not acceptable for any component within the scope of LR. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M39 and finds it acceptable because, when implemented, it will be consistent with recommendations of the GALL-LR Report.

Enhancement 6. LRA Section B.2.3.25 includes an enhancement to the “corrective actions” program element that specifies conditions to ensure that when action limits are reached or exceeded, they are put into the corrective action program to be evaluated and addressed. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.M39 and finds it acceptable because, when implemented, it will be consistent with the recommendations of the GALL-LR Report.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M39. The staff also reviewed the enhancements associated with the “scope of program,” “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, they will make the AMP adequate to manage the applicable aging effects.

Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.25 summarizes OE related to the Lubricating Oil Analysis program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Appendix A Section A.2.2.25 provides the UFSAR supplement for the Lubricating Oil Analysis program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-LR Report Table SRP-LR 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. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.16 Buried and Underground Piping and Tanks

Summary of Technical Information in the Application

LRA Section B.2.3.26 states that the Buried and Underground Piping and Tanks program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.M41, "Buried and Underground Piping and Tanks," as modified by LR-ISG-2015-01, except for the exceptions identified in the LRA. The applicant revised this LRA section by letters dated October 14, 2024 (ML24289A118), January 2, 2025 (ML25002A050), and March 6, 2025 (ML25069A508).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.M41, as modified by LR-ISG-2015-01. The staff also reviewed the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements associated with exceptions 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 these four exceptions and eleven enhancements is documented below.

Exception 1. As revised by letters dated October 14, 2024, and March 6, 2025, LRA Section B.2.3.26 includes an exception to the "preventive actions" program element related to the diesel fuel oil storage tanks, makeup water system cast iron valves, and some of the buried steel discharge and supply piping in the auxiliary saltwater (ASW) system not having cathodic protection as recommended by LR-ISG-2015-01. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M41 and finds it acceptable for the following reasons:

- For the diesel fuel oil storage tanks, the internal wall of the tank is not directly exposed to a soil environment (i.e., it's exposed to a less aggressive annular space between the inner and outer walls) and the external wall is wrapped in a corrosion-resistant fiberglass reinforced plastic, both of which minimize the potential for external corrosion on the inner and outer walls of the tanks. In addition, the staff notes that the annular space will be monitored for leakage, which is in accordance with GALL-LR Report AMP XI.M41 recommendations.
- For the makeup water system cast iron valves, although external coatings and cathodic protection are not provided, the applicant committed to inspecting 10 percent of the valves, with a maximum of six valves, in each 10-year inspection interval. This inspection approach provides reasonable assurance that degradation on the external surfaces of the subject valves will be detected prior to a loss of intended function. Additional discussion documenting the staff's position on the lack of cathodic protection for these cast iron valves in Section 3.0.3.2.8, "Buried Piping and Tanks Inspection," of the 2011 SER.
- For the buried steel discharge and supply piping, the staff notes that the exception is only applicable to a very short run of piping (i.e., 24 feet, as opposed to 5,960 feet of buried ASW supply and discharge piping that will be provided with cathodic protection). In addition, this 24-foot run of piping is coated with a fiber wrapped petroleum-based epoxy coating and will be inspected in accordance with Preventive Action Category F defined in GALL-LR Report Table XI.M41-2, "Inspection of Buried and Underground Piping and Tanks." This provides reasonable assurance that degradation on the external surfaces of the non-cathodically protected piping will be detected prior to a loss of intended function.

Exception 2. As revised by letter dated October 14, 2024, LRA Section B.2.3.26 includes an exception to the "preventive actions" program element related to asbestos cement piping and cast iron valves in the makeup water system not being externally coated as recommended by

LR-ISG-2015-01. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M41 and finds it acceptable for the following reasons:

- For asbestos cement piping, monthly groundwater sampling conducted from February 2024 through July 2024 (summarized in the October 14, 2024, letter) showed pH greater than 7.1, chlorides less than 360 ppm, and sulfates less than 340 ppm. Based on guidance contained in GALL-LR Report AMP XI.S6, "Structures Monitoring," these values are considered non-aggressive to below-grade concrete structural elements.
- The staff's evaluation with respect to external coatings and cathodic protection not being provided for cast iron valves in the makeup water system is documented in Exception 1 above.
- In response to questions by the staff during the audit, the applicant confirmed that buried ductile iron and gray cast iron piping are coated with coal tar epoxy (via the October 14, 2024, letter) and that underground copper alloy piping is coated with a high build epoxy mastic coating (via RCI B.2.3.26-1 (ML25056A500)), both of which are in accordance with the "preventive actions" program element of GALL-LR Report AMP XI.M41.

Exception 3. LRA Section B.2.3.26 includes an exception to the "preventive actions" program element related to the current backfill procedure not specifying that backfill located within six inches of the component meets ASTM D448-08, "Classification for Sizes of Aggregate for Road and Bridge Construction," size number 67 (or size number 10 for polymeric materials). The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M41 and finds it acceptable for the following reasons: (1) the staff did not identify any instances of non-conforming backfill resulting in coating damage or corrosion of buried piping during its audit; and (2) as noted in *Enhancement 3* below, new and replacement backfill quality will be consistent with GALL-LR Report AMP XI.M41 recommendations.

Exception 4. As revised by letter dated October 14, 2024, LRA Section B.2.3.26 includes an exception to the "detection of aging effects" program element related to performing initial inspections by December 1, 2028 (instead of performing initial inspections prior to the period of extended operation). In addition, the NRC staff noted that the applicant clarified that it will not credit inspections satisfying the inspection requirements of the first inspection interval toward the inspections required for the second inspection interval. The staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M41 and finds the proposed timeline to be reasonable based on the timing of the LRA submittal.

Enhancement 1. LRA Section B.2.3.26 includes an enhancement to the "scope of program" program element which relates to enhancing operating procedures to provide direction to evaluate and close makeup water isolation valve MU-0-881, as appropriate, in case of a pressure boundary failure further along the flow path or in the event that the raw water storage reservoirs are in use for long-term cooling. The NRC staff's evaluation related to this topic is documented in Section 2.3.3.5, "Makeup Water System," of the 2011 SER.

Enhancement 2. As revised by letter dated October 14, 2024, LRA Section B.2.3.26 includes an enhancement to the "preventive actions" program element which relates to installing cathodic protection for the remaining portions of the buried auxiliary saltwater system discharge and supply piping in contact with soil. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancements 3 and 4* are implemented, the "preventive actions" program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 3. LRA Section B.2.3.26 includes an enhancement to the "preventive actions" program element which relates to revising the backfill procedure to include the guidance in LR-ISG-2015-01, including a maximum size that meets ASTM D448-08 size number 67 (or size number 10 for polymeric materials) for backfill that is located within six inches of the component. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancements 2 and 4* are implemented, the "preventive actions" program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 4. As revised by letter dated October 14, 2024, LRA Section B.2.3.26 includes an enhancement to the "preventive actions" program element which relates to enhancing procedures to state that the limiting critical potential should not be more negative than -1,200 mV. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancements 2 and 3* are implemented, the "preventive actions" program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 5. LRA Section B.2.3.26 includes an enhancement to the "parameters monitored or inspected" program element which relates to revising implementing procedures to incorporate the qualification recommendations in LR-ISG-2015-01 for individuals evaluating coating degradation. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement is implemented, the "parameters monitored or inspected" program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 6. As revised by letter dated October 14, 2024, LRA Section B.2.3.26 includes an enhancement to the "detection of aging effects" program element which relates to revising the inspection plan to align with the recommendation from LR-ISG-2015-01, Table XI.M41-2 and Section 4.c. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancement 7* are implemented, the "detection of aging effects" program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 7. LRA Section B.2.3.26 includes an enhancement to the "detection of aging effects" and "monitoring and trending" program elements which relates to revising the firewater system flow test to align with the annual frequency recommended in LR-ISG-2015-01. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancement 6* are implemented, the "detection of aging effects" and "monitoring and trending" program elements will be consistent with the corresponding program elements in GALL-LR Report AMP XI.M41.

Enhancement 8. LRA Section B.2.3.26 includes an enhancement to the "acceptance criteria" program element which relates to revising the cathodic protection procedure to specify that for steel components, where the acceptance criteria for the effectiveness of the cathodic protection is other than -850 mV instant-off, loss of material rates will be measured per the recommendations in LR-ISG-2015-01. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancements 9 and 10* are implemented, the "acceptance criteria" program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 9. LRA Section B.2.3.26 includes an enhancement to the “acceptance criteria” program element which relates to revising procedures to include the following: (1) that cracks in controlled low strength material backfill that could admit groundwater to the surface of the component are not acceptable; and (2) where significant coating damage due to non-conforming backfill is identified, the extent of condition will be evaluated to ensure that the as-left condition of the backfill in the vicinity of the observed damage will not lead to further degradation. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancements 8 and 10* are implemented, the “acceptance criteria” program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 10. As revised by letter dated October 14, 2024, LRA Section B.2.3.26 includes an enhancement to the “acceptance criteria” program element which relates to revising procedures to include the following: (1) that blistering, gouges, or wear of nonmetallic piping is evaluated; (2) that measured wall thickness projected to the end of the period of extended operation meets minimum wall thickness requirements; (3) that indications of cracking in metallic pipe are managed in accordance with the corrective action program; and (4) that cementitious piping may exhibit minor cracking and spalling provided that there is no evidence of leakage or exposed or rusted staining from rebar or reinforcing “hoop” bands. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement and *Enhancements 8 and 9* are implemented, the “acceptance criteria” program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

Enhancement 11. LRA Section B.2.3.26 includes an enhancement to the “corrective actions” program element which relates to revising procedures to include the corrective actions recommended by LR-ISG-2015-01. The NRC staff reviewed this enhancement and finds it acceptable because, when this enhancement is implemented, the “corrective actions” program element will be consistent with the corresponding program element in GALL-LR Report AMP XI.M41.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, and the applicant’s response to RCI B.2.3.26-1, 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 with the GALL-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M41. The staff also reviewed the exceptions associated with the “preventive actions” and “detection of aging effects” program elements and their justifications and finds that the Buried and Underground Piping and Tanks program, with the exceptions, is adequate to manage the applicable aging effects. 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,” “acceptance criteria,” and “corrective actions” program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.26 summarizes OE related to the Buried and Underground Piping and Tanks program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the period of extended operation.

Based on its review of plant-specific OE during its audit, the NRC staff determined the need for additional information with respect to if in-scope buried piping is externally coated in accordance with required specifications. However, prior to the issuance of an RAI, the applicant revised the OE discussion in LRA Section B.2.3.26 (by letter dated October 14, 2024) to address both OE examples noted by the staff during its audit. For the makeup water piping OE, the applicant clarified that this was a temporary pipeline that was not within the scope of license renewal. For the fire protection piping OE, an extent of condition determined that the improper coating was limited to piping associated with the main warehouse fire protection system which is not within the scope of license renewal. Based on its review of the revised OE discussion, the staff finds that the subject OE is not representative of the condition of in-scope buried piping and that there is reasonable assurance that in-scope buried piping is coated in accordance with required specifications. Based on its audit and its review of the LRA, as revised, 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.

<u>UFSAR Supplement</u>

As revised by letters dated October 14, 2024, and January 2, 2025, LRA Section A.2.2.26 provides the UFSAR supplement for the Buried and Underground Piping and Tanks program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to implement the Buried and Underground Piping and Tanks program enhancements by January 30, 2025, for managing the effects of aging for applicable components during the period of extended operation. The staff notes that, although the applicant's letter dated March 6, 2025, states that the enhancements were completed, the staff was unable to verify completion; therefore, verification will need to be performed during future license renewal inspection activities. In addition, the staff noted that the applicant committed to complete initial inspections and to install additional cathodic protection by December 1, 2028. Although this is approximately four and three years after the period of extended operation for DCPP Units 1 and 2, respectively, the staff finds the proposed timeline to be reasonable based on the timing of the LRA submittal. Therefore, 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 Buried and Underground Piping and Tanks program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and the enhancements and finds that, with the exceptions and the enhancements when implemented, the AMP will be adequate to manage the applicable aging effects. Thus, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this

AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

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

Summary of Technical Information in the Application

LRA Section B.2.3.27 states that the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program is a new program that will be consistent with the program elements in the GALL-LR Report AMP XI.M42, “Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks,” as modified by LR-ISG-2013-01, “Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers and Tanks” (ML14225A059), except for the exceptions identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.M42, as modified by LR-ISG-2013-01. The staff also reviewed the portions of the “detection of aging effects” program element associated with exceptions to determine whether the program will be adequate to manage the aging effects for which it is credited. The staff’s evaluation of these exceptions is documented below.

Exception 1. LRA Section B.2.3.27 includes an exception to the “detection of aging effects” program element related to the baseline coating/lining inspections recommended by the GALL-LR Report AMP XI.M42, as modified by LR-ISG-2013-01, to occur in the 10-year period prior to the period of extended operation. Instead, the LRA states that the baseline coating/lining inspections will be completed no later than December 1, 2028, which is during the first five years of the period of extended operation. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M42, as modified by LR-ISG-2013-01, and finds it acceptable for the following reasons:

- It is reasonable to grant the applicant relief on the inspection timing since the LRA was submitted within two years of the expiration of the DCPP Unit 1 and 2 licenses and the completion of the staff’s review is not expected until after entry into the period of extended operation.
- The applicant’s proposed five-year inspection period (from 2023–2028) allows time for adequate inspection planning and coordination with refueling outages that might be required to accommodate some of the inspections.
- Subsequent to the initial five-year inspection period (from 2023 to 2028), the guidance of AMP XI.M42, as modified by LR-ISG-2013-01, will ensure that in-scope coatings/linings will be periodically inspected on a four-to-six-year interval and that the aging effects of these coatings/linings will be appropriately managed.

Exception 2. LRA Section B.2.3.27 includes an exception to the “detection of aging effects” program element related to performing periodic flow testing and opportunistic inspections in lieu of periodic inspections for buried internally coated/lined Fire Water System piping. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.M42, as modified by LR-ISG-2013-01, and finds it acceptable for the following reasons:

- The alternative to the GALL-LR Report, as modified by LR-ISG-2013-01, has been approved by the NRC for subsequent license renewals per the GALL-SLR Report, as modified by SLR-ISG-2021-02-Mechanical. As discussed in the GALL-SLR Report, applicants for initial LR (40–60 years) may use aging management guidance for SLR (60–80 years) in their applications.
- The NRC has accepted this alternative approach for other license renewals such as Peach Bottom (see ML20044D902 for the related SE).

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.M42, as modified by LR-ISG-2013-01. The staff also reviewed the exceptions associated with the "detection of aging effects" program element and their justifications and finds that the AMP, with the exceptions, is adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

<u>Operating Experience</u>

LRA Section B.2.3.27 summarizes OE related to the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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 program was evaluated.

<u>UFSAR Supplement</u>

LRA Section A.2.2.27 provides the UFSAR supplement for the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1, as modified by LR-ISG-2013-01. The staff also noted the applicant committed to implement the new Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program by November 2, 2024, for managing the effects of aging for applicable components during the period of extended operation. The staff also noted that the applicant committed to completing initial inspections by December 1, 2028. Therefore, 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 program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and finds that, with the exceptions when implemented, the AMP will be adequate to manage the applicable aging effects. Thus, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.18 ASME Section XI, Subsection IWE

Summary of Technical Information in the Application

LRA Section B.2.3.28 states that the ASME Section XI, Subsection IWE program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.S1, "ASME Section XI, Subsection IWE." The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR 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 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 documented below.

Enhancement 1. LRA Section B.2.3.28, as revised by letter dated October 14, 2024, includes an enhancement to the "preventive actions" program element to enhance bolting procedures for selection and storage of bolting material, installation torque, and use of lubricants and sealants to include recommendations in EPRI NP-5769, EPRI TR 104213, NUREG-1339, and, for ASTM A325, ASTM F1852, and A490 bolts, Section 2 of Research Council for Structural Connections (RCSC) publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts." The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S1 and finds it acceptable because, when implemented, the revised plant procedures will provide guidance for preventive actions for proper selection and storage of bolting material, use lubricant and sealants, and installation torque in accordance with recommended industry standards to ensure that bolting integrity is maintained, which is consistent with the recommendations of the GALL-LR Report.

Enhancement 2. LRA Section B.2.3.28 includes an enhancement to the "preventive actions" program element that relates to prohibiting the use of MoS_2 as a lubricant for structural bolting.

The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S1 and finds it acceptable because, when implemented, the program will include preventive actions to explicitly prohibit the use of MoS_2 lubricant for structural bolting, which is considered a potential contributor to SCC, in order to ensure that bolting integrity is maintained consistent with recommendations in the GALL-LR Report.

Enhancement 3. LRA Section B.2.3.28 includes an enhancement to the “preventive actions” program element that relates to revising plant procedures to include ‘arc strikes’ as a parameter monitored for non-coated surface examinations. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S1 and finds it acceptable because, when implemented, the program will include arc strikes as a parameter monitored or inspected for visual examination of non-coated surfaces consistent with recommendations in the GALL-LR Report.

Enhancement 4. LRA Section B.2.3.28 includes an enhancement to the “detection of aging effects” program element that relates to revising plant procedures to require a supplemental one-time volumetric examination of the containment liner if triggered by plant-specific OE of corrosion initiated on the inaccessible side. From a review of plant-specific OE and the related statement in LRA Section 3.5.2.2.1.3.1, the NRC staff noted that the applicant, thus far, had not identified any degradation that originated on the inaccessible side of the liner; therefore, the triggering OE has not occurred to date at DCPP. As discussed in the GALL-SLR Report, applicants for initial LR (40–60 years) may use aging management guidance for SLR (60–80 years) in their applications. The staff reviewed this enhancement and finds it acceptable because, when implemented, the program will include the provision for supplemental one-time volumetric examination and related criteria recommended in the GALL-SLR Report to address plant-specific OE, if any, of corrosion initiated on the inaccessible side of the containment liner occurring after license issuance.

Enhancement 5. LRA Section B.2.3.28, as revised by letter dated October 14, 2024, includes an enhancement to the “detection of aging effects” program element that relates to conducting a supplemental one-time volumetric examination/surface examination or enhanced visual examination to confirm the absence of cracking due to SCC for a representative sample of two penetrations, out of a population of 10 stainless steel containment high-temperature (above 140°F) piping penetrations or dissimilar metal welds, for each unit identified in the LRA. If cracking is detected by the supplemental one-time examinations, additional inspections will be conducted and the need for periodic inspections is determined in accordance with the site’s corrective action program. The enhancement further states that periodic inspection of the subject components for cracking will be added to the ASME Section XI, Subsection IWE AMP, if necessary, based on the one-time inspection results. The staff also noted from LRA Table 3.5-1, item 3.5-1, 027, as revised by letter dated October 14, 2024, that the stainless-steel fuel transfer tube welds are subject to pressure testing for cracking.

The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S1 and finds it acceptable because, when implemented:

- The enhancement will require a one-time supplemental examination, prior to completion of the first refueling outage during the period of extended operation, of a representative sample of two stainless-steel penetrations or dissimilar metal welds of susceptible containment high-temperature penetrations in each unit (i.e., a total of four penetrations) to confirm the absence of cracking due to SCC.

- If absence of the aging effect cannot be confirmed based on an evaluation of examination results, additional examinations will be performed to determine the need for periodic supplemental examination in accordance with the site's corrective action program.
- The methods that will be used (surface, volumetric, or examination) for one-time (and periodic, if determined necessary) inspection and the 20 percent sample size for the one-time inspection are consistent with that recommended in the GALL-LR Report AMP XI.M32 for detecting cracking due to SCC of pressure-retaining components.
- The one-time inspection will also confirm the absence of cracking due to fatigue of dissimilar metal welds for which CLB fatigue analysis does not exist and serves as leading indicators.
- The one-time inspection approach is acceptable because there is no plant-specific OE thus far, of cracking due to SCC or fatigue in these components.
- Pressure testing of fuel transfer tube welds would be capable of detecting cracking.

The NRC staff also finds that this enhancement applies to the "corrective actions" program element because the LRA states that adverse results of the one-time inspection and need for additional actions will be evaluated in the corrective action program.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.S1. In addition, the staff reviewed the enhancements associated with the "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.28, as revised by letter dated October 14, 2024, summarizes OE related to the ASME Section XI, Subsection IWE program. The staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, as revised, the staff finds that the conditions and OE at the plant are bounded by those for which the ASME Section XI, Subsection IWE program was evaluated.

UFSAR Supplement

LRA Section A.2.2.28 and Table A-3 item 30, as revised by letter dated October 14, 2024, provide the UFSAR supplement for the ASME Section XI, Subsection IWE program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing ASME Section XI, Subsection IWE program for managing the effects of aging for applicable components during the period of extended operation. The staff also noted that the applicant committed to implement the five AMP enhancements, except for LRA Commitment No. 30(f), no later than November 2, 2024 (which is prior to entering the period of extended operation). For LRA Commitment No. 30(f), the staff noted that the applicant committed to perform the one-time inspection for cracking due to SCC or fatigue prior to completion of the first refueling outage after November 2, 2024, for DCPP Unit 1 and after August 26, 2025, for DCPP Unit 2. Therefore, the staff finds that the information in the UFSAR supplement, as revised, is an adequate summary description of the program.

Conclusion

Based on its review of the applicant’s ASME Section XI, Subsection IWE program, as revised, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the enhancements and finds that, when the enhancements are implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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 revised, for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.19 ASME Section XI, Subsection IWL

Summary of Technical Information in the Application

LRA Section B.2.3.29 states that the ASME Section XI, Subsection IWL AMP is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.S2, “ASME Section XI, Subsection IWL.” The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.S2. The staff also reviewed the portions of the “parameters monitored or inspected,” “acceptance criteria,” 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 these three enhancements is documented below.

Enhancement 1. LRA Section B.2.3.29 includes an enhancement to the “parameters monitored or inspected” program element that relates to revising implementation procedures to visually inspect accessible concrete for indications of potential alkali-silica reaction. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S2 and finds it acceptable for the following reasons. When the enhancement is implemented, the program procedure will incorporate the examinations and evaluation procedures defined in American Concrete Institute (ACI) 201.1R and ACI 349.3R, as recommended by the GALL-LR Report, to detect signs of alkali-silica reaction. ACI 201.1R and ACI 349.3R provide guidelines to inspect accessible portions of concrete for signs of alkali-silica reaction, such as map or patterned cracking, gel exudations, surface staining, and deformations due to expansion.

Enhancement 2. LRA Section B.2.3.29 includes an enhancement to the “acceptance criteria” program element that relates to updating the acceptance criteria guidance of procedure NDE VT 3C-1 to be consistent with ACI 349.3R-02. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S2 and finds it acceptable because, when implemented, it will reference the quantitative acceptance criteria provided in ACI 349.3R, which the GALL-LR Report states may be used to augment the qualitative assessment by the Responsible Engineer.

Enhancement 3. LRA Section B.2.3.29 includes an enhancement to the “corrective actions” program element that relates to evaluating items for which examination results do not meet acceptance standards in accordance with IWL-3000, “Evaluation,” and then documenting the evaluation results in an engineering report. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S2 and finds it acceptable because, when implemented, the program will produce an evaluation report which documents the evaluation for examination results that do not meet acceptance standards for whether the concrete containment is acceptable without repair of the item and, if repair is required, the extent, method, and completion date of the repair or replacement. Furthermore, the evaluation report will identify the cause of the condition and the extent, nature, and frequency of additional examinations, all of which are consistent with the recommendations of the GALL-LR Report.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.S2. In addition, the staff reviewed the enhancements associated with the “parameters monitored or inspected,” “acceptance criteria,” and “corrective actions” program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.29 summarizes OE related to the ASME Section XI, Subsection IWL AMP. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the ASME Section XI, Subsection IWL program was evaluated.

UFSAR Supplement

LRA Section A.2.2.29 provides the UFSAR supplement for the ASME Section XI, Subsection IWL AMP. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing ASME Section XI, Subsection IWL program for managing the effects of aging for applicable components during the period of extended operation. Additionally, the staff observed that the applicant has committed to implementing *Enhancements 1 and 2* (Commitment Nos. 31(a) and 31(b)) by November 2, 2024, for DCPP Unit 1 and by August 26, 2025, for DCPP Unit 2, both of which are prior to the start of the period of extended operation. Moreover, *Enhancement 3* (Commitment No. 31(c)), added by letter dated October 14, 2024, will be implemented by January 30, 2025. Therefore, 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 IWL AMP, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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 ASME Section XI, Subsection IWF

Summary of Technical Information in the Application

LRA Section B.2.3.30 states that the ASME Section XI, Subsection IWF AMP is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.S3, "ASME Section XI, Subsection IWF," except for the exception identified in the LRA. The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.S3. The staff also reviewed portions of the "preventive actions," "detection of aging effects," "acceptance criteria," and "corrective actions" program elements associated with an 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 six enhancements is documented below.

Exception 1. LRA Section B.2.3.30, as revised by letter dated October 14, 2024, includes an exception to the "preventive actions" program element related to the recommendation to not use lubricants containing sulfur which is intended to minimize the potential for SCC. The NRC staff reviewed this exception against the corresponding program element in the GALL-LR Report and finds that the program remains adequate to manage the related SCC aging effect for the following reasons:

- The use of MoS_2 as a lubricant will be prohibited during the period of extended operation (see Enhancement 1 below).
- While the lubricants allowed for bolting by DCPP procedures that the plant will continue to use contain low levels of sulfur (i.e., 100 ppm or less), the high purity of the lubricants minimizes or prevents potential for SCC.
- DCPP procedures follow the use of alternative nickel-based anti-seize and graphite alcohol lubricants consistent with EPRI 3002016000 "Materials Handbook for Nuclear Plant Pressure Boundary Applications (2019)" recommendations to minimize the use of aggressive lubricants or those that have potentially aggressive impurities.
- Plant-specific OE indicates no bolting failures due to SCC thus far.
- The program will be enhanced (see Enhancement 4 below) to monitor high-strength bolting with nominal diameter greater than 1-inch, which are most-susceptible to SCC, for SCC through periodic volumetric examination.

Enhancement 1. LRA Section B.2.3.30 includes an enhancement to the "preventive actions" program element to explicitly prohibit the use of MoS_2 as a lubricant for structural bolting. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S3 and finds it acceptable because, when implemented, the program would prohibit the use of MoS_2 as a lubricant, which is a potential contributor to SCC, to minimize the potential for SCC and to ensure bolting integrity consistent with recommendations in GALL-LR AMP XI.S3.

Enhancement 2. LRA Section B.2.3.30, as revised by letter dated October 14, 2024, includes an enhancement to the "preventive actions" program element to enhance bolting procedures to include guidance for the selection and storage of bolting material, installation torque or tension, and use of lubricants and sealants in accordance with recommendations in EPRI NP-5769, EPRI TR 104213, NUREG-1339, and, for ASTM A325, ASTM F1852, and A490 bolts, in accordance with Section 2 of RCSC publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts." The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S3 and finds it acceptable because, when implemented, the program will follow recommendations of applicable industry standards regarding the selection and storage of bolting material, installation torque, use of lubricants and sealants, and SCC potential consistent with recommendations in GALL-LR AMP XI.S3.

Enhancement 3. LRA Section B.2.3.30, as revised by letter dated October 14, 2024, includes an enhancement to the "preventive actions" program element in order to ensure that replacement and maintenance activities for high-strength structural bolting specify that the replaced bolting material has an actual measured yield strength less than 150 ksi. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S3 and finds it acceptable because, when implemented, the program would minimize the potential for SCC by not using high-strength bolting material of the specified actual measured yield strength for replacement bolting consistent with recommendations in GALL-LR AMP XI.S3.

Enhancement 4. LRA Section B.2.3.30 includes an enhancement to the "detection of aging effects" program element that relates to performing volumetric examination comparable to ASME Table IWB-2500-1 (Examination Category B-G-1) to detect cracking due to SCC in high-strength bolting greater than 1 inch in diameter in ASME Class 1 component supports. As stated in LRA Tables 3.5-1 and 3.5.2-1, item 3.5-1, 068, as revised by letter dated October 14, 2024, such high-strength bolting is associated only with ASME Class 1 component supports for the steam generators, reactor coolant pumps, RPV support skirt, and pressurizers. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S3 and finds it acceptable because, when implemented, it will ensure, consistent with the GALL-LR Report recommendations, that susceptible high-strength bolting is volumetrically examined for cracking due to SCC at least once in every 10-year interval during the period of extend operation.

Enhancement 5. LRA Section B.2.3.30 includes an enhancement to the "acceptance criteria" program element to revise plant procedures for ASME Class 1, 2, and 3 supports to also include the following as unacceptable conditions: (1) loss of material due to corrosion or wear; (2) debris, dirt, or excessive wear restricting motion of sliding surfaces; (3) cracked/sheared bolts including high-strength bolts and anchors; and (4) arc strikes, weld splatter, paint scoring, roughness, or general corrosion on closed tolerance machined or sliding surfaces. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S3 and finds it acceptable because, when implemented, it will align the AMP's "acceptance criteria" program element with the applicable criteria of GALL-LR Report AMP XI.S3 (noting that DCPP does not use elastomeric vibration isolation elements in IWF supports).

Enhancement 6. LRA Section B.2.3.30 includes an enhancement to the "corrective actions," program element in order to ensure that adverse results from the examination of high-strength bolting will be evaluated in the corrective action program to determine if additional actions are warranted, such as expansion of inspection scope and frequency of additional supplemental examinations. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S3 and finds it acceptable because, when implemented, the program would evaluate adverse examination results in the corrective action program and determine additional actions and/or corrective measures to ensure bolting integrity consistent with recommendations in GALL-LR AMP XI.S3.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.S3. The staff also reviewed the exception associated with the "preventive actions" program element and its justification and finds that the AMP, with the exception, is adequate to manage applicable aging effects. In addition, the staff reviewed the enhancements associated with the "preventive actions," "detection of aging effects," "acceptance criteria," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.30 summarizes OE related to the ASME Section XI, Subsection IWF AMP. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- 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 beyond that incorporated during the development of the LRA. Based on its audit and its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the ASME Section XI, Subsection IWF AMP was evaluated.

UFSAR Supplement

LRA Section A.2.2.30 and Table A-3 item 32, as revised by letter dated October 14, 2024, provides the UFSAR supplement for the ASME Section XI, Subsection IWF AMP. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Report Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing ASME Section XI, Subsection IWF program for managing the effects of aging for applicable components during the period of extended operation. The staff also noted that the applicant committed to implement the enhancements for both DCPP units no later than November 2, 2024 (which is prior to entering the period of extended operation). Therefore, 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 AMP, as revised, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.21 Masonry Walls

Summary of Technical Information in the Application.

LRA Section B.2.3.32 states that the Masonry Walls program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.S5, “Masonry Walls.”

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.S5. The staff also reviewed the portions of the “parameters monitored or 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 two enhancements is documented below.

Enhancement 1. LRA Section B.2.3.32 includes an enhancement to the “parameters monitored or inspected” and “monitoring and trending” program elements that relates to including condition monitoring for evidence of shrinkage and/or separation of masonry walls and gaps between the supports and masonry walls that could impact the intended function or potentially invalidate its evaluation basis. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.S5 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendation to monitor the masonry walls for cracking from shrinkage and/or separation, and loss of material at the mortar joints and gaps between the supports and masonry walls.

Enhancement 2. LRA Section B.2.3.32 includes an enhancement to the “detection of aging effects” program element that relates to requiring inspections of masonry walls at least every five years. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S5 and finds it acceptable because, when implemented, the inspection frequency for masonry walls will be consistent with the GALL-LR Report recommendation.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.S5. In addition, the staff reviewed the enhancements associated with the “parameters monitored or inspected,” “detection of aging effects,” and “monitoring and trending” program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.32 summarizes OE related to the Masonry Walls program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Masonry Walls program was evaluated.

UFSAR Supplement

LRA Section A.2.2.32 provides the UFSAR supplement for the Masonry Walls program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-LR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing Masonry Walls program for managing the effects of aging for applicable components during the period of extended operation. Additionally, the staff noted that the applicant has committed to implementing the two enhancements (Commitment Nos. 34(a) and 34(b)) by November 2, 2024, for DCPP Unit 1 and by August 26, 2025, for DCPP Unit 2, both of which are prior to the start of the period of extended operation. Therefore, 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 program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.22 Structures Monitoring

Summary of Technical Information in the Application

LRA Section B.2.3.33 states that the Structures Monitoring program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.S6, "Structures Monitoring." The applicant revised this LRA section by letters dated October 14, 2024, January 2, 2025, and January 27, 2025.

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.S6.

For the "parameters monitored or inspected" program element, the applicant's responses to RAI B.2.3.33-1 (ML25002A050) are acceptable because aging effects of cracking, loss of material, and hardening for structural sealants (including weatherproofing boots) are managed by the Structures Monitoring program, which is consistent with the "parameters monitored or inspected" program element of GALL-LR Report AMP XI.S6.

For the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements, the applicant's responses to RAI B.2.3.33-2 (ML25002A050) and RAI B.2.3.33-2A (ML25056A500) are acceptable because the enhanced Structures Monitoring program for managing boric acid attack of reinforced concrete and its implementation are consistent with applicable industry guidelines described in the AMP template of ERPI 3002007348, "Aging Management for Leaking Spent Fuel Pools," as follows: (1) aging management of boric acid attack on reinforced concrete in the reactor cavity, refueling canal, spent fuel pool (SFP) and transfer canal (TC) is in the scope of license renewal; (2) periodic walkdowns of accessible interior walls and ceilings that are adjacent to the reactor cavities, refueling canal, SFPs, and TCs are performed on an interval not to exceed five years; (3) initial inspection frequencies are established and long-term inspection frequencies will be adjusted based on evaluation of internal and external OE; (4) chemistry data (e.g., pH, boron, chlorides, sulfates, iron, etc.) and flow rate will be collected and measured from the reactor cavities, refueling canal, SFPs, and TCs to determine whether leakage conditions have been changed; (5) integrated data are compiled and trended to determine whether leakage conditions have been changed; (6) acceptance criteria for leak chase system discharge are specified; and (7) analysis results of data collected from the reactor cavities, refueling canal, SFPs, and TCs that do not meet acceptance criteria will be entered into the corrective action program and evaluated.

The NRC staff also reviewed the portions of the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," 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 these 20 enhancements is documented below.

Enhancement 1. LRA Section B.2.3.33, Commitment No. 35(a) includes an enhancement to the "detection of aging effects" program element which relates to revising procedures to determine and perform an opportunistic inspection of the pull box. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will include opportunistic inspection of the pull box when there are previous inspection results for the subject pull box or when there is new industry or DCPP-specific OE for the pull box.

Enhancement 2. LRA Section B.2.3.33, Commitment No. 35(b) includes an enhancement to the "scope of program" program element which relates to adding embedments, jet impingement shields, racks, structural sealants (including weatherproofing boots), and sliding surfaces. The

NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to include these components determined to be within scope of license renewal.

Enhancement 3. LRA Section B.2.3.33, Commitment No. 35(c) includes an enhancement to the “preventive actions” program element which relates to including preventive actions for proper selection of bolting material, lubricants, and installation torque or tension, preventive actions for storage, lubricants, and SCC for the structural bolting consisting of ASTM A325, ASTM F1852, and/or ASTM A490 bolts, and prohibiting the use of molybdenum disulfide (MoS_2) for structural bolts. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented: (1) it will be consistent with the GALL-LR Report recommendations to ensure that preventive actions are in accordance with applicable industry guidelines and to ensure that structural bolting integrity is maintained; and (2) the program will include preventive actions to explicitly prohibit the use of MoS_2 as a lubricant for structural bolts to help prevent SCC.

Enhancement 4. LRA Section B.2.3.33, Commitment No. 35(d) includes enhancements to the “parameters monitored or inspected” and “detection of aging effects” program elements which relate to monitoring groundwater chemistry, including consideration for potential seasonal variations, and assess impact of changes in its chemistry on below-grade concrete structures, at least every five years. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be consistent with the GALL-LR Report recommendations to monitor groundwater chemistry (pH, chlorides, and sulfates) on a frequency not to exceed five years.

Enhancement 5. LRA Section B.2.3.33, Commitment No. 35(e) includes an enhancement to the “parameters monitored or inspected” program element which relates to including parameters monitored or inspected for accessible sliding surfaces. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to monitor accessible sliding surfaces for indication of significant loss of material due to wear or corrosion, debris, or dirt.

Enhancement 6. LRA Section B.2.3.33, Commitment No. 35(f) includes an enhancement to the “parameters monitored or inspected” program element which relates to including parameters monitored or inspected for structural sealants including weatherproofing boots. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024 and the applicant’s responses to RAI B.2.3.33-1, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to monitor or inspect structural sealants for cracking, loss of material, and hardening.

Enhancement 7. LRA Section B.2.3.33, Commitment No. 35(g) includes an enhancement to the “detection of aging effects” program element which relates to monitoring all structures on a frequency not to exceed five years. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report

AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to monitor all structures on a frequency for detecting and quantifying aging degradations before there is loss of intended function.

Enhancement 8. LRA Section B.2.3.33, Commitment No. 35(h) includes an enhancement to the "detection of aging effects" program element which relates to conducting baseline inspections of concrete elements for all safety and non-safety-related structures. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will conduct baseline inspections of concrete elements for all safety and non-safety-related structures in accordance with ACI 349.3R-02 acceptance criteria.

Enhancement 9. LRA Section B.2.3.33, Commitment No. 35(i) includes an enhancement to the "detection of aging effects" program element which relates to aligning the inspector qualifications with the guidance in ACI 349.3R-02. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to ensure that inspection qualifications are consistent with industry guidelines and codes of practice for implementing the requirements of 10 CFR 50.65.

Enhancement 10. LRA Section B.2.3.33, Commitment No. 35(j) includes an enhancement to the "acceptance criteria" program element which relates to specifying acceptance criteria for structural sealants including weatherproofing boots. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to ensure that the observed loss of material, cracking, and hardening for structural sealants (including weatherproofing boots) will not result in loss of sealing prior to loss of intended function during the period of extended operation.

Enhancement 11. LRA Section B.2.3.33, Commitment No. 35(k) includes an enhancement to the "detection of aging effects" program element which relates to specifying the inspection frequency for structural sealants (including weatherproofing boots), except for those associated with the CSTs, RWSTs, primary water storage tanks (PWSTs), and transfer tank on a refueling outage frequency. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-LR Report recommendations to monitor structural sealants (including weatherproofing boots) on a frequency not to exceed five years, except for those specified structural sealants on a refueling outage frequency.

Enhancement 12. LRA Section B.2.3.33, Commitment No. 35(l) includes an enhancement to the "acceptance criteria" program element which relates to specifying acceptance criteria for fiberglass roofing. The NRC staff reviewed this enhancement, revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will ensure that there is no evidence of blistering, cracking, or loss of material for the fiberglass roofing that could cause a loss of function prior to the next scheduled inspection.

Enhancement 13. LRA Section B.2.3.33, Commitment No. 35(m) includes an enhancement to the "parameters monitored or inspected" program element which relates to revising implementing procedures to inspect accessible concrete for visual indications of potential alkali-silica reaction. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, it will be consistent with the GALL-SLR Report recommendations to monitor or inspect potential alkali-silica reaction for concrete components and, as discussed in the GALL-SLR Report, applicants for initial LR (40–60 years) may use aging management guidance for SLR (60–80 years) in their applications.

Enhancement 14. LRA Section B.2.3.33, Commitment No. 35(n) includes enhancements to the “parameters monitored or inspected” and “detection of aging effects” program elements which relate to performing rodding, snaking or video inspections of all DCPP Units 1 and 2 SFP and TC leak chase tell-tale drains to identify potential blockages prior to the period of extended operation and performing subsequent periodic tell-tale drain internal inspections initially in the period of extended operation on a frequency of once every five years. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024 and the applicant’s responses to RAI B.2.3.33-2A, against the corresponding program elements in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be in accordance with applicable industry guidelines described in the AMP template of ERPI 3002007348, “Aging Management for Leaking Spent Fuel Pools,” to establish an initial inspection frequency and adjust a long-term inspection frequency for identifying potential blockages of the DCPP Units 1 and 2 SFPs and TCs leak chase tell-tale drains.

Enhancement 15. LRA Section B.2.3.33, Commitment No. 35(o) includes enhancements to the “parameters monitored or inspected,” “detection of aging effects,” and “corrective actions” program elements which relate to: (1) performing periodic walkdowns of accessible interior walls and ceilings that are adjacent to the reactor cavities, refueling canal, SFPs, and TCs on an interval not to exceed five years; and (2) evaluating newly identified leaks or changes in existing leak sites in the corrective action program. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024 and the applicant’s responses to RAI B.2.3.33-2 and RAI B.2.3.33-2A, against the corresponding program elements in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be in accordance with applicable industry guidelines described in the AMP template of ERPI 3002007348 to identify new leaks or changes in existing leak areas through periodic walkdowns of accessible interior walls and ceilings that are adjacent to the reactor cavities, refueling canal, SFPs, and TCs on an interval not to exceed five years and to evaluate them in the corrective action program to ensure that their aging effects are adequately managed.

Enhancement 16. LRA Section B.2.3.33, Commitment No. 35(p) includes enhancements to the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements which relate to: (1) establishing initial inspection frequencies and adjusting long-term inspections frequencies based on evaluation of internal and external OE; (2) specifying acceptance criteria for leak chase system discharge; (3) collecting chemistry data (chlorides and sulfates) from the SFPs and TCs leak chase sampling and trending integrated data to determine whether leakage conditions have changed; and (4) collecting chemistry data (e.g., pH, boron, chlorides, sulfates, Iron, etc.) and measuring flow rate from the reactor cavities and refueling canal to determine whether leakage conditions have changed. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024 and the applicant’s responses to RAI B.2.3.33-2 and RAI B.2.3.33-2A, against the corresponding program elements in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be in accordance with applicable industry guidelines described in the AMP template of ERPI 3002007348 to collect samples from the leak chase system tell-tales drains of the reactor cavities, refueling canal, SFPs, and TCs to and monitor their discharge parameters against the established criteria based on industry and plant OE.

Enhancement 17. LRA Section B.2.3.33, Commitment No. 35(q) includes enhancements to the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements which relate to: (1) developing or revising procedures to manage the reactor cavity, refueling canal, SFP, and TC surveillance and maintenance activities consistent with Elements 1 and 3 through 7 of EPRI 3002007348; and (2) entering and evaluating analysis results of data collected from the reactor cavity, refueling canal, SFP, and TC that do not meet acceptance criteria in the corrective action program, including consideration of revisiting structural evaluations to determine whether any future observed indications of changes in the leakage conditions cause structural margin to become inadequate. The NRC staff reviewed this enhancement, as revised by letter dated October 14, 2024 and the applicant's responses to RAI B.2.3.33-2 and RAI B.2.3.33-2A, against the corresponding program elements in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be in accordance with applicable industry guidelines described in the AMP template of ERPI 3002007348 to ensure that aging effects of the reactor cavity, refueling canal, SFP, and TC are adequately managed during the period of extended operation.

Enhancement 18. LRA Section B.2.3.33, Commitment No. 35(r) includes enhancements to the "parameters monitored or inspected" and "detection of aging effects" program elements which relate to: (1) performing a reactor cavity and refueling canal leak chase internal inspection feasibility determination; (2) performing an internal inspection of DCPP Unit 1 and Unit 2 reactor cavity and refueling canal leak chases during the second Unit 1 refueling outage and the first Unit 2 refueling outage, respectively; (3) performing subsequent periodic tell-tale drain internal inspections of the reactor cavity and refueling canal leak chases on an initial frequency of once every three refueling outage; and (4) adjusting the long-term inspection frequency by evaluating internal and external OE. The NRC staff reviewed these enhancements, as revised by letter dated October 14, 2024 and the applicant's responses to RAI B.2.3.33-2 and RAI B.2.3.33-2A (ML25056A500), against the corresponding program elements in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be in accordance with applicable industry guidelines described in the AMP template of ERPI 3002007348 to establish initial and subsequent inspection frequencies of the reactor cavity and refueling canal leak chase channels and adjust the long-term inspection frequency based on OE and to perform an internal inspection of the DCPP Units 1 and 2 reactor cavity and refueling canal leak chase channels.

Enhancement 19. LRA Section B.2.3.33, Commitment No. 35(s) includes an enhancement to the "scope of program" program element which relates to performing a structural evaluation of any identified degradation of concrete and structural steel due to leakage of borated water from the reactor cavity and refueling canal. The NRC staff reviewed this enhancement, as revised by the applicant's responses to RAI B.2.3.33-2A, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will be in accordance with applicable industry guidelines described in the AMP template of ERPI 3002007348 to perform a structural evaluation of the reactor cavity and refueling canal exposed to the leakage of borated water and a conservative projection of the potential degradation of those surfaces during the period of extended operation.

Enhancement 20. LRA Section B.2.3.33, Commitment No. 35(t) includes an enhancement to the "parameters monitored or inspected" program element which relates to including parameters monitored or inspected for fiberglass roofing panels. The NRC staff reviewed this enhancement, as revised by the applicant's responses to RCI B.2.3.33-1, against the corresponding program element in GALL-LR Report AMP XI.S6 and finds it acceptable because, when it is implemented, the program will monitor fiberglass roofing panels for blistering, cracking, and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, as revised, and the applicant's responses to RAI B.2.3.33-1, RAI B.2.3.33-2, RCI B.2.3.33-1, and RAI B.2.3.33-2A, 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-LR Report are consistent with the corresponding program elements of GALL-LR 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," "acceptance criteria," and "corrective actions" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.33 summarizes OE related to the Structures Monitoring program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, as revised, and the applicant's responses to RAI B.2.3.33-1, RAI B.2.3.33-2, RCI B.2.3.33-1, and RAI B.2.3.33-2A, 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

LRA Appendix A Section A.2.2.33 provides the UFSAR supplement for the Structures Monitoring program. The NRC staff reviewed this UFSAR supplement description of the program, as revised, and the applicant's responses to RAI B.2.3.33-1, RAI B.2.3.33-2, RCI B.2.3.33-1, and RAI B.2.3.33-2A (ML25056A500), and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also 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 period of extended operation. The staff noted that the applicant committed to implement the enhancements according to the following schedules: (1) Commitment Nos. 35(a), 35(d), 35(e), 35(h), 35(i), and 35(j) by November 2, 2024 (for DCPP Unit 1) and by August 26, 2025 (for DCPP Unit 2); (2) Commitment Nos. 35(b), 35(c), 35(f), 35(g), 35(k), 35(l), and 35(m) by January 30, 2025; (3) Commitment No. 35(o) for walkdowns is completed and Commitment Nos. 35(n), 35(o), 35(p), and 35(q) by the first refueling outage after November 2, 20204 and August 26, 2025 for DCPP Units 1 and 2, respectively; (4) Commitment No. 35(r) by the completion of the second DCPP Unit 1 refueling outage in the period of extended operation; and (5) Commitment No. 35(s) by six months following the completion of the first DCPP Unit 2 refueling outage in the period of extended operation. Therefore, the staff finds that the information in the UFSAR supplement, as revised, is an adequate summary description of the program.

Conclusion

Based on its review of the applicant's Structures Monitoring program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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 revised, 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 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

Summary of Technical Information in the Application

LRA Section B.2.3.34 states that the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.S7. 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 six enhancements is documented below.

Enhancement 1. LRA Section B.2.3.34 includes an enhancement to the "scope of program" program element that relates to revising the implementing procedure to include miscellaneous steel (e.g., bar racks) in the scope of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S7 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendations to ensure that the scope of the program is in accordance with applicable industry guidelines and to ensure that miscellaneous steel (e.g., bar racks) is properly maintained.

Enhancement 2. LRA Section B.2.3.34 includes an enhancement to the "preventive action" program element that relates to revising the implementing procedure to specify and ensure that:

1. Structural bolting replacement and maintenance activities will include appropriate preload and proper tightening (torque or tension) as recommended in EPRI documents, ASTM standards, AISC Specification, and in Section 2 of the RCSC publication "Specifications for Structural Joints Using ASTM A325 or A490 Bolts," as applicable.
2. MoS_2 will not be used.

The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S7 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendations to ensure that MoS_2 will not be used, in addition to Code and Standards requirements.

Enhancement 3. LRA Section B.2.3.34 includes an enhancement to the “parameters monitored or inspected” program element that relates to revising the implementing procedures to monitor structural concrete for movements (e.g., heaving, deflection), conditions at junctions with abutments and embankments, loss of material, and increase in porosity and permeability. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S7 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendations to provide reasonable assurance that there is no loss of intended function of the concrete structure between inspections.

Enhancement 4. LRA Section B.2.3.34 includes an enhancement to the “detection of aging effects” program element that relates to the development of requirements for future discharge conduit inspections, including those to be performed during the period of extended operation, based on the findings from the refueling outage 1R17/2R17 (2012/2013) inspections. These requirements will address:

1. inspection interval (not to exceed five years);
2. extent and frequency of marine growth removal; and
3. inspection extent (100 percent vs. sampling).

The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S7 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendations to address:

1. inspection interval (not to exceed five years);
2. extent and frequency of marine growth removal; and
3. inspection extent.

Enhancement 5. LRA Section B.2.3.34 includes an enhancement to the “detection of aging effects” program element that relates to enhancing the implementing procedure to align the inspector qualifications with the guidance in ACI 349.3R-02. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S7 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendations to include inspector qualifications in according to the guidance in ACI 349.3R-02.

Enhancement 6. LRA Section B.2.3.34 includes an enhancement to the “detection of aging effects” program element that relates to enhancing the implementing procedure to conduct a baseline inspection of all concrete water-control structures in accordance with ACI 349.3R-02 acceptance criteria prior to November 2, 2024, and August 26, 2025, for DCPP Units 1 and 2, respectively. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S7 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report recommendations to establish a baseline inspection of all concrete water-control structures in accordance with ACI 349.3R-02 acceptance criteria prior to the period of extended operation.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.S7. 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, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.34 summarizes OE related to the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Structures program was evaluated.

UFSAR Supplement

LRA Appendix A Section A.2.2.34 provides the UFSAR supplement for the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in GALL-LR Report Table XI-01. The staff also noted that the applicant committed to ongoing implementation of the existing RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program for managing the effects of aging for applicable components during the period of extended operation (Commitment No. 36). The applicant committed to implement the program enhancements no later than November 2, 2024, for DCPP Unit 1 and no later than August 26, 2025, for DCPP Unit 2. Therefore, 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 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.24 Protective Coating Monitoring and Maintenance

Summary of Technical Information in the Application

LRA Section B.2.3.35 states that the Protective Coating Monitoring and Maintenance program is an existing program with an enhancement that will be consistent with the program elements in the GALL-LR Report AMP XI.S8, "Protective Coating Monitoring and Maintenance."

Staff Evaluation

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.S8. The staff also reviewed the portions of the "monitoring and trending" 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 one enhancement is documented below.

Enhancement. LRA Section B.2.3.35 includes an enhancement to the "monitoring and trending" program element to specify that a pre-inspection review of the previous two monitoring reports be performed. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.S8 and finds it acceptable because, when implemented, it will be consistent with the wording in the GALL-LR Report.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.S8. In addition, the staff reviewed the enhancement associated with the "monitoring and trending" program element and finds that, when implemented, it will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.35 summarizes OE related to the Protective Coating Monitoring and Maintenance program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, 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

LRA Section A.2.2.35 provides the UFSAR supplement for the Protective Coating Monitoring and Maintenance program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Protective Coating Monitoring and Maintenance program and implementing the enhancement no later than November 2, 2024, and August 26, 2025, for DCPP Units 1 and 2, respectively. Therefore, 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 NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.25 Insulation Material for Electric Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

Summary of Technical Information in the Application

LRA Section B.2.3.37 states that the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits."

<u>Staff Evaluation</u>

The NRC staff reviewed the applicant's claim of consistency with the GALL-LR 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 LRA of the applicant's program to the corresponding program elements of GALL-LR Report AMP XI.E2. The staff also reviewed the portions of the "scope of program," "parameters monitored or inspected," "detection of aging effects," 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 evaluations of these four enhancements is documented below.

<u>Enhancement 1</u>. LRA Section B.2.3.37 includes an enhancement to the "scope of program" program element that relates to the development or revision of procedures/work orders to include the cables and connections used in nuclear instrumentation channels (source range, intermediate range, and power range). The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E2 and finds it acceptable because, when implemented, it will be consistent with AMP XI.E2 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.

<u>Enhancement 2</u>. LRA Section B.2.3.37 includes an enhancement to the "parameters monitored or inspected" program element that relates to the development of procedures/work orders for cable testing to specify the parameters that require monitoring for indications of age-related degradation for nuclear instrumentation channels (source range, intermediate range, and power range). The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E2 and finds it acceptable because, when implemented, it will be consistent with AMP XI.E2 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.

<u>Enhancement 3</u>. LRA Section B.2.3.37 includes enhancements to the "detection of aging effects" program element that relates to the development or revision of procedures associated with calibration/surveillance tests of radiation monitors to implement the review of results obtained during calibration or surveillance tests that fail to meet the acceptance criteria in order to determine whether the associated circuits continue to perform their intended function. Procedures will also be developed to implement cable system testing for nuclear instrumentation monitors to detect deterioration and determine the condition of cable system insulation. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E2 and finds it acceptable because, when implemented, it will be consistent with AMP XI.E2 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 4. LRA Section B.2.3.37 includes an enhancement to the "acceptance criteria" program element that relates to the development of procedures/work orders to implement testing of nuclear instrumentation channels (source range, intermediate range, and power range) cables to specify the test acceptance criteria. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E2 and finds it acceptable because, when implemented, it will be consistent with AMP XI.E2 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.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.E2. In addition, the staff reviewed the enhancements associated with the "scope of program," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements and finds that, when implemented, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.37 summarizes OE related to the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program was evaluated.

UFSAR Supplement

LRA Section A.2.2.37 provides the UFSAR supplement for the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program for managing the effects of aging for applicable components during the period of extended operation. The staff also noted that the applicant committed to enhance the program as follows by November 2, 2024, and by August 26, 2025, for DCPP Units 1 and 2, respectively:

- Procedures/work orders will be developed or revised to include the cables and connections used in nuclear instrumentation channels (source range, intermediate range, and power range).
- Procedures/work orders for cable testing will be developed to specify the parameters that require monitoring for indications of age-related degradation for nuclear instrumentation channels (source range, intermediate range, and power range).
- Procedures associated with calibration/surveillance tests of radiation monitors will be developed or revised to implement the review of results obtained during calibration or surveillance tests that fail to meet acceptance criteria in order to determine whether the associated circuits continue to perform their intended function in light of any aging effects on cables and connectors insulation. Review of the calibration/surveillance tests will be completed prior to November 2, 2024, and prior to August 26, 2026, for DCPP Units 1 and 2, respectively, and at least 10 years thereafter. Calibration/surveillance results that do not meet acceptance criteria are reviewed for aging effects when the results will be available.
- Procedures/work orders will be developed to implement cable system testing for nuclear instrumentation monitors (SRM/IRM/PRM) using a proven test for detecting deterioration of the insulation system, such as insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable system insulation condition. Cable system testing will be performed at least every 10 years, with the first tests completed prior to November 2, 2024, and prior to August 26, 2025, for DCPP Units 1 and 2, respectively.

Therefore, 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 Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.2.26 Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Technical Information in the Application

LRA Section B.2.3.38 states that the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is an existing program with enhancements that will be consistent with the program elements in the GALL-LR Report AMP XI.E3, “Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” except for the exceptions identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.E3. 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 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 these four exceptions and 10 enhancements is documented below.

Exception 1. LRA Section B.2.3.38 includes an exception to the “preventive actions” program element related to a one-time inspection of pull boxes for inspections for excessive drooping/sagging of cables, and for visible indications of damage or degradation to cables and cable supports, in lieu of periodic inspections with direct inspection of accessible cable conduit ends and direct inspection of cables and cable support structures. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because the cable pull boxes between the intake structure and turbine building are designed to drain to a building sump or in-ground sump, which is separate from the pull boxes. The in-ground sump has an automatic sump pump and high-level alarm and would indicate high water level before water begins to back up into the cable pull boxes. With the water level indications available before water backs up into the cable manholes, the need for periodic inspections due to exposure to significant moisture, defined as periodic exposure to moisture that last more than a few days (e.g., cable wetting or submergence in water), is not necessary.

Exception 2. LRA Section B.2.3.38 includes an exception to the “preventive actions” program element related to the inspection frequency for water collection in a limited number of intake structure pull boxes from annually to every refuel outage due to these pull boxes not being accessible during normal plant operation. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because the design of the pull box drainage system and the existence of an automatic sump pump with alarm features will indicate water level rise prior to water backing up into the cable pull boxes. These features should prevent inaccessible cables from being exposed to significant moisture.

Exception 3. LRA Section B.2.3.38 includes an exception to the “preventive actions” program element related to event driven inspections for water accumulation in pull boxes. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because the design of the turbine building and intake structure pull boxes ensures that water will be drained away from the pull boxes, and the reliability of sump pumps and alarm features will be confirmed during annual inspections, in conjunction with blockage free drain conduits which provide reliable drainage of water from pull boxes. These features and actions should prevent inaccessible power cables from being exposed to significant moisture.

Exception 4. LRA Section B.2.3.38 includes an exception to the “preventive actions” program element related to inspection of dewatering devices (e.g., sump pumps) prior to any known or predicted heavy rain or flooding events. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because the automatic sump pumps with alarm features will be tested at least once annually prior to the rainy season, and California weather patterns consist of concentrated rainy seasons lasting approximately six to seven months. Rain outside of the rainy season is very rare and generally produces negligible amounts of rainfall. Testing once annually prior to the rainy season provides reasonable assurance that the sump pumps and alarm features will operate properly throughout the season.

Enhancement 1. LRA Section B.2.3.38 includes an enhancement to the “scope of program” program element that relates to enhancing procedure/working orders to implement the managing of aging effects of inaccessible and underground in-scope power cables (greater than or equal to 400 volts) that are potentially exposed to significant moisture. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 2. LRA Section B.2.3.38 includes an enhancement to the “preventive actions” program element that relates to enhancing pull box inspection maintenance plans to initiate engineering evaluation to assess cable degradation and to determine the cause of water accumulation, if cables are found to be submerged. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 3. LRA Section B.2.3.38 includes an enhancement to the “preventive actions” program element that relates to enhancing maintenance plans for intake structure pull boxes to revise the inspection frequency to every refueling outage and include inspections of inaccessible conduit ends for water collection and inspections of cables and cable support structures for visible signs of degradation. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 4. LRA Section B.2.3.38 includes an enhancement to the “preventive actions” program element that relates to enhancing maintenance plans for pull box sump and sump alarm tests to implement testing of the pull box sump pump and alarm features to be performed at least once annually prior to the rainy season, with the first tests performed prior to November 2, 2024, and prior to August 26, 2025, for DCPP Units 1 and 2, respectively. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 5. LRA Section B.2.3.38 includes an enhancement to the “preventive actions” program element that relates to the performance of a one-time inspection of pull boxes prior to November 2, 2024, and prior to August 26, 2025, for DCPP Units 1 and 2, respectively, which will include inspections for excessive drooping or sagging of cables, and visible indications of damage or degradation of cables and cable supports. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 6. LRA Section B.2.3.38 includes an enhancement to the “parameters monitored or inspected” program element that relates to enhancing procedures/work orders to implement testing of power cables (greater than or equal to 400 volts) to provide an indication of the condition of cable insulation. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 7. LRA Section B.2.3.38 includes an enhancement to the “detection of aging effects” program element that relates to enhancing procedures/work orders to implement periodic testing of power cables (greater than or equal to 400 volts) to determine the condition of cable insulation. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 8. LRA Section B.2.3.38 includes an enhancement to the “monitoring and trending” program element that relates to enhancing procedures/work orders to implement trending of trendable test results based on the type of test or inspection selected. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 9. LRA Section B.2.3.38 includes an enhancement to the “acceptance criteria” program element that relates to enhancing pull box inspection maintenance plans for intake structures to include inspection acceptance criteria, which are defined by lack of visible signs of degradation. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

Enhancement 10. LRA Section B.2.3.38 includes an enhancement to the “acceptance criteria” program element that relates to enhancing procedures/work orders to specify acceptance criteria for cable test results. The NRC staff reviewed this enhancement against the corresponding program element in GALL-LR Report AMP XI.E3 and finds it acceptable because, when implemented, it will be consistent with the GALL-LR Report and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of the inaccessible power cables within the scope of the AMP will be maintained consistent with the CLB.

The NRC staff conducted an audit to verify the applicant’s claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.E3. The staff also reviewed the exceptions associated with the “preventive actions” program element 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 “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, they will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant’s program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.38 summarizes OE related to the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant’s corrective action program database; and
- provide a basis for the staff’s conclusions on the ability of the applicant’s proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program was evaluated.

UFSAR Supplement

LRA Section A.2.2.38 provides the UFSAR supplement for the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program for managing the effects of aging for applicable components during the period of extended operation. The staff also noted that the applicant committed to enhance the program as follows by November 2, 2024, and by August 26, 2025, for DCPP Units 1 and 2, respectively:

- Enhance procedure/work orders to implement aging effects management of inaccessible and underground in-scope power cables (greater than or equal to 400 volts).
- Enhance maintenance plans for periodic inspection of pull boxes with potential for water intrusion that contain in-scope power cables (greater than or equal to 400 volts) to determine if water has accumulated at least once per year, except for intake structure pull boxes that are inspected every refueling outage, and if cables are submerged (i.e., cable exposed to significant moisture), corrective actions are taken to keep the cable dry, assess cable degradation, and to determine the cause of pull box water accumulation.
- Perform one-time inspection of pull boxes, which will include inspections for excessive drooping or sagging of cables, and visible indications of damage or degradation of cables and cable supports.
- Enhance maintenance plans for intake structure pull boxes to revise the inspection frequency to every refueling outage, include inspection of accessible conduit ends for water collection, and include inspection of cables and cable support structures for visible signs of degradation. Enhance maintenance plans to initiate an engineering evaluation to assess cable degradation and to determine the cause of water accumulation, when cables are found submerged.
- Enhance maintenance plans to perform testing of pull box sump and sump alarm features at least once annually prior to the rainy season, with the first tests completed prior to November 2, 2024, and prior to August 26, 2025, for DCPP Units 1 and 2, respectively.
- Create procedure/work orders to implement testing of power cables (greater than 400 volts) to provide an indication of the condition of cable insulation, using a proven test for detecting deterioration of the insulation system due to wetting or submergence. The condition of cable insulation will be assessed with reasonable confidence using one or more of the following techniques: dielectric loss (dissipation factor or power factor), AC voltage withstand, partial discharge, step voltage, time domain reflectometry, insulation resistance and polarization index, line resonance analysis, or other testing that is state-of-the-art at the time the tests are performed. Test results that are trendable will be used to provide additional information on the rate of cable insulation degradation. More frequent testing may occur based on test results and OE.
- Create procedure/work orders to define acceptance criteria for pull box inspections and cable testing.

Therefore, 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 Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR Report are consistent. The staff also reviewed the exceptions and the enhancements and finds that, with the exceptions and the enhancements when implemented, the AMP will be adequate to manage the applicable aging effects. Thus, 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).

3.0.3.2.27 Metal Enclosed Bus

Summary of Technical Information in the Application

LRA Section B.2.3.39 states that the Metal Enclosed Bus program is an existing program with an enhancement that will be consistent with the program elements in the GALL-LR Report AMP XI.E4, "Metal Enclosed Bus," except for the exception identified in the LRA.

Staff Evaluation

The NRC staff reviewed the applicant’s claim of consistency with the GALL-LR 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 LRA of the applicant’s program to the corresponding program elements of GALL-LR Report AMP XI.E4. The staff also reviewed the portions of the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” “acceptance criteria,” and “corrective actions” program elements associated with an exception and 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 one exception and one enhancement is documented below.

Exception. LRA Section B.2.3.39 includes an exception to the “parameters monitored or inspected,” program element related to not needing to inspect or test bolted connections between bus segments or the inspection of insulating materials on the isolated phase bus. The NRC staff reviewed this exception against the corresponding program element in GALL-LR Report AMP XI.E4 and finds it acceptable because the isolated phase bus segments are not wrapped with insulation, most of the isophase bus sections are welded together, and associated bolted connections are part of active electrical components.

Enhancement. LRA Section B.2.3.39 includes an enhancement to the “scope of program,” “parameters monitored or inspected,” “detection of aging effects,” “acceptance criteria,” and “corrective actions” program elements that relates to the creation of procedure(s) to formalize the existing inspection and testing of the metal enclosed buses and include specific inspection scope, inspection methods, inspection frequencies, and actions to be taken when acceptance criteria are not met. The NRC staff reviewed this enhancement against the corresponding program elements in GALL-LR Report AMP XI.E4 and finds it acceptable because, when implemented, it will be consistent AMP XI.E4 and will provide reasonable assurance that the effects of aging will be managed so that the intended functions of metal enclosed bus within the scope of the AMP will be maintained consistent with the CLB.

The NRC staff conducted an audit to verify the applicant's claim of consistency with the GALL-LR Report. Based on its audit and its review of the LRA, 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-LR Report are consistent with the corresponding program elements of GALL-LR Report AMP XI.E4. The staff also reviewed the exception associated with the "parameters monitored or inspected" 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 enhancement associated with the "scope of program," "parameters monitored or inspected," "detection of aging effects," "acceptance criteria," and "corrective actions' program elements and finds that, when implemented, it will make the AMP adequate to manage the applicable aging effects. Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

Operating Experience

LRA Section B.2.3.39 summarizes OE related to the Metal Enclosed Bus program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs 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 its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Metal Enclosed Bus program was evaluated.

UFSAR Supplement

LRA Section A.2.2.39 provides the UFSAR supplement for the Metal Enclosed Bus program. The NRC staff reviewed this UFSAR supplement description of the program and noted that it is consistent with the recommended description in SRP-LR Table 3.0-1. The staff also noted that the applicant committed to ongoing implementation of the existing the DCPP Metal Enclosed Bus AMP, including an enhancement to create procedure(s) to formalize the existing inspection and testing of the metal enclosed buses and include specific inspection scope, inspection methods, inspection frequencies, and actions to be taken when acceptance criteria are not met by November 2, 2024, and by August 26, 2025, for DCPP Units 1 and Unit 2, respectively. Therefore, 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 Metal Enclosed Bus program, the NRC staff concludes that those program elements for which the applicant claimed consistency with the GALL-LR 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. Thus, 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).

3.0.3.3 Aging Management Programs Not Consistent with or Not Addressed in the Generic Aging Lessons Learned Report

In LRA Appendix B, the applicant identified the following AMPs as plant-specific:

- Periodic Inspections for Selective Leaching
- Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators

For AMPs not consistent with or not addressed in the GALL-LR Report, the NRC staff performed a complete review to determine their adequacy to monitor or manage aging effects during the period of extended operation. The staff's evaluation of these plant-specific AMPs is documented in the following sections.

3.0.3.3.1 Periodic Inspections for Selective Leaching

<u>Summary of Technical Information in the Application</u>

LRA Section B.2.3.41 describes the new Periodic Inspections for Selective Leaching program as plant-specific. The applicant revised this LRA section by letter dated October 14, 2024 (ML24289A118).

<u>Staff Evaluation</u>

GALL-LR Report AMP XI.M33, "Selective Leaching," recommends: (1) one-time inspections to demonstrate the absence of selective leaching; or (2) a plant-specific AMP for materials and environments where selective leaching is currently occurring. The applicant identified two populations (i.e., materials and environment combinations) where selective leaching is occurring and provided the plant-specific Periodic Inspections for Selective Leaching program to manage loss of material due to selective leaching for these populations. The two populations to be managed using this plant-specific AMP are: (1) gray cast iron exposed to soil; and (2) aluminum-bronze exposed to raw water.

For plant-specific programs, the NRC staff typically reviews 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 applicant's program against the acceptance criteria for the corresponding elements as stated in SRP-LR Section A.1.2.3. However, with the issuance of GALL-SLR Report AMP XI.M33, the staff provided a framework to manage this aging mechanism through periodic inspections, as opposed to the GALL-LR AMP XI.M33 framework which recommends one-time inspections to demonstrate that this aging effect is not occurring. In addition, the staff noted that the applicant developed this plant-specific program based on the guidance provided in GALL-SLR Report AMP XI.M33. Therefore, instead of comparing the program elements listed above to corresponding elements as stated in SRP-LR Section A.1.2.3, the staff compared the program elements of the applicant's program to the corresponding program elements of GALL-SLR

Report AMP XI.M33. The staff's evaluation related to these program elements is documented next. The staff's evaluation related to the "confirmation process" and "administrative controls" program elements and compliance with Criterion XVI, "Corrective Action," of 10 CFR Part 50, Appendix B of the "corrective action" program element is documented in SE Section 3.0.4.

The NRC staff conducted an audit as part of its review of the Periodic Inspections for Selective Leaching program. For the "preventive actions" program element, the NRC staff noted that the GALL-SLR Report does not provide specific guidance on preventive actions to mitigate loss of material due to selective leaching. However, based on plant-specific OE noted by the staff during its audit, the staff determined the need for additional information regarding why periodic refurbishment cleaning of aluminum-bronze valves exposed to raw water is not credited as a preventive action in LRA Section B.2.3.41. Prior to the issuance of an RAI, the applicant revised LRA Section B.2.3.41 by letter dated October 14, 2024, to credit this activity to mitigate loss of material due to selective leaching for aluminum-bronze valves exposed to raw water, thus addressing the staff's concern.

In addition, for the "detection of aging effects" program element, the NRC staff determined the need for additional information with respect to the quantity of destructive examinations that will be performed for gray cast iron components exposed to soil, resulting in the issuance of RAI B.2.3.41-1 (ML24339B881). In relation to the applicant's response to RAI B.2.3.41-1 (ML25002A050), the staff did not consider the applicant's position, that an individual buried gray cast iron piping line should be treated as one component, to be consistent with the GALL-SLR Report. However, the combination of conducting two destructive examinations (i.e., one destructive examination for each reactor unit) and an increased sample size beyond GALL-SLR Report recommendations for visual/mechanical inspections (see the OE discussion below for more information) provides reasonable assurance that loss of material due to selective leaching on the external surfaces of gray cast iron components exposed to soil will be adequately managed during the period of extended operation. Therefore, the staff's concern described in RAI B.2.3.41-1 is resolved.

Based on its audit and its review of the LRA, as revised, the NRC 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.M33 (other than the deviations associated with the "preventive actions" and "detection of aging effects" program elements which are addressed above). Therefore, the staff finds that the applicant's program is adequate to manage the applicable aging effects.

<u>Operating Experience</u>

LRA Section B.2.3.41 summarizes OE related to the Periodic Inspections for Selective Leaching program. The NRC staff reviewed OE information in the LRA and during the audit. As discussed in the Audit Report, the staff conducted an independent search of the plant OE information to:

- identify examples of age-related degradation, as documented in the applicant's corrective action program database; and
- provide a basis for the staff's conclusions on the ability of the applicant's proposed AMPs to manage the effects of aging during the period of extended operation.

In addition to OE involving aluminum-bronze valves exposed to raw water (which is addressed in the "preventive actions" program element discussion above), the NRC staff identified OE involving gray cast iron piping exposed to soil for which it determined the need for additional information. Specifically, based on plant-specific OE noted by the staff during its audit, the staff determined the need for additional information with respect to using the reduced sample size (i.e., the GALL-SLR Report AMP XI.M33 sample size referenced by the applicant is 3 percent with a maximum of 10 components, whereas the GALL-LR Report sample size is 20 percent with a maximum of 25 components) for visual/mechanical inspections of gray cast iron piping exposed to soil. However, prior to the issuance of an RAI, the applicant revised LRA Section B.2.3.41 by letter dated October 14, 2024, to clarify that the GALL-LR Report sample size (i.e., 20 percent with a maximum of 25 components) will be used during the period of extended operation for gray cast iron piping exposed to soil, addressing the staff's concern. Based on its audit and its review of the LRA, as revised, the staff finds that the conditions and OE at the plant are bounded by those for which the Periodic Inspections for Selective Leaching program was evaluated.

UFSAR Supplement

As revised by letter dated October 14, 2024, LRA Section A.2.2.41 provides the UFSAR supplement for the Periodic Inspections for Selective Leaching program. The NRC 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 implement the new Periodic Inspections for Selective Leaching program by November 2, 2024, for DCPP Unit 1, and by August 26, 2025, for DCPP Unit 2, for managing the effects of aging for applicable components during the period of extended operation. In addition, the staff noted that the applicant committed to complete initial inspections prior to March 31, 2026. Although this is approximately 17 months after the start of the period of extended operation for DCPP Unit 1, and 7 months after the start of the period of extended operation for DCPP Unit 2, the staff finds the proposed timeline to be reasonable based on the timing of the LRA submittal. Therefore, 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 Periodic Inspections for Selective Leaching program, the NRC staff concludes that the applicant has demonstrated that the applicable aging effects 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).

3.0.3.3.2 Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators

Summary of Technical Information in the Application

LRA Section B.2.3.42 describes the existing Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program as plant-specific.

Staff Evaluation

The NRC staff reviewed 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 applicant's program against the acceptance criteria for the corresponding elements as stated in SRP-LR Section A.1.2.3. The staff's review focused on how the applicant's program manages aging effects through the effective incorporation of these program elements. The staff's evaluation of each of these program elements is documented next. The staff's evaluation related to the "confirmation process" and "administrative controls" program elements and compliance with Criterion XVI, "Corrective Action," of 10 CFR Part 50, Appendix B of the "corrective action" programs element is documented in SE Section 3.0.4.

Scope of Program

The NRC staff reviewed the applicant's "scope of program" program element against the criteria in SRP-LR Section A.1.2.3.1. The staff noted that the applicant identified the 230-kV and 500-kV components required for station blackout recovery, which includes the high-voltage insulators, transmission conductors and connections, and switchyard bus and connections, that will be managed by the program. The staff finds the applicant's "scope of program" program element to be adequate because it adequately identifies and includes the specific components subject to an AMR for LR. The staff also conducted an audit to verify the applicant's conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, the staff determined that the "scope of program" program element satisfies the criteria defined in SRP-LR Section A.1.2.3.1 and, therefore, is acceptable.

Preventive Actions

The NRC staff reviewed the applicant's "preventive actions" program element against the criteria in SRP-LR Section A.1.2.3.2. The staff noted that preventive actions are not provided because the applicant's program does not prevent degradation due to aging effects but, instead, provides measures for monitoring to detect the age-related degradation prior to loss of component intended function. The staff finds the applicant's "preventive actions" program element to be adequate because the applicant's program is a condition monitoring program that does not rely on preventive actions. The staff also conducted an audit to verify the applicant's conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, the staff determined that the "preventive actions" program element satisfies the criteria defined in SRP-LR Section A.1.2.3.2 and, therefore, is acceptable.

Parameters Monitored or Inspected

The NRC staff reviewed the applicant's "parameters monitored or inspected" program element against the criteria in SRP-LR Section A.1.2.3.3. The staff noted that the applicant's program will inspect the 230-kV and 500-kV components for signs of contamination, corrosion, cracks, strand breakage, and wear. The staff also noted that based on the applicant's program description for the "scope of program" and "parameters monitored or inspected" program elements:

(1) the signs of contamination and wear on high-voltage insulators will be evidence of loss of material and reduced insulation resistance of high-voltage insulators;

(2) the signs of corrosion, cracks, and wear on switchyard bus and connections will be evidence of increased resistance of connection and loss of material of switchyard bus and connections; and

(3) the signs of corrosion, broken strands, and wear on transmission conductors and connections will be evidence of loss of conductor strength, increased resistance of connection, and loss of material of transmission conductors and connections.

The staff finds the applicant’s “parameters monitored or inspected” program element, as revised by response to RAI 3.6, as supplemented (ML25002A050 and ML25069A508), to be adequate because parameters monitored or inspected (contamination, corrosion, cracks, broken strands, and wear) should detect the presence and extent of aging effects (loss of material, reduced insulation resistance, increased resistance of conductors, loss of conductor strength) prior to loss of component intended function. The staff also conducted an audit to verify the applicant’s conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, as revised, and the applicant’s response to RAI 3.6, the staff determined that the “parameters monitored or inspected” program element satisfies the criteria defined in SRP-LR Section A.1.2.3.3 and, therefore, is acceptable.

Detection of Aging Effects

The NRC staff reviewed the applicant’s “detection of aging effects” program element against the criteria in SRP-LR Section A.1.2.3.4. The staff noted that the applicant’s visual inspections of switchyard bus and transmission conductors and infrared thermography inspections of connections are based on industry OE and the frequency of inspections are based on the plant-specific OE. The staff also noted that the applicant will review the inspection results to evaluate degraded conditions for high-voltage insulators, switchyard bus and connections, and transmission conductors and connections. Additionally, there will be multiple inspection data during the 20-year period of extended operation to detect aging effects before a loss of component intended function since experience has shown that aging degradation of components included in this AMP is a slow process. The staff finds the applicant’s “detection of aging effects” program element to be adequate because the applicant’s program will evaluate inspection data for degradation to detect aging effects before a loss of component intended function. The staff also conducted an audit to verify the applicant’s conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, the staff determined that the “detection of aging effects” program element satisfies the criteria defined in SRP-LR Section A.1.2.3.4 and, therefore, is acceptable.

Monitoring and Trending

The NRC staff reviewed the applicant’s “monitoring and trending” program element against the criteria in SRP-LR Section A.1.2.3.5. The staff noted that the monitoring of high-voltage insulators, transmission conductors and connections, and switchyard bus and connections for degraded conditions will aid in establishing rates of degradation to ensure corrective actions prior to loss of intended function. The staff also noted that the trending of inspection results will provide a basis for timely corrective action prior to loss of intended function. The staff finds the applicant’s “monitoring and trending” program element to be adequate because the applicant’s monitoring and trending activities should provide a prediction of the extent of degradation and thus enable timely corrective or mitigative actions. The staff also conducted an audit to verify the applicant’s conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, the staff determined that the “monitoring and trending” program element satisfies the criteria defined in SRP-LR Section A.1.2.3.5 and, therefore, is acceptable.

Acceptance Criteria

The NRC staff reviewed the applicant’s “acceptance criteria” program element against the criteria in SRP-LR Section A.1.2.3.6. The staff noted that the acceptance criteria for thermography inspections, which will be based on temperature rise above a reference temperature (ambient temperature or baseline temperature), will ensure that the intended functions of the components are maintained consistent with CLB design conditions during the period of extended operation. The staff also noted that the acceptance criteria for visual inspections, which is a lack of any visual indication of aging mechanisms and effects on the components, provides an indication that the intended functions of the components will be maintained consistent with CLB design conditions during the period of extended operation. The staff finds the applicant's "acceptance criteria" program element to be adequate because the acceptance criteria for thermography and visual inspections will ensure that the intended functions of the components will be maintained consistent with CLB design conditions during the period of extended operation. The staff also conducted an audit to verify the applicant's conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, the staff determined that the "acceptance criteria" program element satisfies the criteria defined in SRP-LR Section A.1.2.3.6 and, therefore, is acceptable.

Corrective Actions

The NRC staff reviewed the applicant's "corrective actions" program element against the criteria in SRP-LR Section A.1.2.3.7. The staff noted that early identification of degradation conditions will allow timely corrective actions prior to loss of function. According to the applicant, the corrective actions will be performed in accordance with plant procedures and may include, but are not limited to, increased inspection/hot wash frequency, replacement, or repair. The staff noted that the applicant's engineering evaluation will consider the extent of condition, potential causes, the probability of recurrence, and the corrective actions required. The staff finds the applicant's "corrective actions" program element to be adequate because the corrective actions and corresponding engineering evaluation should promptly identify and correct conditions adverse to quality. The staff also conducted an audit to verify the applicant's conformance with SRP-LR Appendix A.1.2.3. Based on its audit and its review of the LRA, the staff determined that the "corrective actions" program element satisfies the criteria defined in SRP-LR Section A.1.2.3.7 and, therefore, is acceptable.

Operating Experience

LRA section B.2.3.42 summarizes OE related to the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed OE information in the LRA and during the audit against the acceptance criteria in SRP-LR Section A.1.2.3.10. As discussed in the Audit Report (ML24311A123), the staff conducted an independent search of the plant OE information to determine whether any previously unknown or recurring aging effects were identified. The staff did not identify any OE indicating that the applicant should modify its proposed program beyond that incorporated. Based on its audit and its review of the LRA, the staff finds that the conditions and OE at the plant are bounded by those for which the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program was evaluated.

UFSAR Supplement

LRA section A.2.2.42 provides the UFSAR supplement for the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed this UFSAR supplement description of the program against the recommended description for this type of program as described in SRP-LR Table 3.0-1. The staff noted that this description is not consistent with the staff guidance and is based on plant-specific OE; therefore, the current licensing basis should include additional detail. Accordingly, the UFSAR supplement for the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program is consistent, as modified by responses to RAI 3.6, as supplemented (ML25002A050 and ML25065A252), with the corresponding program description in SRP-LR Table 3.0-1 and includes appropriate details associated with plant-specific OE.

The NRC staff also noted that the applicant committed to continue the existing Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators AMP, including enhancements required by November 2, 2024, and by August 26, 2025, for DCPP Units 1 and 2, respectively, to:

- Identify transmission and substation components required to support station blackout recovery which are in the scope of LR aging management. In the 230 kV switchyard, these are the components between the startup transformers and disconnects 217 and 219. In the 500 kV switchyard, these are the components between the main transformers and switchyard breakers 532/632 (associated with DCPP Unit 1) and 542/642 (associated with DCPP Unit 2).
- Include gathering and reviewing completed maintenance and inspection results, by the plant staff, to identify adverse trends.
- Require that an engineering evaluation will be conducted when a degraded condition is detected that considers the extent of the condition, reportability of the event, potential causes, probably of recurrence, and the corrective actions.

Therefore, the staff finds that the information in the UFSAR supplement, as revised, is an adequate summary description of the program.

Conclusion

Based on its review of the applicant’s Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program, the NRC staff concludes that the applicant has demonstrated that the applicable aging effects 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).

3.0.4 QA Program Attributes Integral to Aging Management Programs

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

1. *Corrective Actions* – Corrective actions, including root cause determination and prevention of recurrence, should be timely.
2. *Confirmation Process* – Confirmation process should ensure that corrective actions have been completed and are effective.
3. *Administrative Controls* – Administrative controls should provide a formal review and approval process.

The SRP-LR, 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 quality assurance requirements of 10 CFR Part 50, Appendix B. Additionally, 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”) for nonsafety-related SCs subject to an AMR. 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 period of extended operation.
>
> For nonsafety-related SCs that are subject to an AMR for license renewal, an applicant has the option to expand the scope of its 10 CFR Part 50 Appendix B program to include these SCs and to address corrective actions, the confirmation process, and administrative controls for aging management during the 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, the confirmation process, and administrative controls for managing aging of nonsafety-related SCs that are subject to an AMR for license renewal, 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 the Application

LRA Appendix A, “Updated Final Safety Analysis Report Supplement,” Section A.1.3, “Quality Assurance Program and Administrative Controls,” and LRA 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 that are applied to the AMPs for both safety-related and nonsafety-related SCs.

LRA Appendix A, Section A.1.3, states:

> The DCPP QA Program implements the requirements of 10 CFR [Part] 50, Appendix B, and will be consistent with the summary in Appendix A.2, “Quality Assurance for Aging Management Programs (Branch Technical Position IQMB-1),” of NUREG-1800. The QA Program includes the elements of corrective action, confirmation process, and administrative controls, and is applicable to safety-related SSCs. DCPP will enhance the QA Program to include nonsafety-related SSCs that are subject to AMR for LR.

LRA Appendix B, Section B.1.3, states, in part:

> The DCPP QA Program implements the requirements of 10 CFR [Part]50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants,” and is consistent with the summary provided in Appendix A.2 of NUREG-1800 and Appendix, “Quality Assurance for Aging Management Programs,” of NUREG-1801. The DCPP QA Program includes the elements of corrective action, such as the confirmation process, and administrative controls, and is applicable to safety-related and nonsafety-related SSCs that are subject to aging management activities.

3.0.4.2 Staff Evaluation

The NRC staff reviewed LRA Appendix A, Section A.1.3, and Appendix B, Section B.1.3, which describe how the applicant's existing QA program includes the QA-related elements (i.e., corrective action, confirmation process, and administrative controls) for AMPs, consistent with the staff's guidance described in BTP IQMB-1. During its audit (ML24311A123), the staff also reviewed a sample of the applicant's AMP basis documents and verified that the AMPs implement the corrective action program, confirmation process, and administrative controls as described in the LRA. Based on its audit and its review of the LRA, the staff determined that the quality attributes presented in the AMP basis documents and the associated AMPs are consistent with the staff's position regarding QA for aging management.

3.0.4.3 Conclusion

On the basis of the NRC staff's review of LRA Appendix A, Section A.1.3, and LRA Appendix B, Section B.1.3, and its audit, the staff finds that the QA attributes presented in the AMP basis documents and the associated AMPs are consistent with SRP-LR, BTP RLSB-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 CLB for the 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

LRA Appendix A, Section A.1.4, "Operating Experience Program," and LRA Appendix B, Section B.1.4, "Operating Experience Program," describe the consideration of OE for AMPs. LRA Sections A.1.4 and B.1.4 state that the applicant does a systematic review of plant-specific and industry OE concerning aging management and age-related degradation to ensure that the LR AMPs will be effective in managing the aging effects for which they are credited. The LRA states that OE for the programs credited with managing the effects of aging is reviewed to identify corrective actions that may result in program enhancements.

The LRA states that as an initial LR application, the LRA was prepared based on the guidance in the GALL-LR Report. However, the NRC staff noted that the LRA provides a description in LRA Sections A.1.4 and B.1.4 of the review and dispositioning of plant-specific and industry OE that is consistent with guidance contained NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (the SRP-SLR), Appendix A.4, "Operating Experience for Aging Management Programs." Accordingly, the staff's evaluation references the SRP-SLR, Appendix A.4, as appropriate, to provide context for the staff's review and the basis for the staff's conclusions.

3.0.5.2 Staff Evaluation

3.0.5.2.1 Overview

In accordance with 10 CFR 54.21(a)(3), an LR applicant is required to demonstrate that the effects of aging on SCs subject to an AMR will be adequately managed so that their intended function(s) will be maintained in a way that is consistent with the CLB for the period of extended operation.

The SRP-SLR, Appendix A.4, 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 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 AMP's implementation schedule.

3.0.5.2.2 Consideration of Future Operating Experience

The NRC staff reviewed LRA Sections A.1.4 and B.1.4 to determine how the applicant would consider future OE to ensure that the AMPs are effective. The staff evaluated the applicant's OE review activities, as described in the LRA. SE Sections 3.0.5.2.3 and 3.0.5.2.4 contain the staff's evaluations with respect to LRA Sections A.1.4 and B.1.4.

3.0.5.2.3 Acceptability of Existing Programs

SRP-SLR Section A.4.2, "Position," describes existing programs generally acceptable to the NRC staff for the capture, processing, and evaluation of OE concerning age-related degradation and aging management during the term of a renewed operating license. The acceptable programs are those relied on to meet the requirements of Appendix B to 10 CFR Part 50 and Item I.C.5, "Procedures for Feedback of Operating Experience to Plant Staff," in NUREG-0737, "Clarification of TMI Action Plan Requirements," dated 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 (SEEIN) program endorsed in Generic Letter 82-04, "Use of INPO SEEIN Program," dated March 9, 1982).

LRA Sections A.1.4 and B.1.4 state that the applicant uses its OE program to systematically capture and review OE from plant-specific and industry sources. The applicant stated that the OE program meets the requirements of NUREG-0737. The applicant further stated that the OE program interfaces and relies on active participation in the INPO OE program. Based on this information, the NRC staff determined 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

Application of Existing Programs and Procedures to the Processing of Operating Experience Related to Aging

SRP-SLR Section A.4.2 states that the programs and procedures relied upon to meet the requirements of Appendix B to 10 CFR Part 50 and NUREG-0737, Item I.C.5, should not preclude the consideration of OE on age-related degradation and aging management.

LRA Sections A.1.4 and B.1.4 state that OE from plant-specific and industry sources are systematically captured and reviewed on an ongoing basis in accordance with the QA program, which is consistent with Appendix B to 10 CFR Part 50, and the OE program, which is consistent with NUREG-0737, Item I.C.5. LRA Section B.1.4 states that the ongoing evaluation of OE includes a review of corrective actions, which may result in program enhancements. Section B.1.4 further states that trending reports, program health reports, assessments, and corrective action program items were reviewed to determine whether aging effects have been identified on applicable components.

Based on this information, the NRC staff determined that the processes implemented under the QA program, the corrective action program, and the OE program 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 under Appendix B to 10 CFR Part 50 to include nonsafety-related SCs.

LRA Appendix A, Section A.1.3, and LRA Appendix B, Section B.1.3, state that the applicant's QA program includes nonsafety-related SCs, which the NRC staff finds consistent with the guidance in SRP-SLR Section A.2 and, therefore, consistent with SRP-SLR Section A.4.2 as well. SE Section 3.0.4 documents the staff's evaluation of LRA Sections A.1.3 and B.1.3 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.

LRA Sections A.1.4 and B.1.4 state that the sources of external OE include the INPO OE program, GALL-LR Report and GALL-SLR Report revisions, and other NRC review and guidance documentation.

The NRC staff finds that the applicant will consider an appropriate breadth of industry OE for impacts to its aging management activities, which includes sources that the staff considers to be the primary sources of external OE information. Based on the staff's review and the consistency of consideration of guidance documents as industry OE with the guidance in SRP-SLR, Section A.4.2, the staff finds it 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 to aging management activities.

LRA Sections A.1.4 and 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 the 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. The NRC staff finds that the applicant's OE review processes will include screening all new OE to identify and evaluate items that have the potential to impact the aging management activities. Based on the staff's review and the consistency of screening of incoming OE with the guidance in SRP-SLR, Section A.4.2, the staff finds it acceptable.

Identification of Operating Experience Related to Aging

SRP-SLR Section A.4.2 states that coding should be used within the plant corrective action 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.

LRA Sections A.1.4 and B.1.4 state that the corrective action program identifies either plant-specific OE related to aging or industry OE related to aging, and LRA Section B.1.4 discusses the tracking and trending of this information.

Based on the NRC staff's review and the consistency of the identification of OE related to aging with the guidance in SRP-SLR, Section A.4.2, the staff finds it 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 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 action 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.

LRA Sections A.1.4 and 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 NRC staff determined that the applicant's evaluations of age-related OE include the assessment of appropriate information to determine potential impacts to the aging management activities. The staff also determined that the applicant's OE program, in conjunction with the corrective action 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 use of the OE program and corrective action program to ensure that the effects of aging are adequately managed is 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's corrective action 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.

LRA Section B.1.4 states that internal OE includes event investigations, trending reports, and lessons learned from in-house events as captured in program health reports, program assessments, and in the 10 CFR Part 50, Appendix B corrective action program. In addition, LRA Section B.1.4 states that AMPs are either 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. LRA Section B.1.4 states that the OE program also meets the requirements of NEI 14-12 for periodic program assessments and that AMP and OE assessments would be performed on a periodic basis.

Based on the NRC staff's review and the consistency of the applicant's treatment of AMP implementation results as OE with the guidance in SRP-SLR, Section A.4.2, the staff finds it 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 that 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.

LRA Sections A.1.4 and B.1.4 state that the OE program provides for training to those responsible for activities including screening, evaluating, and communicating OE items related to aging management and aging-related degradation.

Based on the NRC staff's review and the consistency of the scope of personnel included in the applicant's training program with the guidance in SRP-SLR, Section 4.2, the staff finds it acceptable.

Reporting Operating Experience to the Industry

SRP-SLR Section A.4.2 states that guidelines should be established for reporting plant-specific OE on age-related degradation and aging management to the industry.

Based on the NRC staff's review and the consistency of the applicant's reporting OE to the industry with the guidance in SRP-SLR, Section 4.2, the staff finds it 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 renewed license.

LRA Sections A.1.4 and B.1.4 state that the applicant's self-assessment process provides for periodic evaluation of the effectiveness of this OE program. LRA Sections A.1.4 and B.1.4 state that the OE program will be implemented on an ongoing basis throughout the terms of the renewed licenses. LRA Section A.1.4 provides the UFSAR supplement summary description of the applicant's enhanced programmatic activities for ongoing review of the OE. Upon issuance of renewed licenses in accordance with 10 CFR 54.3(c), this summary description will be incorporated into the CLB and, at that time, the applicant will be obligated to conduct its OE review activities accordingly.

The NRC staff finds the implementation schedule acceptable because the applicant will implement the OE review activities on an ongoing basis throughout the term of the renewed operating licenses.

3.0.5.2.5 Conclusion

Based on its review of the LRA, the NRC staff determined that the applicant's programmatic activities for the ongoing review of OE are acceptable for:

- the systematic review of plant-specific and industry OE to ensure that the LR AMPs are, and will continue to be, effective in managing the aging effects for which they are credited; and
- the enhancement of AMPs or 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 the staff's review and the consistency of the applicant's OE review activities with the guidance in SRP-SLR, Section 4.2, 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 for the facility must contain a summary description of the programs and activities for managing the effects of aging for the period of extended operation. LRA Section A.1.4 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 NRC staff determined that the content of the applicant's summary description is consistent with the example and also 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 NRC 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 function(s) will remain 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 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

LRA Section 3.1 provides AMR results for those components the applicant identified in LRA Section 2.3.1, "Reactor Vessel, Internals, and Reactor Coolant System," as being subject to an AMR. LRA Table 3.1-1, "Summary of Aging Management Evaluation for the RPV, Internals, Reactor Coolant System," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-LR Report for the reactor coolant system components and component groups.

3.1.2 Staff Evaluation

SE Table 3.1-1, below, summarizes the NRC staff's evaluation of the component groups listed in LRA Section 3.1 and addressed in the GALL-LR Report.

Table 3.1-1 Staff Evaluation for Reactor Vessel, Internals, and Reactor Coolant System Components in the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.1-1, 001	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 002	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 003	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 004	Not applicable to DCPP (see SE Section 3.1.2.2.1)
3.1-1, 005	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 006	Not applicable to pressurized-water reactors (PWRs) (see SE Section 3.1.2.2.1)
3.1-1, 007	Not applicable to PWRs (see SE Section 3.1.2.2.1)
3.1-1, 008	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 009	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 010	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.1)
3.1-1, 011	Not applicable to PWRs (see SE Section 3.1.2.2.1)
3.1-1, 012	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.2.1 and 3.1.2.2.2.2)
3.1-1, 013	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.3.1)
3.1-1, 014	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.3.2)
3.1-1, 015	Not applicable to DCPP (see SE Section 3.1.2.2.3.3)
3.1-1, 016	Not applicable to PWRs (see SE Section 3.1.2.2.4.1)
3.1-1, 017	Not applicable to PWRs (see SE Section 3.1.2.2.4.2)
3.1-1, 018	Not applicable to DCPP (see SE Section 3.1.2.2.5)
3.1-1, 019	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.6.1)
3.1-1, 020	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.6.2)
3.1-1, 021	Not applicable to PWRs (see SE Section 3.1.2.2.7)
3.1-1, 022	Not applicable to DCPP (see SE Section 3.1.2.2.8)
3.1-1, 023	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 024	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 025	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.11.1 and 3.1.2.2.11.2)
3.1-1, 026	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 027	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 028	Not Used (addressed by 3.1-1, 055c) (see SE Section 3.1.2.2.9)
3.1-1, 029	Not applicable to PWRs (see SE Section 3.1.2.2.12)
3.1-1, 030	Not applicable to PWRs
3.1-1, 031	Not applicable to PWRs
3.1-1, 032	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 033	Consistent with the GALL-LR Report
3.1-1, 034	Not applicable to DCPP
3.1-1, 035	Consistent with the GALL-LR Report
3.1-1, 036	Consistent with the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.1-1, 037	Consistent with the GALL-LR Report
3.1-1, 038	Consistent with the GALL-LR Report
3.1-1, 039	Consistent with the GALL-LR Report
3.1-1, 040	Consistent with the GALL-LR Report
3.1-1, 040a	Consistent with the GALL-LR Report
3.1-1, 041	Not applicable to PWRs (see SE Section 3.1.2.2.12)
3.1-1, 042	Consistent with the GALL-LR Report
3.1-1, 043	Not applicable to PWRs
3.1-1, 044	Not applicable to DCPP
3.1-1, 045	Consistent with the GALL-LR Report
3.1-1, 046	Consistent with the GALL-LR Report
3.1-1, 047	Consistent with the GALL-LR Report
3.1-1, 048	Consistent with the GALL-LR Report
3.1-1, 049	Consistent with the GALL-LR Report
3.1-1, 050	Consistent with the GALL-LR Report
3.1-1, 051a	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 051b	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 052a	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 052b	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 052c	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 053a	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 053b	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 053c	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 054	Consistent with the GALL-LR Report
3.1-1, 055a	Not applicable to DCPP
3.1-1, 055b	Not applicable to DCPP
3.1-1, 055c	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 056a	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 056b	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 056c	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 058a	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 058b	Not applicable to DCPP (see SE Section 3.1.2.2.9)
3.1-1, 059a	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 059b	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 059c	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 060	Not applicable to PWRs
3.1-1, 061	Consistent with the GALL-LR Report
3.1-1, 062	Consistent with the GALL-LR Report
3.1-1, 063	Not applicable to PWRs
3.1-1, 064	Consistent with the GALL-LR Report
3.1-1, 065	Not applicable to DCPP
3.1-1, 066	Consistent with the GALL-LR Report
3.1-1, 067	Consistent with the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.1-1, 068	Not applicable to DCPP
3.1-1, 069	Consistent with the GALL-LR Report
3.1-1, 070	Consistent with the GALL-LR Report
3.1-1, 071	Consistent with the GALL-LR Report
3.1-1, 072	Consistent with the GALL-LR Report
3.1-1, 073	Not applicable to DCPP
3.1-1, 074	Consistent with the GALL-LR Report
3.1-1, 075	Not applicable to DCPP
3.1-1, 076	Not Used (addressed by 3.1-1, 071)
3.1-1, 077	Consistent with the GALL-LR Report
3.1-1, 078	Consistent with the GALL-LR Report
3.1-1, 079	Not applicable to PWRs
3.1-1, 080	Not applicable to DCPP
3.1-1, 081	Consistent with the GALL-LR Report
3.1-1, 082	Not Used (addressed by 3.1-1, 081)
3.1-1, 083	Consistent with the GALL-LR Report
3.1-1, 084	Not applicable to PWRs
3.1-1, 085	Not applicable to PWRs
3.1-1, 086	Not Used (addressed by 3.1-1, 025)
3.1-1, 087	Consistent with the GALL-LR Report
3.1-1, 088	Consistent with the GALL-LR Report
3.1-1, 089	Consistent with the GALL-LR Report
3.1-1, 090	Not applicable to DCPP
3.1-1, 091	Not applicable to PWRs
3.1-1, 092	Consistent with the GALL-LR Report
3.1-1, 093	Not applicable to DCPP
3.1-1, 094	Not applicable to PWRs
3.1-1, 095	Not applicable to PWRs
3.1-1, 096	Not applicable to PWRs
3.1-1, 097	Not applicable to PWRs
3.1-1, 098	Not applicable to PWRs
3.1-1, 099	Not applicable to PWRs
3.1-1, 100	Not applicable to PWRs
3.1-1, 101	Not applicable to PWRs
3.1-1, 102	Not applicable to PWRs
3.1-1, 103	Not applicable to PWRs
3.1-1, 104	Not applicable to PWRs
3.1-1, 105	Not applicable to DCPP
3.1-1, 106	Consistent with the GALL-LR Report
3.1-1, 107	Consistent with the GALL-LR Report
3.1-1, 108	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 109	This item number is not used in the SRP-LR or the GALL-LR Report
3.1-1, 110	Not applicable to PWRs

Component Group (SRP-LR Item No.)	Staff Evaluation
3.1-1, 114	Consistent with the GALL-LR Report
3.1-1, 118	Not Used (addressed by 3.1-1, 028, 3.1-1, 053a, 3.1-1, 053b, and 3.1-1, 053c)
3.1-1, 119	Consistent with the GALL-LR Report (see SE Section 3.1.2.2.9)
3.1-1, 127a	Consistent with the GALL-LR 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 3.1.2.1 discusses AMR results for components that the applicant stated are either not applicable to DCPP or are consistent with the GALL-LR Report. Section 3.1.2.1.1 summarizes the staff's review of items that are not applicable or not used and documents any RAIs issued and the staff's conclusions.
2. SE Section 3.1.2.2 discusses AMR results for which the GALL-LR Report and SRP-LR 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-LR Report. These AMR results typically are identified by generic notes F through J and plant-specific notes in the LRA.

3.1.2.1 Aging Management Review Results Consistent with the GALL-LR Report

This subsection documents the NRC staff's review of AMR results listed in LRA Tables 3.1.2-1 through 3.1.2-5 that the applicant determined to be consistent with the GALL-LR Report. The staff audited and reviewed the information in the LRA. The staff did not repeat its review of the matters described in the GALL-LR Report (including exceptions to the GALL-LR Report); however, the staff did verify that the material presented in the LRA was applicable and that the applicant identified the appropriate GALL-LR Report for AMRs. For those AMR items that the staff found to be consistent with the GALL-LR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions, as documented in the GALL-LR Report, are considered to be the basis for the acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-LR Report" is documented in SE Table 3.1-1, and no separate writeup is required or provided. The staff did not identify any of these AMR items that required additional review with an associated writeup. Additionally, SE Section 3.1.2.1.1 documents the staff's review of AMR items that the applicant determined to be not applicable or not used.

3.1.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

For LRA Table 3.1-1, items 3.1-1, 004; 3.1-1, 015; 3.1-1, 018; 3.1-1, 022; 3.1-1, 034; 3.1-1, 044; 3.1-1, 051a; 3.1-1, 051b; 3.1-1, 052a; 3.1-1, 052b; 3.1-1, 052c; 3.1-1, 055a; 3.1-1, 055b; 3.1-1, 056a; 3.1-1, 056b; 3.1-1, 056c; 3.1-1, 058a; 3.1-1, 058b; 3.1-1, 065; 3.1-1, 068; 3.1-1, 073; 3.1-1, 075; 3.1-1, 080; 3.1-1, 090; 3.1-1, 093; and 3.1-1, 105, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable to DCPP. The NRC staff reviewed the LRA, the description of the material and the environment associated with each AMR item, and the associated AMP and plant-specific documents and finds the applicant's claim acceptable.

For LRA Table 3.1-1, items 3.1-1, 006; 3.1-1, 007; 3.1-1, 011; 3.1-1, 016; 3.1-1, 017; 3.1-1, 021; 3.1-1, 029 through 3.1-1, 031; 3.1-1, 041; 3.1-1, 043; 3.1-1, 060; 3.1-1, 063; 3.1-1, 079;

3.1-1, 084; 3.1-1, 085; 3.1-1, 091; 3.1-1, 094 through 3.1-1, 104; and 3.1-1, 110, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable because the associated items are applicable only to boiling-water reactors (BWRs). The NRC staff reviewed the SRP-LR, confirmed that these items apply only to BWRs, and finds that these items are not applicable to DCPP because it is a PWR.

For the following LRA Table 3.1-1 items, the applicant claims that the corresponding items in the GALL-LR Report are not used and are addressed by other LRA Table 1 AMR items: 3.1-1, 028 (addressed by 3.1-1, 055c), 3.1-1, 076 (addressed by 3.1-1, 071), 3.1-1, 082 (addressed by 3.1-1, 081), 3.1-1, 086 (addressed by 3.1-1, 025), and 3.1-1, 118 (addressed by 3.1-1, 028; 3.1-1, 053a; 3.1-1, 053b; and 3.1-1, 053c). The NRC staff reviewed the LRA and confirmed that the aging effects for each of these items will be addressed by other LRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate items acceptable.

3.1.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-LR Report

In LRA Section 3.1.2.2, the applicant further evaluates aging management for certain reactor vessel internals and reactor coolant system components, as recommended by the GALL-LR Report, and the applicant also 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 in SRP-LR Section 3.1.2.2. The following subsections document the staff's review.

3.1.2.2.1 Cumulative Fatigue Damage

LRA Section 3.1.2.2.1 is associated with LRA Table 3.1-1, Items 001, 002, 003, 005, 008, 009, and 010. This section indicates that the time-limited aging analysis (TLAA) on cumulative fatigue damage in reactor coolant system components is evaluated in accordance with 10 CFR 54.21(c)(1) and is further addressed in LRA Section 4.3. This is consistent with SRP-LR Section 3.1.2.2.1 and is, therefore, acceptable. The NRC staff's evaluation of the fatigue TLAAs for reactor coolant system components is documented in SE Section 4.3.

The applicant also determined that LRA Table 3.1-1, Item 004 for reactor vessel support skirts is not applicable to DCPP Units 1 and 2 because the reactor vessel is supported by reactor vessel nozzles and there is no reactor vessel support skirt. LRA Section 2.3.1.5 also states that the reactor vessel is nozzle-supported. The NRC staff evaluated the applicant's determination in accordance with SRP-LR Section 3.1.2.2.1 and finds it acceptable because there is no reactor vessel support skirt at DCPP Units 1 and 2 and, accordingly, LRA Table 3.1-1, Item 004 is not applicable to DCPP Units 1 and 2.

In addition, the NRC staff confirmed that LRA Table 3.1-1, Items 006, 007, and 011 are appliable only to BWRs and, therefore, are not applicable to DCPP Units 1 and 2, which are PWRs.

3.1.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

<u>Items 1 and 2</u>. LRA Section 3.1.2.2.2, items 1 and 2, are associated with LRA Table 3.1.1, AMR item 3.1-1, 012, which addresses loss of material due to general, pitting, and crevice corrosion of steam generator (SG) upper and lower shells, transition cone, and new transition cone closure welds for Westinghouse Model 44 and 51 SGs exposed to secondary feedwater or

steam. The SRP-LR recommends an augmented inspection to manage these aging effects. In addition, for applicants that have replaced the bottom part of their recirculating SGs, the SRP-LR recommends volumetric examinations. The applicant stated that these items are not applicable because both DCPP units are Westinghouse Model Delta 54. The applicant also stated that it will manage loss of material for the SG shell exposed to secondary water with the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program (B2.1.1) and the Water Chemistry program (B2.1.2).

The NRC staff's evaluations of the applicant's ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program and Water Chemistry program are documented in SE Sections 3.0.3.2.2 and 3.0.3.1.2, respectively. In its review of components associated with item 3.1-1, 012, the staff finds that the applicant has addressed the further evaluation criteria and that the applicant's proposal to manage the effects of aging using these programs is acceptable because:

- The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program includes techniques to confirm that the integrity of the SG shell is adequately maintained by detecting and monitoring potential flaws.
- The Water Chemistry program monitors and controls the secondary water chemistry conditions to minimize environmental effects on aging degradation in these components.
- The use of these programs is consistent with the guidance in the GALL-LR Report.
- The augmented inspections recommended in the SRP-LR are not applicable to the DCPP SGs.

Based on the programs identified, the NRC staff determined that the applicant's programs meet the criteria of SRP-LR Section 3.1.2.2.2, item 1. For those AMR items associated with LRA Section 3.1.2.2.2, items 1 and 2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

Item 1. LRA Section 3.1.2.2.3, item 1 states that evaluation of loss of fracture toughness due to neutron irradiation embrittlement is a TLAA as defined in 10 CFR 54.3 and TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1). Furthermore, as discussed in item 3.1-1, 013, LRA Section 4.2 describes the disposition of this TLAA. The NRC staff finds that this is consistent with SRP-LR Section 3.1.2.2.3, item 1, and is, therefore, acceptable. The staff's evaluation of the TLAA for loss of fracture toughness due to neutron irradiation embrittlement is documented in SE Section 4.2.

Item 2. LRA Section 3.1.2.2.3, item 2, associated with LRA Table 3.1-1, item 3.1-1, 014, states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel shells and reactor vessel embrittlement TLAA beltline and extended beltline materials as discussed in LRA Section 4.2. The applicant explained that its Reactor Vessel Surveillance program manages reduction in fracture toughness due to neutron irradiation embrittlement of reactor vessel beltline and extended beltline materials. The NRC staff's evaluation of the Reactor Vessel Surveillance program is documented in SE Section 3.0.3.2.13. The staff finds the applicant's use of its Reactor Vessel Surveillance program is acceptable because it is consistent with AMR item IV.A2.RP-229 in the GALL-LR Report.

Based on the AMP identified, the NRC staff determined that the applicant meets the criteria of SRP-LR Section 3.1.2.2.3, item 2, that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Item 3</u>. LRA Section 3.1.2.2.3, item 3, associated with LRA Table 3.1-1, AMR item 3.1-1, 015, addresses reduction in fracture toughness for Babcock and Wilcox reactor internals exposed to a reactor coolant with neutron flux environment. The applicant stated that AMR item 3.1-1, 015 is not applicable to DCPP.

Section 1.4.2 of the DCPP UFSAR indicates that the nuclear steam supply system (NSSS) was designed and furnished by the Westinghouse Electric Corporation and consists of a Westinghouse PWR and supporting auxiliary systems. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.1.2.2.3, item 3, and finds it acceptable because DCPP includes reactor vessel internal components that were designed with a Westinghouse NSSS.

3.1.2.2.4 Cracking Due to Stress Corrosion Cracking and Intergranular Stress Corrosion Cracking

<u>Item 1</u>. LRA Section 3.1.2.2.4, item 1, associated with LRA Table 3.1-1, AMR item 3.1-1, 016, addresses cracking due to stress corrosion cracking (SCC) and IGSCC in the BWR top head enclosure vessel flange leak detection lines made of stainless steel and nickel alloy and exposed to the reactor coolant leakage environment. The applicant stated that this item is not applicable to DCPP, as it applies to BWRs only. The NRC staff reviewed the applicant's claim against the criteria in SRP-LR Section 3.1.2.2.4, item 1, and finds it acceptable because this item corresponds to SRP-LR Table 3.1-1, AMR item 16, which applies only to BWRs, and DCPP Units 1 and 2 are PWRs.

<u>Item 2</u>. LRA Section 3.1.2.2.4, item 2, associated with LRA Table 3.1-1, item 3.1-1, 017, addresses cracking due to SCC and IGSCC for stainless steel BWR isolation condenser components exposed to reactor coolant. The applicant stated that this item is not applicable to DCPP, as it applies to BWRs only. Section 1.4.2 of the DCPP UFSAR indicates that the NSSS was designed and furnished by the Westinghouse Electric Corporation and consists of a Westinghouse PWR and supporting auxiliary systems. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.1.2.2.4, item 2, and finds it acceptable because this item applies only to BWRs and the DCPP Units 1 and 2 are PWRs and do not have BWR isolation condenser components.

3.1.2.2.5 Crack Growth Due to Cyclic Loading

LRA Section 3.1.2.2.5 addresses crack growth of underclad flaws in reactor pressure vessel forgings due to cyclic loading as a potential aging effect that may be managed through a TLAA, consistent with the SRP-LR. However, the applicant concludes that crack growth due to cyclic loading of a reactor vessel shell fabricated of SA508-CL2 forgings clad with stainless steel using a high-heat input welding process is not a TLAA as defined in 10 CFR 54.3.

SE Section 4.7.3 documents the NRC staff's evaluation of the applicant's basis for not including a crack growth due to cyclic loading TLAA evaluation. The staff agrees with the applicant's conclusion that reactor vessel underclad cracking is not a TLAA for DCPP LR because the applicant does not rely on an analysis as part of its CLB and, therefore, the crack growth analysis does not conform to the criteria of 10 CFR 54.3.

3.1.2.2.6 Cracking Due to Stress Corrosion Cracking

Item 1. LRA Section 3.1.2.2.6, item 1, associated with LRA Table 3.1-1, item 3.1-1, 019, addresses the management of SCC in PWR stainless steel reactor vessel bottom mounted instrument (BMI) guide tubes exposed to a reactor coolant environment.

SRP-LR recommends an evaluation of a plant-specific program to manage the aging effects. The LRA states that SCC for the stainless steel BMI guide tubes will be managed by two programs: (1) Water Chemistry (B.2.3.2) and (2) ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.3.1). The applicant stated that the Water Chemistry program provides controls to minimize contaminants which may lead to SCC, and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program uses VT-2 inspections which can identify degradation of the BMIs.

Based on the AMPs identified, the NRC staff determined that the applicant’s programs meet the SRP-LR Section 3.1.2.2.6, item 1 criteria. Specifically, the Water Chemistry program can mitigate the effects of SCC by reducing contaminants that can lead to SCC, while the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is capable of performing condition monitoring of the stainless steel BMIs. Therefore, for those AMR items associated with LRA Section 3.1.2.2.6 item 1, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 2. LRA Section 3.1.2.2.6, item 2 associated with LRA Table 3.1-1, AMR item 3.1-1, 020 addresses cracking due to SCC for the ASME Code Class 1 reactor coolant system cast austenitic stainless steel piping as well as piping components exposed to the reactor coolant, which will be managed by the Water Chemistry and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD programs.

The NRC staff reviewed the applicant’s proposal against the criteria in SRP-LR Section 3.1.2.2.6, item 2. In its review of components associated with AMR item 3.1-1, 020, the NRC staff finds that the applicant has met the further evaluation criteria, and determined that its proposal is acceptable because:

- The monitoring and controlling of coolant chemistry minimize the concentrations of detrimental contaminants that can cause and facilitate SCC in the cast austenitic stainless steel; and
- The periodic inservice inspections provide reasonable assurance that any potential SCC in the cast austenitic stainless steel, if it were to occur, would be detected prior to its loss of intended function.

Therefore, the staff finds that this aging effect is adequately managed.

Based on the programs identified, the NRC staff determined that the applicant’s programs meet the SRP-LR Section 3.1.2.2.6, item 2 criteria. Therefore, for those AMR items associated with LRA Section 3.1.2.2.6, item 2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.2.2.7 Cracking Due to Cyclic Loading

LRA Section 3.1.2.2.7, associated with LRA Table 3.1-1, AMR item 3.1-1, 021, addresses cracking due to cyclic loading for steel and stainless steel BWR isolation condenser components exposed to reactor coolant. The applicant stated that this item is not applicable to DCPP. Section 1.4.2 of the DCPP UFSAR indicates that the NSSS was designed and furnished by the Westinghouse Electric Corporation and consists of a Westinghouse PWR and supporting auxiliary systems. The NRC staff evaluated the applicant’s claim against the criteria in SRP-LR Section 3.1.2.2.7 and finds it acceptable because DCPP Units 1 and 2 are PWRs and, thus, do not have BWR isolation condenser components.

3.1.2.2.8 Loss of Material Due to Erosion

LRA Section 3.1.2.2.8, associated with LRA Table 3.1-1, AMR Item 3.1-1, 022, addresses loss of material due to erosion in steel SG feedwater impingement plates and supports exposed to secondary feedwater. The GALL-LR Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed. The applicant stated that this item is not applicable because the DCPP SGs do not have feedwater impingement plates and supports. The NRC staff evaluated the applicant’s claim against the criteria in SRP-LR Section 3.1.2.2.8 and finds it acceptable because the further evaluation applies only to SG impingement plates, and the DCPP SGs do not have these components.

3.1.2.2.9 Aging Management of Pressurized-Water Reactor Vessel Internals

LRA Section 3.1.2.2.9 addresses further evaluation of Section 3.1.2.2.9 of the SRP-LR. LR-ISG-2011-04 removed several further evaluations including 3.1.2.2.9 and SLR-ISG-2021-01-PWRVI supersedes previous guidance in its entirety and notes that further evaluation 3.1.2.2.9 is applicable to subsequent license renewal periods only. Although the applicant notes, accordingly, that further evaluation 3.1.2.2.9 is not applicable to the DCPP LRA, the applicant provides that:

- Cracking (SCC/IASCC) of items 3.1-1, 053a, 053b, 053c, and 118 will be managed by the DCPP PWR Vessel Internals AMP (B.2.3.7) and the DCPP Water Chemistry AMP (B.2.3.2) for reactor vessel internals components other than those in the “no additional measures” MRP-227, Revision 1-A categorization.
- Loss of fracture toughness, changes in dimensions, loss of preload, and loss of material for pertinent reactor vessel internals components under items 3.1-1, 059a, 059b, 059c, and 119 will be managed by the DCPP PWR Vessel Internals AMP (B.2.3.7).
- The flux thimble tubes will be managed by the DCPP Flux Thimble Tube Inspection AMP (B.2.3.23), as discussed in item 3.1-1, 054. Control rod guide tube support (split) pins are categorized as “no additional measures” components and will be managed by the DCPP PWR Vessel Internals AMP (B.2.3.7), as discussed in item 3.1-1, 055c.
- For those AMR items associated with LRA Section 3.1.2.2.9, the NRC staff concludes that the LRA is consistent with the GALL-SLR Report, as updated by SLR-ISG-2021-01-PWRVI, and the SRP-LR. The staff further 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.2.2.10 Loss of Material Due to Wear

Applicable to subsequent license renewal periods only. See the discussion of further evaluation 3.1.2.2.9 above.

3.1.2.2.11 Cracking Due to Primary Water Stress Corrosion Cracking

LRA Table 3.1-1, AMR item 3.1-1, 025 addresses cracking due to primary water stress corrosion cracking (PWSCC) for steel (with nickel-alloy cladding) or nickel-alloy SG primary-side components—divider plate and tube-to-tube sheet welds exposed to reactor coolant. LRA Section 3.1.2.2.11, associated with LRA Table 3.1-1, AMR item 3.1-1, 025, addresses cracking for nickel-alloy material exposed to reactor coolant, which will be managed by the Steam Generators and Water Chemistry programs. Aging management for these components is listed in Table 3.1.2-4, as supplemented by letter dated October 14, 2024. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.1.2.2.11, Items 1 and 2.

Item 1. The applicant stated that the DCPP SGs have divider plate assemblies fabricated from Alloy 690 plate materials and Alloy 690-type weld materials and that a plant-specific AMP is not necessary based on the use of these materials. The SRP-LR, as modified by LR-ISG-2016-01, states that a plant-specific AMP is not needed for plants with divider plate assemblies fabricated of Alloy 690 and Alloy 690-type weld materials, in which case PWSCC of the divider plate assemblies can be managed with the Steam Generators and Water Chemistry programs. Accordingly, the NRC staff finds that the applicant has met the further evaluation criteria for DCPP because a plant-specific AMP is not necessary and managing PWSCC of the SG divider plate assemblies with the Water Chemistry and Steam Generators programs is consistent with the SRP-LR, as modified by LR-ISG-2016-01.

Based on the programs identified, the NRC staff determined that the applicant's programs meet the criteria for item 1 in SRP-LR Section 3.1.2.2.11, as modified by LR-ISG-2016-01. For the AMR item associated with LRA Section 3.1.2.2.11, item 1, the staff concludes that the LRA is consistent with the GALL-LR Report, as modified by LR-ISG-2016-01, 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 2. The applicant stated that the DCPP SGs have thermally treated Alloy 690 tubes and tube-to-tubesheet welds and that a plant-specific AMP is not necessary based on the use of these materials. The SRP-LR, as modified by LR-ISG-2016-01, states that a plant-specific AMP is not needed for plants with Alloy 690 tubes and Alloy 690-type tubesheet cladding, in which case PWSCC of the tube-to-tubesheet welds can be managed with the Water Chemistry program. Accordingly, the NRC staff finds that the applicant has met the further evaluation criteria for DCPP because a plant-specific AMP is not necessary if the tubes and tube-to-tubesheet welds are Alloy 690 material. Furthermore, managing PWSCC of the SG tube-to-tubesheet welds with the Water Chemistry program is consistent with the SRP-LR, as modified by LR-ISG-2016.

Based on the program identified, the NRC staff determined that the applicant's program meets the criteria for item 2 in SRP-LR Section 3.1.2.2.11, as modified by LR-ISG-2016-01. For the AMR item associated with LRA Section 3.1.2.2.11, item 2, the staff concludes that the LRA is consistent with the GALL-LR Report, as modified by LR-ISG-2016-01, 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.2.2.12 Cracking due to Fatigue

Removed as a result of LR-ISG-2011-04.

3.1.2.2.13 Cracking due to Stress Corrosion Cracking and Fatigue

Removed as a result of LR-ISG-2011-04.

3.1.2.2.14 Loss of Material due to Wear

Removed as a result of LR-ISG-2011-04.

3.1.2.2.15 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.

3.1.2.2.16 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.1.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-LR Report

The following subsections document the NRC staff's review of those AMR results listed in LRA Tables 3.1.2-1 through 3.1.2-5 that are either not consistent with, or not addressed in, the GALL-LR Report and that 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 SRP-LR Table 1 item, the subsections are organized by applicable AMR sections and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-LR Report, the NRC 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 period of extended operation. The following sections document the staff's evaluation.

3.1.2.3.1 Steam Generators – Summary of Aging Management Evaluation

<u>Nickel-Alloy Steam Generator Tubes Exposed Externally to Treated Water</u>. LRA Table 3.1.2-4 states that reduction of heat transfer for nickel-alloy SG tubes exposed to an external environment of secondary water will be managed by the Steam Generators and Water Chemistry programs. The AMR items cite generic note H, for which the applicant has identified reduction of heat transfer as an additional aging effect. The AMR items cite plant-specific

note 2, which states that although the reduction of heat transfer due to fouling is not in the GALL-LR Report for this component, material, and environment combination, it is included as item IV.D1.R-407 in the GALL-SLR Report, with the Steam Generators and Water Chemistry AMPs identified for managing the aging effect. The NRC staff reviewed the associated items in the LRA and considered whether the aging effects proposed by the applicant constitute all of the applicable aging effects for this component, material, and environment description. In addition to reduction of heat transfer, the staff noted that the applicant addressed cracking and loss of material for this component, material, and environment combination in other AMR items.

The NRC staff finds the applicant's proposal to manage reduction of heat transfer acceptable because, consistent with GALL-SLR Report item IV.D1.R-407, this aging effect can be effectively managed with the Steam Generators and Water Chemistry programs.

3.1.2.3.2 Reactor Vessel – Summary of Aging Management Evaluation – Reactor Vessel Control Rod Drive Mechanism

Stainless Steel Thermal Sleeves Exposed to Reactor Coolant. LRA Table 3.1.2-5 states that the stainless steel control rod drive mechanism (CRDM) thermal sleeves exposed to reactor coolant will be managed for loss of material by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.3.1) program. The AMR items cite generic note H. The items associated with the CRDM thermal sleeves cite plant-specific note 3, which states that based on the OE reflected in the GALL-SLR Report (IV.A2.R-414) and NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR) (ML17188A158) (3.1-1, 117), loss of material due to wear can occur in the stainless steel thermal sleeves of CRDM head penetration nozzles due to the interaction between the penetration nozzles and the thermal sleeves.

The NRC staff noted that this combination of aging effect, material, and environment is not identified in GALL-LR Report. However, as cited by the applicant, the GALL-SLR Report provides guidance to address the component and aging effect. The applicant addressed this combination of aging effect, loss of material for this component, material, and environment in AMR Table 3.1.2-5, plant-specific note 3.

The NRC staff's evaluation of the applicant's ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.3.1) program is documented in SE Section 3.0.3.2.2. The staff finds the applicant's proposal to manage aging using the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program acceptable, because industry has adopted inspection procedures to monitor for the loss of material for these components during inservice inspections. Therefore, for these AMR items associated with LRA Table 3.1.2-5 related to stainless steel CRDM thermal sleeves, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2 Aging Management of Engineered Safety Features (ESF)

3.2.1 Summary of Technical Information in the Application

LRA Section 3.2 provides AMR results for those components that the applicant identified in LRA Section 2.3.2, "Engineered Safety Features," as being subject to an AMR. LRA Table 3.2-1, "Summary of Aging Management Evaluations for the ESF," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-LR Report for the ESF components and component groups.

3.2.2 Staff Evaluation

SE Table 3.2-1, below, summarizes the NRC staff's evaluation of the component groups listed in LRA Section 3.2 and addressed in the GALL-LR Report.

Table 3.2-1. Staff Evaluation for Engineered Safety Features Components in the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.2-1, 001	Consistent with the GALL-LR Report (see SE Section 3.2.2.2.1)
3.2-1, 002	Not applicable to DCPP (see SE Section 3.2.2.2.2)
3.2-1, 003	Not applicable to DCPP (see SE Section 3.2.2.2.3.1)
3.2-1, 004	Not applicable to DCPP (see SE Section 3.2.2.2.3.2)
3.2-1, 005	Not applicable to DCPP (see SE Section 3.2.2.2.4)
3.2-1, 006	Not applicable to PWRs (see SE Section 3.2.2.2.5)
3.2-1, 007	Not applicable to DCPP (see SE Section 3.2.2.2.6)
3.2-1, 008	Not applicable to DCPP
3.2-1, 009	Consistent with the GALL-LR Report
3.2-1, 010	Not applicable to DCPP
3.2-1, 011	Not applicable to PWRs
3.2-1, 012	Not applicable to DCPP
3.2-1, 013	Not Used (addressed by 3.3-1, 012 and 3.3-1, 078)
3.2-1, 014	Not Used (addressed by 3.2-1, 013)
3.2-1, 015	Consistent with the GALL-LR Report
3.2-1, 016	Consistent with the GALL-LR Report
3.2-1, 017	Not applicable to PWRs
3.2-1, 018	Consistent with the GALL-LR Report
3.2-1, 019	Consistent with the GALL-LR Report
3.2-1, 020	Consistent with the GALL-LR Report (see SE Section 3.2.2.1.2)
3.2-1, 021	Consistent with the GALL-LR Report (see SE Section 3.2.2.1.1)
3.2-1, 022	Consistent with the GALL-LR Report
3.2-1, 023	Not applicable to DCPP
3.2-1, 024	Not Used (addressed by 3.3-1, 134)
3.2-1, 025	Not applicable to DCPP
3.2-1, 026	Not applicable to PWRs
3.2-1, 027	Not applicable to DCPP
3.2-1, 028	Consistent with the GALL-LR Report
3.2-1, 029	Consistent with the GALL-LR Report
3.2-1, 030	Consistent with the GALL-LR Report
3.2-1, 031	Consistent with the GALL-LR Report
3.2-1, 032	Consistent with the GALL-LR Report
3.2-1, 033	Consistent with the GALL-LR Report
3.2-1, 034	Consistent with the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.2-1, 035	Not applicable to DCPP
3.2-1, 036	Not applicable to DCPP
3.2-1, 037	Not applicable to DCPP
3.2-1, 038	Not applicable to PWRs
3.2-1, 039	Not Used (addressed by 3.2-1, 040)
3.2-1, 040	Consistent with the GALL-LR Report
3.2-1, 041	Not applicable to DCPP
3.2-1, 042	Not applicable to DCPP
3.2-1, 043	Not applicable to PWRs
3.2-1, 044	Consistent with the GALL-LR Report
3.2-1, 045	Not Used (addressed by 3.2-1, 044)
3.2-1, 046	Not applicable to PWRs
3.2-1, 047	Not applicable to DCPP
3.2-1, 048	Consistent with the GALL-LR Report
3.2-1, 049	Consistent with the GALL-LR Report
3.2-1, 050	Consistent with the GALL-LR Report
3.2-1, 051	Consistent with the GALL-LR Report
3.2-1, 052	Not applicable to DCPP
3.2-1, 053	Not Used (addressed by 3.2-1, 063)
3.2-1, 053.5	Not applicable to DCPP
3.2-1, 054	Not applicable to PWRs
3.2-1, 055	Not applicable to DCPP
3.2-1, 056	Consistent with the GALL-LR Report
3.2-1, 057	Consistent with the GALL-LR Report
3.2-1, 058	Not applicable to DCPP
3.2-1, 059	Consistent with the GALL-LR Report
3.2-1, 060	Consistent with the GALL-LR Report
3.2-1, 061	Not Used (addressed by 3.2-1, 062)
3.2-1, 062	Consistent with the GALL-LR Report
3.2-1, 063	Consistent with the GALL-LR Report
3.2-1, 064	Consistent with the GALL-LR Report
3.2-1, 065	Consistent with the GALL-LR Report
3.2-1, 066	Not applicable to DCPP (see SE Section 3.2.2.2.9)
3.2-1, 067	Not applicable to DCPP
3.2-1, 068	Consistent with the GALL-LR Report
3.2-1, 069	Not Used (addressed by 3.3-1, 132)
3.2-1, 070	Consistent with the GALL-LR Report
3.2-1, 071	Not Used (addressed by 3.3-1, 132)
3.2-1, 072	Consistent with the GALL-LR Report
3.2-1, 073	Consistent with the GALL-LR Report
3.2-1, 074	Not applicable to DCPP

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 stated are either not applicable to DCPP or are consistent with the GALL-LR Report. Section 3.2.2.1.1 summarizes the staff's review of items that are not applicable or not used and documents any RAIs issued and the staff's conclusions. The remaining subsections in SE Section 3.2.2.1 document the staff's review of components that required additional information or otherwise required explanation.
2. SE Section 3.2.2.2 discusses AMR results for which the GALL-LR Report and SRP-LR 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-LR Report. These AMR results typically are identified by generic notes F through J and plant-specific notes in the LRA.

3.2.2.1 Aging Management Review Results Consistent with the GALL-LR Report

This subsection documents the NRC staff's review of AMR results listed in LRA Tables 3.2.2-1 through 3.2.2-4 that the applicant determined to be consistent with the GALL-LR Report. The staff audited and reviewed the information in the LRA. The staff did not repeat its review of the matters described in the GALL-LR Report (including exceptions to the GALL-LR Report); however, the staff did verify that the material presented in the LRA was applicable and that the applicant identified the appropriate GALL-LR Report AMRs. For those AMR items that the staff found to be consistent with the GALL-LR Report and for which no additional evaluation or RAI applies, the staff's review and conclusions, as documented in the GALL-LR Report, are considered to be the basis for the acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-LR Report" is documented in SE Table 3.2-1, and no separate writeup is required or provided. SE Section 3.2.2.1.1 documents the staff's review of AMR items that the applicant determined to be not applicable or not used. For the AMR items that required additional evaluation (such as responses to RAIs), the staff's evaluation is documented in SE Section 3.2.2.1.2.

3.2.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

For LRA Table 3.2-1, items 3.2-1, 002; 3.2-1, 003; 3.2-1, 005; 3.2-1, 007; 3.2-1, 008; 3.2-1, 010; 3.2-1, 012; 3.2-1, 023; 3.2-1, 025; 3.2-1, 027; 3.2-1, 035; 3.2-1, 036; 3.2-1, 037; 3.2-1, 041; 3.2-1, 042; 3.2-1, 047; 3.2-1, 052; 3.2-1, 053.5; 3.2-1, 055; 3.2-1, 058; 3.2-1, 066; 3.2-1, 067; and 3.2-1, 074, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable to DCPP. The NRC staff reviewed the LRA, the description of the material and the environment associated with each AMR item, and the associated AMP and plant-specific documents and finds the applicant's claim acceptable.

For LRA Table 3.2-1, items 3.2-1, 006; 3.2-1, 011; 3.2-1, 017; 3.2-1, 026; 3.2-1, 038; 3.2-1, 043; 3.2-1, 046; and 3.2-1, 054, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable because the associated items are applicable only to BWRs. The NRC staff reviewed the SRP-LR, confirmed that these items apply only to BWRs, and finds that these items are not applicable to DCPP because it is a PWR.

For the following LRA Table 3.2-1 items, the applicant claims that the corresponding items in the GALL-LR Report are not used and are addressed by other LRA Table 1 AMR items: 3.2 1, 013 (addressed by 3.3-1, 012 and 3.3-1, 078); 3.2-1, 014 (addressed by 3.2-1, 013); 3.2-1, 024 (addressed by 3.3-1, 134); 3.2-1, 039 (addressed by 3.2-1, 040); 3.2-1, 045 (addressed by 3.2-1, 044); 3.2-1, 053 (addressed by 3.2-1, 063); 3.2-1, 061 (addressed by 3.2-1, 062); 3.2-1, 069 (addressed by 3.3-1, 132); and 3.2-1, 071 (addressed by 3.3-1, 132). The NRC staff reviewed the LRA and confirmed that the aging effects for each of these items will be addressed by other LRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate items acceptable.

The applicant claims that item 3.2-1, 021 is not applicable because the DCPP safety injection accumulators are maintained at containment ambient conditions (i.e., <140°F). The NRC staff reviewed the LRA and the UFSAR and was unable to verify the applicant's claim of non-applicability. Therefore, the staff submitted an audit question requesting clarification. By letter dated October 14, 2024 (ML24289A118), the applicant revised Table 3.2-1, item 3.2-1, 021 to state that cracking is an AERM for the DCPP safety injection accumulators at temperatures above 140°F, and revised Table 3.2.2-5 to include cracking as an AERM for the safety injection accumulators. The staff finds the applicant's revisions to item 3.2-1, 021 and Table 3.2.2-5 acceptable because the revisions address the aging effect of accumulators at temperatures exceeding 140°F.

3.2.2.1.2 Cracking Due to Stress Corrosion Cracking

LRA Table 3.2-1, AMR item 3.2-1, 020 addresses cracking due to SCC in the stainless steel piping, piping components, piping elements, and tanks exposed to treated water (borated) >60°C (>140°F). For the LRA Table 2 AMR items that cite generic note E and plant-specific note 1, the LRA credits the One Time Inspection of ASME Code Class 1 Small-Bore Piping program to manage the aging effect for the Class 1 piping and piping components < 4 inches exposed internally to treated borated water >60°C (>140 °F).

Based on its review of components associated with AMR items 3.2-1, 020 for which the applicant cited generic note E and plant-specific note 1, the NRC staff finds the applicant's proposal to manage the effects of aging using the One Time Inspection of ASME Code Class 1 Small-Bore Piping program acceptable because:

- The program includes a demonstrated volumetric examination capable of detecting SCC or opportunistic destructive examination that is conducted on locations susceptible to SCC.
- The proposed examinations provide reasonable assurance that any potential SCC in the components is detected prior to its loss of intended function and that this aging effect is adequately managed.

3.2.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-LR Report

In LRA Section 3.2.2.2, the applicant further evaluates aging management for certain ESF components, as recommended by the GALL-LR 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 in SRP-LR Section 3.2.2.2. The following subsections document the staff's review.

3.2.2.2.1 Cumulative Fatigue Damage

LRA Section 3.2.2.2.1, associated with LRA Table 3.2-1, item 001, indicates that the TLAA on cumulative fatigue damage in ESF components is evaluated in accordance with 10 CFR 54.21(c)(1) and is addressed in LRA Section 4.3. This is consistent with SRP-LR Section 3.2.2.2.1 and is, therefore, acceptable. The NRC staff's evaluation of the fatigue TLAAs for ESF components is documented in SE Section 4.3.

3.2.2.2.2 Loss of Material Due to Cladding Breach

LRA Section 3.2.2.2.2, associated with LRA Table 3.2-1, item 3.2-1, 002, addresses loss of material due to cladding breach for steel pump casings with stainless steel cladding exposed to treated borated water. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.2 and finds it acceptable because there are no steel pump casings with stainless steel cladding exposed to treated borated water in ESF systems at DCPP.

3.2.2.2.3 Loss of Material Due to Pitting and Crevice Corrosion

Item 1. LRA Section 3.2.2.2.3, item 1, associated with LRA Table 3.2-1, item 3.2-1, 003, addresses loss of material due to pitting and crevice corrosion in partially encased stainless steel tanks exposed to raw water due to cracking of the perimeter seal from weathering. The applicant stated there are no partially encased stainless steel tanks with breached moisture barriers exposed to raw water in the ESF systems at DCPP. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.3, item 1, and finds it acceptable because based on a review of the LRA and UFSAR, the ESF systems do not include partially encased stainless steel tanks exposed to this environment at DCPP.

Item 2. LRA Section 3.2.2.2.3, item 2, as supplemented by letter dated March 6, 2025 (ML25069A508), associated with LRA Table 3.2-1, item 3.2-1, 004, addresses loss of material due to pitting and crevice corrosion for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air. The applicant stated that this item is not applicable because there are no stainless steel components of this type exposed to atmosphere/weather in the ESF systems at DCPP. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.3, item 2, and finds it acceptable because based on a review of the LRA and UFSAR, there are no in-scope stainless steel components in the ESF systems exposed to atmosphere/weather at DCPP.

3.2.2.2.4 Loss of Material Due to Erosion

LRA Section 3.2.2.2.4, associated with LRA Table 3.2-1, item 3.2-1, 005, addresses loss of material due to erosion for stainless steel minimum flow orifices exposed to treated borated water in the high-pressure centrifugal safety injection pumps. The applicant stated that this item is not applicable because the high-pressure safety injection pumps are no longer used for normal system charging, and the associated licensee event report (LER 50-275/94-023 (ML16343A366)), which relates to DCPP, has been closed and no longer applies. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.4 and finds it acceptable because, based on the corrective actions to prevent recurrence in the licensee's event report, the applicant's use of the positive displacement pumps as the primary supply for normal charging minimizes erosion of the high-pressure safety injection pump minimum flow orifices and eliminates the need to manage the associated loss of material.

3.2.2.2.5 Loss of Material Due to General Corrosion and Fouling that Leads to Corrosion

LRA Section 3.2.2.2.5, associated with LRA Table 3.2-1, item 3.2-1, 006, addresses loss of material due to general corrosion and fouling for steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces exposed to indoor air. The applicant stated that this item is not applicable and applies to BWRs only. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.5 and finds it acceptable because based on its review of the SRP-LR, this item is associated only with BWRs and DCPP is a PWR.

3.2.2.2.6 Cracking Due to Stress Corrosion Cracking

LRA Section 3.2.2.2.6, as supplemented by letter dated October 14, 2024 (ML24289A116), associated with LRA Table 3.2-1, item 3.2-1, 007, addresses cracking due to SCC for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air. The applicant stated that there are no stainless steel components of this type exposed to atmosphere/weather in the ESF systems. The applicant further stated that the applicability of this AMR item is limited to stainless steel siding, doors, and support instruments exposed to atmosphere/weather, and structural bolting exposed to atmosphere/weather and plant indoor air in Containments, Structures, and Component Supports. For the ESF systems, the NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.6 and finds it acceptable because based on a review of the LRA and UFSAR, there are no in-scope stainless steel components exposed to atmosphere/weather in the ESF systems at DCPP.

For the LRA Table 2 AMR items that cite generic note E for Containments, Structures, and Component Supports, the LRA credits the Structures Monitoring program to manage the aging effect for stainless steel siding, doors, and support instruments exposed to atmosphere/weather, and for stainless steel structural bolting exposed to atmosphere/weather and plant indoor air. Based on its review of components associated with AMR item 3.2-1, 007 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the Structures Monitoring program acceptable because this program applies to siding, doors, support instruments, and structural bolting, and the proposed periodic inspections are capable of detecting cracking.

Based on the program identified, the NRC staff determined that the applicant's program meets the SRP-LR Section 3.2.2.2.6 criteria. For those AMR items associated with LRA Section 3.2.2.2.6, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2.2.2.7 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.

3.2.2.2.8 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.2.2.2.9 Loss of Material Due to Recurring Internal Corrosion

LRA Section 3.2.2.2.9, associated with LRA Table 3.2-1, item 3.2-1, 066, addresses recurring internal corrosion for metallic piping, piping components, and tanks exposed to raw water or wastewater. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.2.2.2.9. The applicant stated that its review of OE documentation did not find any instances that met the criteria of recurring internal corrosion in the ESF systems. Based on this review, the applicant stated that item 3.2-1, 066 was not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.2.2.2.9 and finds it acceptable because the staff also did not identify any examples of recurring internal corrosion in ESF systems during its review of the applicant's OE information.

3.2.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-LR Report

The following subsections document the NRC staff's review of those AMR results listed in LRA Tables 3.2.2-1 through 3.2.2-4 that are either not consistent with, or not addressed in, the GALL-LR Report and that 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 SRP-LR Table 1 item, the subsections are organized by applicable AMR sections and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-LR Report, the NRC 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 period of extended operation. The following sections document the staff's evaluation.

3.2.2.3.1 Containment Spray System – Summary of Aging Management Evaluation

<u>Stainless Steel Piping, Piping Components, Valve Bodies, Tubing, and Tanks Exposed Internally to Sodium Hydroxide</u>. LRA Table 3.2.2-2 states that loss of material will be managed by the Water Chemistry and One-Time Inspection programs. There is no associated AMR item in the GALL-LR Report, and the applicant cites generic note G. Plant-specific note 1 states that there are no AMR items in the GALL-LR Report for stainless steel components in a sodium hydroxide environment and that the use of stainless steel up to 200°F and 50 weight-percent sodium hydroxide is common in industrial applications with no special consideration for aging. The sodium hydroxide concentration is controlled by the Water Chemistry program, which is augmented by the One-Time Inspection program. The NRC staff reviewed the associated items in the LRA 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 review of ASM Handbook, Volume 13C, "Corrosion: Environments and Industries," which states that all stainless steels are resistant to general corrosion by all concentrations of caustic soda up to about 150°F, the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination. The staff finds the applicant's proposal to manage the effects of aging acceptable because the material and environment combinations addressed here are appropriate, based on review of the ASM Handbook, Volume 13C.

3.2.2.3.2 Residual Heat Removal System – Summary of Aging Management Evaluation

Nickel-Alloy Piping and Piping Components Exposed Internally to Treated Borated Water. LRA Table 3.2.2-3 states that loss of material will be managed by the Water Chemistry and One-Time Inspection programs, and that wall thinning will be managed by the Flow-Accelerated Corrosion program. There is no associated AMR item in the GALL-LR Report, and the applicant cites generic note G. Plant-specific note 1 states that there are no AMR items in the GALL-LR Report for nickel-alloy components in a treated borated water environment and, as noted in LR-ISG-2012-01, a material that is completely erosion resistant is not available and it is therefore appropriate to manage wall thinning in the associated components. The NRC staff reviewed this item and noted that the GALL-SLR Report does address loss of material in nickel-alloy components exposed to treated borated water and recommends using the Water Chemistry and One-Time Inspection programs. Accordingly, the staff finds the applicant's proposal consistent with the GALL-SLR Report and LR-ISG-2012-01 and, therefore, acceptable.

3.2.2.3.3 Containment HVAC System – Summary of Aging Management Evaluation

Copper Alloy Valve Bodies and Heat Exchanger Tubes Exposed to Plant Indoor Air and Ventilation Atmosphere. LRA Tables 3.2.2-4, 3.3.2-10, and 3.3.2-14 state that loss of material and reduction of heat transfer for copper alloy valve bodies and heat exchanger tubes exposed to plant indoor air and ventilation atmosphere will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The applicant applied generic note H, for which the applicant has identified loss of material and reduction of heat transfer as additional aging effects. However, the NRC staff notes that loss of material for copper alloy components in indoor air environments are addressed in AMR items (e.g., V.F.EP-10), showing that there are no aging effects requiring management. Consequently, the staff considers managing loss of material for these items using the above AMP to be conservative because the aging effect is not expected for these components, for this material and environment combination. For reduction of heat transfer, the staff finds the applicant's proposal acceptable, because the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program involves performing inspections to determine the presence or extent of degradation, which can foul heat transfer surfaces.

3.3 Aging Management of Auxiliary Systems

3.3.1 Summary of Technical Information in the Application

LRA Section 3.3 provides AMR results for those components that the applicant identified in LRA Section 2.3.3, "Auxiliary Systems," as being subject to an AMR. LRA Table 3.3-1, "Summary of Aging Management Evaluations for Auxiliary Systems," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-LR Report for the auxiliary systems components and component groups.

3.3.2 Staff Evaluation

SE Table 3.3-1, below, summarizes the NRC staff's evaluation of the component groups listed in LRA Section 3.3 and addressed in the GALL-LR Report.

Table 3.3-1 Staff Evaluation for Auxiliary Systems Components in the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.3-1, 001	Consistent with the GALL-LR Report (see SE Section 3.3.2.2.1)
3.3-1, 002	Consistent with the GALL-LR Report (see SE Section 3.3.2.2.1)
3.3-1, 003	Consistent with the GALL-LR Report (see SE Section 3.3.2.2.2)
3.3-1, 004	Consistent with the GALL-LR Report (see SE Section 3.3.2.2.3)
3.3-1, 005	Not applicable to DCPP (see SE Section 3.3.2.2.4)
3.3-1, 006	Consistent with the GALL-LR Report (see SE Section 3.3.2.2.5)
3.3-1, 007	Not Used (addressed by 3.3-1, 018)
3.3-1, 008	Not Used (addressed by 3.3-1, 020)
3.3-1, 009	Consistent with the GALL-LR Report
3.3-1, 010	Not applicable to DCPP
3.3-1, 011	Not applicable to DCPP
3.3-1, 012	Consistent with the GALL-LR Report
3.3-1, 013	Not Used (addressed by 3.3-1, 012)
3.3-1, 014	Consistent with the GALL-LR Report
3.3-1, 015	Consistent with the GALL-LR Report
3.3-1, 016	Not applicable to PWRs
3.3-1, 017	Consistent with the GALL-LR Report
3.3-1, 018	Consistent with the GALL-LR Report
3.3-1, 019	Not Used (addressed by 3.3-1, 020)
3.3-1, 020	Consistent with the GALL-LR Report
3.3-1, 021	Not applicable to PWRs
3.3-1, 022	Not applicable to PWRs
3.3-1, 023	Not applicable to DCPP
3.3-1, 024	Not applicable to PWRs
3.3-1, 025	Not applicable to PWRs
3.3-1, 026	Not applicable to DCPP
3.3-1, 027	Not applicable to PWRs
3.3-1, 028	Not Used (addressed by 3.3-1, 124)
3.3-1, 029	Not Used (addressed by 3.3-1, 125)
3.3-1, 030	Not applicable to DCPP
3.3-1, 030.5	Not applicable to DCPP
3.3-1, 031	Not applicable to DCPP
3.3-1, 032	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.2)
3.3-1, 032a	Consistent with the GALL-LR Report
3.3-1, 033	Not applicable to DCPP
3.3-1, 034	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.2)
3.3-1, 035	Not Used (addressed by 3.3-1, 036 and 3.3-1, 064)
3.3-1, 036	Consistent with the GALL-LR Report
3.3-1, 037	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.2)
3.3-1, 038	Consistent with the GALL-LR Report
3.3-1, 039	Not Used (addressed by 3.3-1, 040)
3.3-1, 040	Consistent with the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.3-1, 041	Not Used (addressed by 3.3-1, 040)
3.3-1, 042	Consistent with the GALL-LR Report
3.3-1, 043	Not Used (addressed by 3.3-1, 023)
3.3-1, 044	Consistent with the GALL-LR Report
3.3-1, 045	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.3)
3.3-1, 046	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.3)
3.3-1, 047	Not applicable to PWRs
3.3-1, 048	Consistent with the GALL-LR Report
3.3-1, 049	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.3)
3.3-1, 050	Consistent with the GALL-LR Report
3.3-1, 051	Not applicable to DCPP
3.3-1, 052	Consistent with the GALL-LR Report
3.3-1, 053	Consistent with the GALL-LR Report
3.3-1, 054	Not Used (addressed by 3.3-1, 079 and 3.3-1, 089)
3.3-1, 055	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.4)
3.3-1, 056	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.5)
3.3-1, 057	Consistent with the GALL-LR Report
3.3-1, 058	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.6)
3.3-1, 059	Consistent with the GALL-LR Report
3.3-1, 060	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.7)
3.3-1, 061	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.7)
3.3-1, 062	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.7)
3.3-1, 063	Consistent with the GALL-LR Report
3.3-1, 064	Consistent with the GALL-LR Report
3.3-1, 065	Not applicable to DCPP
3.3-1, 066	Consistent with the GALL-LR Report
3.3-1, 067	Not applicable to DCPP
3.3-1, 068	Consistent with the GALL-LR Report
3.3-1, 069	Consistent with the GALL-LR Report
3.3-1, 070	Consistent with the GALL-LR Report
3.3-1, 071	Consistent with the GALL-LR Report
3.3-1, 072	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.8)
3.3-1, 073	Not applicable to DCPP
3.3-1, 074	Not applicable to DCPP
3.3-1, 075	Not applicable to DCPP
3.3-1, 076	Consistent with the GALL-LR Report
3.3-1, 077	Not applicable to DCPP
3.3-1, 078	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.9)
3.3-1, 079	Consistent with the GALL-LR Report
3.3-1, 080	Consistent with the GALL-LR Report
3.3-1, 081	Consistent with the GALL-LR Report
3.3-1, 082	Consistent with the GALL-LR Report
3.3-1, 083	Consistent with the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.3-1, 084	This item number is not used in the SRP-LR or the GALL-LR Report
3.3-1, 085	Consistent with the GALL-LR Report
3.3-1, 086	Consistent with the GALL-LR Report
3.3-1, 087	This item number is not used in the SRP-LR or the GALL-LR Report
3.3-1, 088	Consistent with the GALL-LR Report
3.3-1, 089	Consistent with the GALL-LR Report
3.3-1, 090	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.10)
3.3-1, 091	Not applicable to DCPP
3.3-1, 092	Consistent with the GALL-LR Report
3.3-1, 093	Consistent with the GALL-LR Report
3.3-1, 094	Consistent with the GALL-LR Report
3.3-1, 095	Consistent with the GALL-LR Report
3.3-1, 096	Consistent with the GALL-LR Report
3.3-1, 097	Consistent with the GALL-LR Report
3.3-1, 098	Consistent with the GALL-LR Report
3.3-1, 099	Consistent with the GALL-LR Report
3.3-1, 100	Consistent with the GALL-LR Report
3.3-1, 101	Not Used (addressed by 3.4-1, 045)
3.3-1, 102	Not applicable to DCPP
3.3-1, 103	Consistent with the GALL-LR Report
3.3-1, 104	Not applicable to DCPP
3.3-1, 105	Not Used (addressed by 3.3-1, 103)
3.3-1, 106	Consistent with the GALL-LR Report
3.3-1, 107	Consistent with the GALL-LR Report
3.3-1, 108	Not Used (addressed by 3.3-1, 107)
3.3-1, 109	Consistent with the GALL-LR Report
3.3-1, 109x	Consistent with the GALL-LR Report
3.3-1, 110	Not applicable to PWRs
3.3-1, 111	Not Used (addressed by 3.3-1, 120 and 3.5-1, 077)
3.3-1, 112	Consistent with the GALL-LR Report
3.3-1, 113	Consistent with the GALL-LR Report
3.3-1, 114	Consistent with the GALL-LR Report
3.3-1, 115	Not applicable to DCPP
3.3-1, 116	Consistent with the GALL-LR Report
3.3-1, 117	Consistent with the GALL-LR Report
3.3-1, 118	Consistent with the GALL-LR Report
3.3-1, 119	Consistent with the GALL-LR Report
3.3-1, 120	Consistent with the GALL-LR Report
3.3-1, 121	Consistent with the GALL-LR Report
3.3-1, 122	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.11)
3.3-1, 123	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.11)
3.3-1, 124	Consistent with the GALL-LR Report
3.3-1, 125	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.12)

Component Group (SRP-LR Item No.)	Staff Evaluation
3.3-1, 126	Consistent with the GALL-LR Report
3.3-1, 127	Consistent with the GALL-LR Report (see SE Section 3.3.2.2.8)
3.3-1, 128	Consistent with the GALL-LR Report
3.3-1, 129	Not Used (addressed by 3.3-1, 139)
3.3-1, 130	Consistent with the GALL-LR Report
3.3-1, 131	Consistent with the GALL-LR Report
3.3-1, 132	Consistent with the GALL-LR Report
3.3-1, 133	Not applicable to DCPP
3.3-1, 134	Consistent with the GALL-LR Report
3.3-1, 135	Not Used (addressed by 3.3-1, 040)
3.3-1, 136	Consistent with the GALL-LR Report
3.3-1, 137	Not Used (addressed by 3.3-1, 139)
3.3-1, 138	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.13 and 3.3.2.3.14)
3.3-1, 139	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.14)
3.3-1, 140	Not applicable to DCPP

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 stated are either not applicable to DCPP or are consistent with the GALL-LR Report. Section 3.3.2.1.1 summarizes the staff's review of items that are not applicable or not used and documents any RAIs issued and the staff's conclusions. The remaining subsections in SE Section 3.3.2.1 document the review of components that required additional information or otherwise required explanation.
2. SE Section 3.3.2.2 discusses AMR results for which the GALL-LR Report and SRP-LR 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-LR Report. These AMR results typically are identified by generic notes F through J and plant-specific notes in the LRA.

3.3.2.1 Aging Management Review Results Consistent with the GALL-LR Report

This subsection documents the NRC staff's review of AMR results listed in LRA Tables 3.3.2-1 through 3.3.2-25 that the applicant determined to be consistent with the GALL-LR Report. The staff audited and reviewed the information in the LRA. The staff did not repeat its review of the matters described in the GALL-LR Report (including exceptions to the GALL-LR Report); however, the staff did verify that the material presented in the LRA was applicable and that the applicant identified the appropriate GALL-LR Report AMRs. For those AMR items that the staff found to be consistent with the GALL-LR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions, as documented in the GALL-LR Report, are considered to be the basis for the acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-LR Report" is documented in SE Table 3.3-1, and no separate writeup is required or provided. SE Section 3.3.2.1.1 documents the staff's review of AMR items that the applicant determined to be not applicable or not used. For the AMR items that required additional evaluation (such as responses to RAIs), the staff's evaluation is documented in SE Sections 3.3.2.1.2 through 3.3.2.1.15.

3.3.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

For LRA Table 3.3-1, items 3.3-1, 005; 3.3-1, 010; 3.3-1, 011; 3.3-1, 023; 3.3-1, 026; 3.3-1, 030; 3.3-1, 030.5; 3.3-1, 031; 3.3-1, 033; 3.3-1, 051; 3.3-1, 065; 3.3-1, 067; 3.3-1, 073; 3.3-1, 074; 3.3-1, 075; 3.3-1, 077; 3.3-1, 091; 3.3-1, 102; 3.3-1, 104; 3.3-1, 115; 3.3-1, 133; and 3.3-1, 140, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable to DCPP. The NRC staff reviewed the LRA, the description of the material and the environment associated with each AMR item, and the associated AMP and plant-specific documents and finds the applicant's claim acceptable.

For LRA Table 3.3-1, items 3.3-1, 016; 3.3-1, 021; 3.3-1, 022; 3.3-1, 024; 3.3-1, 025; 3.3-1, 027; 3.3-1, 047; and 3.3-1, 110, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable because the associated items are only applicable to BWRs. The NRC staff reviewed the SRP-LR, confirmed that these items only apply to BWRs, and finds that these items are not applicable to DCPP because it is a PWR.

For the following LRA Table 3.3-1 items, the applicant claims that the corresponding items in the GALL-LR Report are not used and are addressed by other LRA Table 1 AMR items: 3.3-1, 007 (addressed by 3.3-1, 018); 3.3-1, 008 (addressed by 3.3-1, 020); 3.3-1, 013 (addressed by 3.3-1, 012); 3.3-1, 019 (addressed by 3.3-1, 020); 3.3-1, 028 (addressed by 3.3-1, 124); 3.3-1, 029 (addressed by 3.3-1, 125); 3.3-1, 035 (addressed by 3.3-1, 036 and 3.3-1, 064); 3.3 1, 039 (addressed by 3.3-1, 040); 3.3-1, 041 (addressed by 3.3-1, 040); 3.3-1, 043 (addressed by 3.3-1, 023); 3.3-1, 054 (addressed by 3.3-1, 079 and 3.3 1, 089); 3.3-1, 101 (addressed by 3.4-1, 045); 3.3-1, 105 (addressed by 3.3-1, 103); 3.3-1, 108 (addressed by 3.3-1, 107); 3.3-1, 111 (addressed by 3.3-1, 120 and 3.5-1, 077); 3.3-1, 129 (addressed by 3.3-1, 139); 3.3-1, 135 (addressed by 3.3-1, 040); and 3.3-1, 137 (addressed by 3.3-1, 139). The NRC staff reviewed the LRA and confirmed that the aging effects for each of these items will be addressed by other LRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate items acceptable.

3.3.2.1.2 Cracking Due to Aggressive Chemical Attack and Leaching and Changes in Material Properties Due to Aggressive Chemical Attack

LRA Table 3.3.1, AMR item 3.3-1, 032 addresses cracking due to aggressive chemical attack and leaching and changes in material properties due to aggressive chemical attack for piping, piping components, and piping elements exposed to raw water. For the LRA Table 2 AMR that cites generic note E, the LRA credits the Fire Water System program to manage the aging effect for piping, piping components, and piping elements. Based on its review of components associated with AMR item 3.3-1, 032 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the Fire Water System program acceptable because the program includes performing routine preventive maintenance, inspections, and testing; operator rounds, performance monitoring, and reliance on the corrective action program; and system improvements to address aging and obsolescence issues.

LRA Table 3.3-1, AMR item 3.3-1, 034 addresses loss of material due to general, pitting, and crevice corrosion for nickel alloy, copper alloy piping, piping components, and piping elements exposed to raw water. For the LRA Table 2 AMR item 3.3-1, 034 that cites generic note E, the

LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for nickel alloy, copper alloy piping, piping components, and piping elements.

Based on its review of components associated with AMR item 3.3-1, 034 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance. Additionally, visual inspections may be augmented by physical manipulation to detect hardening and loss of strength of both internal and external surfaces of elastomers or by sufficient pressurization of the elastomer material to expand the surface in such a way that cracks or crazing is evident. The AMP also includes VT-1 or surface examination of the internal surfaces of stainless steel, aluminum, and copper alloy (i.e., >15% Zn or >8% Al) to detect cracking. Visual inspections for leakage or surface cracks are an acceptable alternative to conducting surface examination to detect cracking if it has been determined that cracks will be detected prior to challenging the structural integrity or intended function of the component.

LRA Table 3.3-1, AMR item 3.3-1, 037 addresses loss of material due to general, pitting, and crevice and microbiologically influenced corrosion and fouling that leads to corrosion for steel piping, piping components, and piping elements exposed to raw water. For LRA Table 2 AMR item 3.3-1, 037 that cites generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for steel piping, piping components, and piping elements.

Based on its review of components associated with AMR item 3.3-1, 037 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance. Additionally, visual inspections may be augmented by physical manipulation to detect hardening and loss of strength of both internal and external surfaces of elastomers or by sufficient pressurization of the elastomer material to expand the surface in such a way that cracks or crazing is evident. The AMP also includes VT-1 or surface examination of the internal surfaces of stainless steel, aluminum, and copper alloy (i.e., >15% Zn or >8% Al) to detect cracking. Visual inspections for leakage or surface cracks are an acceptable alternative to conducting surface examination to detect cracking if it has been determined that cracks will be detected prior to challenging the structural integrity or intended function of the component.

LRA Table 3.4-1, AMR item 3.4-1, 020 addresses loss of material due to pitting, crevice, and microbiologically influenced corrosion for copper alloy, stainless steel piping, piping components, and piping elements exposed to raw water. For the LRA Table 2 AMR item 3.4-1, 020 that cites generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for copper alloy, stainless steel piping, piping components, and piping elements.

Based on its review of components associated with AMR item 3.4-1, 020 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance. Additionally, the components, as stated in the LRA, are no longer in service and are abandoned in place.

3.3.2.1.3 Loss of Material due to General, Pitting, and Crevice Corrosion

LRA Table 3.3-1, AMR item 3.3-1, 045 addresses loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements and tanks exposed to closed-cycle cooling water. For the LRA Table 2 AMR item that cites generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for steel piping, piping components, and piping elements and tanks. Based on its review of components associated with AMR item 3.3-1, 045 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance.

LRA Table 3.3-1, AMR item 3.3-1, 046 addresses loss of material due to general, pitting, and crevice and galvanic corrosion for steel, copper alloy heat exchanger components, piping, piping components, and piping elements and tanks exposed to closed-cycle cooling water. For the LRA Table 2 AMR item that cites generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for steel piping, piping components, and piping elements and tanks. Based on its review of components associated with AMR item 3.3-1, 046 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance.

LRA Table 3.3-1, AMR item 3.3-1, 049 addresses loss of material due to general, pitting, and crevice corrosion for stainless steel, piping, piping components, and piping elements exposed to closed-cycle cooling water. For the LRA Table 2 AMR item that cites generic note E, the LRA credits the Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for stainless steel piping, piping components, and piping elements and tanks. Based on its review of components associated with AMR item 3.3-1, 049 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance.

LRA Table 3.4-1, AMR item 3.4-1, 025 addresses loss of material due to general, pitting, and crevice and galvanic corrosion for steel heat exchanger components exposed to closed-cycle cooling water. For the LRA Table 2 AMR item that cites generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for steel piping, piping components, and piping elements and tanks. Based on its review of components associated with AMR item 3.4-1, 025 for which the applicant cited generic note E, the NRC 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 program includes that visual inspections of internal surfaces of plant components will be performed opportunistically by qualified inspectors during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance. Additionally, the components, as stated in the LRA, are no longer in service and are abandoned-in-place.

3.3.2.1.4 Loss of Material Due to General and Pitting Corrosion

LRA Table 3.3-1, AMR item 3.3-1, 055 addresses loss of material due to general and pitting corrosion for carbon steel and gray cast iron piping, piping components, regulators, and valve bodies exposed internally to plant indoor air. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for carbon steel and gray cast iron piping, piping components, regulators, and valve bodies exposed internally to plant indoor air. The AMR items cite plant-specific note 3, which states that GALL-LR Report Section XI.M24, "Compressed Air Monitoring," applies to the monitoring of the piping and components associated with the air compressors and dryers. Air compressor and dryer piping and components are not in-scope for DCPP. In-scope piping and components are associated with containment penetrations and air/nitrogen gas piping and components for backup operation of valves. Therefore, GALL-LR Report Section XI.M24 is not considered appropriate to DCPP, and alternate aging management programs are specified for the in-scope piping and components.

Based on its review of components associated with AMR items 3.3-1, 055 for which the applicant cited generic note E, the NRC 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 staff notes that there are items in the GALL-LR Report that recommend the use of GALL-LR Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," to manage loss of material for steel piping exposed to condensation. Additionally, the staff notes that the applicant's program includes visual inspections of the internal surfaces of components to manage loss of material by qualified inspectors. These inspections are performed during periodic maintenance activities.

3.3.2.1.5 Loss of Material Due to Pitting and Crevice Corrosion

LRA Table 3.3-1, AMR item 3.3-1, 056 addresses loss of material due to pitting and crevice corrosion for stainless steel piping, piping components, and piping elements exposed internally to plant indoor air. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program to manage the aging effect for stainless steel piping, piping components, and piping elements exposed internally to plant indoor air. The AMR items cite plant-specific note 3, which states that GALL-LR Report Section XI.M24 applies to the monitoring of the piping and components associated with the air compressors and dryers. Air compressor and dryer piping and components are not in-scope for DCPP. In-scope piping and components are associated with containment penetrations and air/nitrogen gas piping and components for backup operation of valves. Therefore GALL-LR Report Section XI.M24 is not considered appropriate to DCPP, and alternate aging management programs are specified for the in-scope piping and components.

Based on its review of components associated with AMR item 3.3-1, 056 for which the applicant cited generic note E, the NRC 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 staff notes that there are items in the GALL-LR Report that recommend the use of GALL-LR Report AMP XI.M38 to manage loss of material for steel piping exposed to internal condensation. Also, the staff notes that the applicant's program includes visual inspections of the internal surfaces of components to manage loss of material by qualified inspectors. These inspections are performed during periodic maintenance activities.

3.3.2.1.6 Loss of Material Due to General, Pitting, and Crevice Corrosion

LRA Table 3.3-1, AMR item 3.3-1, 058, as modified by letter dated October 14, 2024 (ML24289A118), addresses loss of material for carbon steel piping, piping components, and tanks in the carbon dioxide fire suppression system exposed externally to indoor uncontrolled air. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the External Surfaces Monitoring of Mechanical Components program to manage loss of material for the noted components in lieu of the Fire Protection program. Based on its review of components associated with AMR item 3.3-1, 058, which cite generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the alternate program acceptable because periodic visual inspections in accordance with the External Surfaces Monitoring of Mechanical Components program can identify loss of material before a loss of intended function.

3.3.2.1.7 Concrete Cracking, Spalling, and Loss of Material Due to Aggressive Chemical Attack, Reaction with Aggregates, Freeze-Thaw, and Corrosion of Embedded Steel

LRA Table 3.3-1, AMR items 3.3-1, 060, 061, and 062, as modified by letter dated October 14, 2024 (ML24289A118), address cracking, spalling, and loss of material for reinforced concrete structural fire barriers exposed to outdoor and uncontrolled indoor air. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the ASME Section XI, Subsection IWL program to manage the noted aging effects for the concrete structural fire barriers in lieu of the Fire Protection and Structures Monitoring programs. The revised AMR items cite plant-specific note 12, stating that the only fire barrier walls within the containment building are the concrete containment dome and exterior walls, which are inspected through the alternate program. Based on its review of components associated with AMR items 3.3-1, 060, 061, and 062, for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the alternate program acceptable because periodic visual inspections in accordance with the ASME Section XI, Subsection IWL program can identify cracking, spalling, and loss of material before a loss of intended function.

3.3.2.1.8 Loss of Material Due to Selective Leaching

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.3-1, AMR item 3.3-1, 072 addresses loss of material due to selective leaching for gray cast iron and copper alloy (i.e., >15% Zn or >8% Al) piping, piping components, piping elements, and heat exchanger components exposed to treated water, closed-cycle cooling water, soil, raw water, and wastewater. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the plant-specific Periodic Inspections for Selective Leaching program to manage the aging effect for: (1) gray cast iron components exposed to soil, and (2) aluminum-bronze components exposed to raw water. The NRC staff's evaluation with respect to managing loss of material due to selective leaching for these components using the plant-specific Periodic Inspections for Selective Leaching program is documented in SE Section 3.0.3.3.1.

3.3.2.1.9 Loss of Material Due to General Corrosion

LRA Table 3.3-1, item 3.3-1, 078 addresses loss of material due to general corrosion for steel piping components, ducting components, and closure bolting exposed to uncontrolled indoor air, outdoor air, and condensation environments. For the LRA Table 2 items that cite generic note E for this item, the LRA credits the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program to manage the aging effect for cranes, crane rails, and crane trolleys in a "atmosphere/weather" environment. As provided in LRA Table 3.0-1, the cited environment corresponds to the GALL-LR Report's outdoor air and condensation environments.

Based on its review of components associated with item 3.3-1, 078, for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program acceptable because the inspections performed by the cited program for managing loss of material due to general corrosion for steel components will be comparably effective for both uncontrolled indoor air and outdoor air environments.

3.3.2.1.10 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

LRA Table 3.3-1, AMR item 3.3-1, 090 addresses loss of material for steel ducting and components exposed internally to condensation. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Fire Protection program to manage loss of material for carbon steel and galvanized steel dampers exposed internally to ventilation atmosphere in lieu of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. LRA Table 3.0-1 indicates that the ventilation atmosphere environment includes the corresponding GALL-LR Report condensation environment. Based on its review of components associated with AMR item 3.3-1, 090 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the alternate program acceptable because periodic visual inspections in accordance with the Fire Protection program can identify loss of material before a loss of intended function.

3.3.2.1.11 No Aging Effects

LRA Table 3.3-1, AMR items 3.3-1, 122 and 3.3-1, 123 address no aging effects for titanium heat exchanger components, piping, piping components, and piping elements exposed to air (item 3.3-1, 122) and raw water (item 3.3-1, 123). By letter dated October 14, 2024 (ML24289A118), the applicant added plant-specific note No. 4 to LRA Table 3.3.2-3, which clarified that the "[t]itanium grade is either AMS [Aerospace Materials Specification] 4943 or ASTM [American Society of Testing and Materials] B 338 GR 1, neither of which are susceptible to stress corrosion cracking under operating environments specified in the table." The NRC staff's evaluation related to citing no aging effects for these grades of titanium is documented in Section 3.3.2.3.3, "Saltwater and Chlorination System - Summary of Aging Management Review - LRA Table 3.3.2-3," of the 2011 SER (ML11153A103).

3.3.2.1.12 Loss of Material Due to Pitting, Crevice Corrosion

LRA Table 3.3-1, AMR item 3.3-1,125 addresses loss of material due to pitting, crevice corrosion for steel (with stainless steel cladding), stainless steel spent fuel storage racks (BWR), spent fuel storage racks (PWR), piping, piping components, and piping elements exposed to treated water and treated borated water. LRA Table 3.4-1 AMR item 3.4-1, 016, as modified by letter dated October 14, 2024 (ML24289A118), addresses loss of material due to pitting, crevice corrosion for copper alloy, stainless steel, nickel alloy, aluminum piping, piping components, and piping elements, heat exchanger components and tubes, and PWR heat exchanger components exposed to treated water and steam. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program to manage the aging effects of these AMR items.

In LRA Table 3.3.2-5, "Makeup Water System – Summary of Aging Management Evaluation," item 3.4-1, 016 addresses loss of material for stainless steel valve body and piping, piping components exposed to a demineralized water internal environment. Table 3.3.2-5 plant-specific note 3 states, "Components are associated with the boric acid evaporator subsystem which is abandoned-in-place. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24)."

In LRA Table 3.3.2-8, "Chemical and Volume Control System – Summary of Aging Management Evaluation," item 3.3-1, 125 addresses loss of material for stainless steel evaporator, heat exchanger (Boric Acid Evaporator) shell-side components, heat exchanger (Boric Acid Feed Preheater) shell-side components, heat exchanger (Boric Acid Feed Preheater) tube-side components, piping, piping components, pump casing (Boric Acid Conc Holding Tank Transfer Pumps), pump casing (Boric Acid Evaporator Conc Pumps), and valve body and vessel exposed to a treated borated water internal environment. Item 3.3-1, 125 also addresses loss of material for cast austenitic stainless steel tank (Boric Acid Conc Holding Tanks) and valve body exposed to a treated borated water internal environment. Item 3.4-1, 016 addresses loss of material for stainless steel heat exchanger (Boric Acid Distillate Cooler) tube-side components, heat exchanger (Boric Acid Evaporator) tube-side components, heat exchanger (Boric Acid Feed Preheater) shell-side components, piping, piping components, and tank (Absorption Tower Tanks) and valve body exposed to a demineralized water internal or secondary water internal environment. Item 3.4-1, 016 also addresses carbon steel with stainless steel cladding pump casing (Boric Acid Evaporator Distillate Pumps) exposed to a demineralized water internal environment. Table 3.3.2-8 plant-specific note 1 states, "Components are associated with the boric acid evaporator subsystem which is abandoned-in-place. The DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) will manage the aging effect for the Boric Acid Evaporator subsystem."

In LRA Table 3.3.2-21, "Secondary Sampling System – Summary of Aging Management Evaluation," item 3.4-1, 016 addresses loss of material for stainless steel valve body exposed to a secondary water internal environment. Table 3.3.2-21 plant-specific note 2 states, "Components are associated with the boric acid evaporator subsystem which is abandoned-in-place. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24)."

In LRA Table 3.3.2-23, "Solid Radwaste System – Summary of Aging Management Evaluation," item 3.3-1, 125 addresses loss of material for stainless steel piping, piping components and valve body exposed to a treated borated water internal environment. Table 3.3.2-23 plant-specific note 3 states, “Components are associated with the boric acid evaporator subsystem which is abandoned-in-place. Thus, aging of the components will be managed by DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24).”

Based on its review of the components associated with items 3.3-1,125 and 3.4-1, 016, which cite generic note E in Tables 3.3.2-5, 3.3.2-8, 3.3.2-21, and 3.3.2-23, the NRC staff finds the applicant’s proposal of using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program acceptable because the associated periodic inspections are capable of detecting loss of material for these components.

LRA Table 3.3.2-5, as modified by letter dated March 6, 2025 (ML25069A508), states that loss of material for stainless steel closure bolting exposed to a demineralized water external environment will be managed by the Bolting Integrity program. There is no associated AMR item in the GALL-LR Report. The applicant cites generic note E; however, the NRC staff considers this item to be comparable to generic note G because the environment is not addressed in the GALL-LR Report for this component and material combination. Plant-specific note 11, as modified by letter dated March 6, 2025, states, “Consistent with the guidance in NUREG-2191 Item VII.I.A-423, loss of material for submerged bolting (in treated water) will be managed by the DCPP Bolting Integrity AMP (B.2.3.9).” The staff reviewed this item and noted that the GALL-SLR Report does address loss of material in stainless steel closure bolting exposed to treated water and recommends using the Bolting Integrity program. Based on this item not being addressed in the GALL-LR Report but being consistent with the guidance in the GALL-SLR Report, the staff finds it acceptable.

3.3.2.1.13 Loss of Coating or Lining Integrity Due to Blistering, Cracking, Flaking, Peeling, Delamination, Rusting, or Physical Damage, and Spalling for Cementitious Coatings/Linings

LRA Table 3.3-1, AMR item 3.3-1, 138 addresses loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, or physical damage, and spalling for cementitious coatings/linings for metallic piping, piping components, heat exchangers, and tanks with internal coatings/linings exposed to closed-cycle cooling water, raw water, treated water, treated borated water, wastewater, lubricating oil, or fuel oil. For the LRA Table 2 AMR items that cite generic note E in the makeup water system, the LRA credits the Aboveground Metallic Tanks program to manage the aging effect for internally coated/lined carbon steel makeup water system CST and transfer tank. The AMR items cite plant-specific note 4, which states that the DCPP Aboveground Metallic Tanks AMP will monitor for loss of material and loss of coating integrity on the internal coatings/linings of the CSTs and transfer tank.

Based on its review of makeup water system components associated with AMR item 3.3-1, 138 for which the applicant cited generic note E, the NRC staff noted that the GALL-LR Report, as modified by LR-ISG-2013-01, allows for GALL-LR Report AMP XI.M29, “Aboveground Metallic Tanks,” to manage the aging effects of internal coatings/linings of in-scope components provided that:

- The recommendations of GALL-LR Report AMP XI.M42, including associated exceptions or enhancements, are incorporated into the Aboveground Metallic Tanks AMP; and
- The UFSAR Supplement for GALL-LR Report AMP XI.M42 is included in the application with a reference to the Aboveground Metallic Tanks AMP.

The NRC staff finds the applicant's proposal to manage the effects of aging using the Aboveground Metallic Tanks program acceptable because:

- The recommendations of GALL-LR Report AMP XI.M42 have been incorporated into the DCPP Aboveground Metallic Tanks program including recommendations for inspection frequency, parameters monitored and inspected, acceptance criteria, corrective actions, and qualification of the coating specialist and inspection personnel; and
- The UFSAR Supplement for the Aboveground Metallic Tanks program states that the program will manage loss of coating/lining integrity on internal coatings in the CSTs and transfer tank and incorporates the recommendations of GALL-LR Report AMP XI.M42.

3.3.2.1.14 Loss of Coating or Lining Integrity due to Blistering, Cracking, Flaking, Peeling, Delamination, Rusting, or Physical Damage, and Spalling for Cementitious Coatings/Linings

LRA Table 3.3-1, AMR item 3.3-1, 138 addresses loss of coating or lining integrity and spalling (only for cementitious coatings/linings) for metallic piping, piping components, heat exchangers, and tanks with internal coatings/linings exposed to closed-cycle cooling water, raw water, treated water, treated borated water, wastewater, lubricating oil, or fuel oil. For the LRA Table 2 AMR items that cite generic note E in the fire protection system, the LRA credits the Fire Water System program to manage loss of coating or lining integrity for coated/lined carbon steel fire water storage tank exposed externally to demineralized water and internally to raw water. Based on its review of components associated with AMR item 3.3-1, 138 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging acceptable because the Fire Water System program is being enhanced, consistent with guidance in the GALL-SLR Report, as modified by LR-ISG-2013-01, to manage loss of coating integrity of the fire water storage tank (see the discussions of *Enhancement 7 and Exception 6* to the Fire Water System program in SE Section 3.0.3.2.10).

3.3.2.1.15 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Fouling that Leads to Corrosion

LRA Table 3.3-1, AMR item 3.3-1, 139 addresses loss of material due to general, pitting, crevice, and microbiologically influenced corrosion and fouling that leads to corrosion for metallic piping, piping components, heat exchangers, and tanks with internal coatings/linings exposed to closed-cycle cooling water, raw water, treated water, treated borated water, wastewater, lubricating oil, or fuel oil. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Aboveground Metallic Tanks program to manage the aging effect for internally coated/lined carbon steel makeup water system CSTs and transfer tank. The AMR items cite plant-specific note 4, which states that the DCPP Aboveground Metallic Tanks AMP will monitor for loss of material and loss of coating integrity on the internal coatings/linings of the CSTs and transfer tank.

Based on its review of components associated with AMR item 3.3-1, 139 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the Aboveground Metallic Tanks program acceptable because the CSTs and transfer tank are within the scope of the Aboveground Metallic Tanks program for managing the effects of corrosion on the intended function of these tanks, and the Aboveground Metallic Tanks program's inspections and tests are capable of identifying a loss of material before a loss of intended function. The inspection program for Aboveground Metallic Tanks includes one-time and periodic visual inspections, as well as volumetric inspection of tank bottoms and 20 percent of the tank shell internal surfaces.

3.3.2.1.16 Loss of Material Due to General, Pitting, and Crevice Corrosion

LRA Table 3.4-1 AMR item 3.4-1, 013 addresses loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements exposed to treated water. LRA Table 3.4-1 AMR item 3.4-1, 014 addresses loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements and PWR heat exchanger components exposed to treated water and steam. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program to manage the aging effects of these AMR items.

LRA Table 3.3.2-8, item 3.4-1, 013 addresses loss of material for carbon steel heat exchanger (Boric Acid Evaporator Condenser) shell-side components and piping and piping components exposed to a secondary water internal environment. Item 3.4-1, 014 addresses loss of material for carbon steel heat exchanger (Boric Acid Vent Condenser) shell-side components exposed to a demineralized water internal environment. Table 3.3.2-8 plant-specific note 1 states, “Components are associated with the boric acid evaporator subsystem which is abandoned-in-place. The DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) will manage the aging effect for the Boric Acid Evaporator subsystem.”

LRA Table 3.3.2-18, “Extraction Steam and Heater Drip System – Summary of Aging Management Evaluation,” item 3.4-1, 013 addresses loss of material for carbon steel piping and piping components exposed to a secondary water internal environment. Table 3.3.2-18 plant-specific note 1 states, “Components are associated with the boric acid evaporator subsystem which is abandoned-in-place. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24).”

Based on its review of the components associated with items 3.4-1, 013 and 3.4-1, 014 that cite generic note E in Tables 3.3.2-8 and 3.3.2-18, the NRC staff finds the applicant’s proposal of using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program acceptable because the associated periodic inspections are capable of detecting loss of material for these components.

3.3.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-LR Report

In LRA Section 3.3.2.2, the applicant further evaluates aging management for certain auxiliary system components as recommended by the GALL-LR Report and provides information on 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-LR Section 3.3.2.2. The following subsections document the staff’s review.

3.3.2.2.1 Cumulative Fatigue Damage

LRA Section 3.3.2.2.1 states that fatigue is a TLAA as defined in 10 CFR 54.3, which is required to be evaluated in accordance with 10 CFR 54.21(c) and is addressed separately in Section 4.3, “Metal Fatigue Analysis,” or Section 4.7, “Other Plant-Specific Time-Limited Aging Analyses,” of the SRP-LR.

LRA Section 3.3.2.2.1, associated with LRA Table 3.3-1, AMR item 3.3-1, 001, addresses cumulative fatigue damage due to fatigue for steel cranes: structural girder exposed to air-indoor, uncontrolled (external), which will be managed by the TLAA 4.7.1. The NRC staff reviewed the applicant’s proposal against the criteria in SRP-LR Section 3.3.2.2.1 and finds the applicant’s claim acceptable because the staff confirmed from GALL-LR Chapter II that the AMR items corresponding to item 3.3-1, 001 applied to steel cranes: structural girder exposed to air-indoor, uncontrolled (external).

In its review of components associated with AMR item 3.3-1, 001, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant’s proposal to manage the effects of aging using the TLAA 4.7.1 is acceptable because the proposed program will be consistent (with unrelated exception) with the GALL-LR Report recommendation to adequately manage the cumulative fatigue damage due to fatigue for steel cranes.

LRA Section 3.3.2.2.1, associated with LRA Table 3.3-1, item 002, indicates that the TLAA on cumulative fatigue damage in the components of auxiliary systems is evaluated in accordance with 10 CFR 54.21(c)(1) and is addressed in LRA Section 4.3. The NRC staff finds that the applicant’s evaluation of the TLAA is consistent with SRP-LR Section 3.3.2.2.1 and is, therefore, acceptable. The staff’s evaluation of the fatigue TLAA for the components of auxiliary systems is documented in SE Section 4.3.

Based on its review, the NRC staff concludes that the applicant meets SRP-LR Section 3.3.2.2.1 criteria. For items 3.3-1, 001 and 3.3-1, 002 that apply to LRA Section 3.3.2.2.1, the staff determined that the LRA is consistent with the GALL-LR Report and that the applicant has demonstrated that it will adequately manage the effects of aging so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.2 Cracking Due to Stress Corrosion Cracking and Cyclic Loading

LRA Section 3.3.2.2.2, associated with LRA Table 3.3-1, AMR item 3.3-1, 003, addresses cracking due to stress corrosion cracking and cyclic loading for stainless steel heat exchanger components exposed to treated borated water greater than 60°C, which will be managed by the Water Chemistry and One-Time Inspection programs. The NRC staff reviewed the applicant’s proposal against the criteria in SRP-LR Section 3.3.2.2.2.

In its review of components associated with AMR item 3.3-1, 003, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant’s proposal to manage the effects of aging using the Water Chemistry and One-Time Inspection programs is acceptable because the One-Time Inspection program will verify the absence of cracking at the beginning of the period of extended operation through the use of appropriate visual, surface, or volumetric inspection techniques and, in addition, temperature and radioactivity of the shell-side water of the letdown (non-regenerative) heat exchanger will be continuously monitored by plant instrumentation during operation during the period of extended operation.

Based on the programs identified, the NRC staff concludes that the applicant's programs meet the criteria in SRP-LR Section 3.3.2.2.2. For those AMR items associated with LRA Section 3.3.2.2.2 (AMR item 3.3-1, 003), the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.3 Cracking Due to Stress Corrosion Cracking

LRA Section 3.3.2.2.3, associated with LRA Table 3.3-1, AMR item 3.3-1, 004, addresses cracking due to stress corrosion cracking for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, which will be managed by the External Surfaces Monitoring of Mechanical Components program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.3.2.2.3. In its review of components associated with AMR item 3.3-1, 004, the staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the External Surfaces Monitoring of Mechanical Components program is acceptable because the proposed periodic inspections are capable of detecting cracking.

Based on the program identified, the NRC staff concludes that the applicant's program meets the SRP-LR Section 3.3.2.2.3 criteria. For those AMR items associated with the LRA Section 3.3.2.2.3, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.4 Loss of Material Due to Cladding Breach

LRA Section 3.3.2.2.4, associated with LRA Table 3.3-1, AMR item 3.3-1, 005, addresses loss of material due to cladding breach for steel pump casings with stainless steel cladding exposed to treated borated water. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.3.2.2.4 and finds it acceptable because there are no steel pump casings with stainless steel cladding exposed to treated borated water in auxiliary systems at DCPP.

3.3.2.2.5 Loss of Material Due to Pitting and Crevice Corrosion

LRA Section 3.3.2.2.5, associated with LRA Table 3.3-1, AMR item 3.3-1, 006, addresses loss of material due to pitting and crevice corrosion for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, which will be managed by the External Surfaces Monitoring of Mechanical Components program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.3.2.2.5. In its review of components associated with AMR item 3.3-1, 006, the staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the External Surfaces Monitoring of Mechanical Components program is acceptable because the proposed periodic inspections are capable of detecting loss of material.

Based on the program identified, the NRC staff concludes that the applicant's program meets the SRP-LR Section 3.3.2.2.5 criteria. For those AMR items associated with the LRA Section 3.3.2.2.5, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.2.6 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.

3.3.2.2.7 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.3.2.2.8 Loss of Material Due to Recurring Internal Corrosion

LRA Section 3.3.2.2.8, associated with LRA 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 or wastewater, which will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components and the Fire Water System programs. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.3.2.2.8. 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 that the applicant's proposal to manage the effects of aging using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components and the Fire Water System programs is acceptable because the programs have been augmented to have increased inspection and corrective actions.

Based on the programs identified, the NRC staff concludes that the applicant's programs meet the SRP-LR Section 3.3.2.2.8 criteria. For those AMR items associated with LRA Section 3.3.2.2.8, the staff concludes that the LRA is consistent with the GALL-LR 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 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-LR Report

The following subsections document the NRC staff's review of those AMR results listed in LRA Tables 3.3.2-1 through 3.3.2-25 that are either not consistent with or not addressed in the GALL-LR Report and that 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 SRP-LR Table 1 item, the subsections are organized by applicable AMR sections and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-LR Report, the NRC 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 period of extended operation. The following sections document the staff's evaluation.

3.3.2.3.1 Component Cooling Water System – Summary of Aging Management Evaluation

<u>Nickel Alloys and Aluminum Exposed to Closed-Cycled Cooling Water</u>. LRA Table 3.3.2-4 states that loss of material and reduction of heat transfer for nickel alloys and aluminum heat

exchangers exposed to closed-cycle cooling water will be managed by the Closed Treated Water Systems program. The AMR item cites generic note G.

The NRC staff reviewed the associated items in the LRA 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 noted that the applicant addressed loss of material for this component, material, and environment combination in other AMR items. Based on the GALL-LR Report, the Closed Treated Water Systems program includes:

- water treatment, including the use of corrosion inhibitors, to modify the chemical composition of the water such that the function of the equipment is maintained and such that the effects of corrosion are minimized;
- chemical testing of the water to ensure that the water treatment program maintains the water chemistry within acceptable guidelines; and
- inspections to determine the presence or extent of corrosion and/or cracking.

Additionally, the DCPP Closed Treated Water Systems AMP implements the water treatment, which includes: the use of a corrosion inhibitor to minimize the corrosion; chemical testing of water to ensure and maintain the water chemistry within acceptable level; and condition monitoring or visual inspections of components to determine the presence of corrosion, cracking, or fouling. The NRC staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination. The staff finds the applicant’s proposal to manage the effects of aging acceptable because use of the Closed Treated Water Systems program to manage loss of material in nickel-alloy components exposed to closed-cycle cooling water is consistent with the recommendations of the GALL-LR Report.

3.3.2.3.2 Makeup Water System – Summary of Aging Management Evaluation

<u>Coated/Lined Asbestos Cement Piping Components Exposed to Raw Water</u>. LRA Table 3.3.2-5 and Table 3.3.2-12 state that loss of coating integrity for coated/lined asbestos cement piping components exposed to raw water will be managed by the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program. The AMR items cite generic note F.

The NRC staff reviewed the associated items in the LRA and considered whether the aging effects proposed by the applicant constitute all of the applicable aging effects for this component, material, and environment description. The staff notes that as provided in NUREG-2221, “Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG-2191 and NUREG-2192” (ML17362A126), item VII.C1.A-416, which is associated with SRP-SLR item 3.3.1-138, was modified by changing the cited material from “metallic” to “any material” and kept the AERM as loss of coating integrity. As discussed in the Abstract for the GALL-SLR Report, both current holders of initial operating licenses as well as future applicants for initial license renewal may choose to reference the subsequent license renewal documents in their applications. Based on this analysis, the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination. The staff also finds the applicant’s proposal to manage the effects of aging acceptable because the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program has been determined to be the appropriate aging management program to manage loss of coating integrity for components constructed of any material, not just metallic materials.

Carbon Steel, Stainless Steel, Cast Austenitic Stainless Steel, and Copper Alloy Piping, Piping Components, Valve Bodies, Pump Casings, and Tanks Exposed to Sodium Hydroxide. LRA Table 3.3.2-5 and Table 3.3.2-8 state that loss of material for carbon steel, stainless steel, cast austenitic stainless steel, and copper alloy piping, piping components, valve bodies, pump casings, and tanks exposed to sodium hydroxide will be managed for these components by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The AMR items cite generic note G. Plant-specific note 2 states that the use of carbon steel or stainless steel up to 200°F and 50 weight-percent sodium hydroxide is common in industrial applications with no special consideration for aging. Plant-specific note 5 states that use of copper alloy in non-elevated temperature environments is also common in industrial applications with no special considerations for aging.

The NRC staff noted that ASM Handbook, Volume 13C, “Corrosion: Environments and Industries,” states that carbon and low-alloy steels are typically protected by the presence of a passive layer of magnetite up to about 50 percent solutions of sodium hydroxide and that all stainless steels are resistant to general corrosion by all concentrations of caustic soda up to about 150°F. Based on its analysis and review of ASM Handbook, Volume 13C, the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination.

Stainless Steel Piping, Piping Components, and Valve Bodies Exposed to Sulfuric Acid. LRA Table 3.3.2-5 states that loss of material for stainless steel piping and piping components exposed to sulfuric acid will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The AMR items cite generic note G. The ASM Handbook, Volume 13C also shows that stainless steel has generally good resistance to sulfuric acid at low concentrations.

The NRC staff reviewed the associated items in the LRA and considered whether the aging effects proposed by the applicant constitute all of the applicable aging effects for this component, material, and environment description. The staff finds that the applicant has identified all applicable aging effects for these component, material, and environment combinations. Based on its analysis and review of the ASM Handbook, Volume 13C, the staff finds the applicant’s proposal to manage the effects of aging acceptable because the material and environment combinations addressed here are appropriate.

Asbestos Cement Piping and Piping Components Exposed to Raw Water. LRA Table 3.3.2-5, item 3.3-1, 032 states that cracking and loss of material for asbestos cement piping and piping components exposed to raw water will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The AMR item cites generic note H. Plant-specific note 9 states that the applicant will manage the loss of material aging effect instead of the changes in material properties aging effect for asbestos cement piping and piping components exposed to raw water, based on the updated guidance in NUREG-2192, Table 3.3-1, item 208. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to monitor asbestos cement piping and piping components with an internal environment of raw water for cracking and loss of material.

The NRC staff reviewed the associated item in the LRA 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 the component, material, and environment combination. Based on the guidance in NUREG-2192, the staff finds the applicant's proposal to manage the effects of aging acceptable because the component, material, and environment combination addressed here are appropriate.

3.3.2.3.3 Auxiliary Building Heating, Ventilation, and Air Conditioning System – Summary of Aging Management Evaluation

Elastomeric Flex Connections Exposed to Atmosphere/Weather. LRA Table 3.3.2-11 states that hardening and loss of strength for elastomeric flex connections exposed to atmosphere/weather will be managed by the External Surfaces Monitoring of Mechanical Components program. The AMR item cites generic note G. As provided in LRA Table 3.0-1, the cited environment corresponds to the GALL-LR Report's outdoor air and condensation environments.

The NRC staff reviewed the associated item in the LRA 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 notes that the applicant addressed loss of material for this component, material, and environment combination in other AMR items. Based on its review of GALL-SLR Report items VII.F1.A-504, VII.I.AP-102, and VII.D.A-729 for elastomeric components exposed to various air environments, the staff finds the applicant has identified all applicable aging effects for this component, material, and environment combination. The staff also finds the applicant's proposal to manage the effects of aging acceptable because the staff has previously determined (for the GALL-SLR Report items reviewed above) that the External Surfaces Monitoring of Mechanical Components program can adequately manage the effects of aging for elastomeric components exposed to air environments.

3.3.2.3.4 Liquid Radwaste System – Summary of Aging Management Evaluation

Elastomeric Caulking and Sealant Exposed to Lubricating Oil. LRA Table 3.3.2-17 states that hardening and loss of strength for elastomeric caulking and sealant exposed to lubricating oil will be managed by the External Surfaces Monitoring of Mechanical Components program. The AMR item cites generic note G. The associated plant-specific note explains that the caulking and sealant material is used in the reactor coolant pump lube oil spill collection guttering joints and is oil and heat-resistant.

The NRC staff reviewed the associated item in the LRA 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 GALL-SLR Report Section IX.E, "Use of Terms for Aging Effects," the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination because the material is oil- and heat-resistant. Additionally, hardening and loss of strength are listed as the applicable aging effects requiring management. Based on the limited flow expected by the reactor coolant pump lube oil spill collection guttering, the staff did not consider loss of material as an applicable AERM. The staff also finds the applicant's proposal to manage the effects of aging acceptable because the periodic visual inspections of the External Surfaces Monitoring of Mechanical Components program, augmented by physical manipulation (e.g., pressing, flexing) can adequately manage the effects of aging for elastomeric components exposed to lubricating oil environments.

<u>Carbon Steel Valve Bodies Exposed to Treated Borated Water</u>. LRA Table 3.3.2-17 states that loss of material will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The AMR items cite generic note G. Plant-specific note 7 states that carbon steel piping and piping components exposed to treated borated water will be managed by this AMP.

The NRC staff reviewed the associated items in the LRA 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 reviewed the Boric Acid Corrosion Guidebook, Revision 1, which states that at temperatures less than 140°F, corrosion rates in aerated boric acid solutions with a concentration slightly greater than PWR primary water did not exceed 0.015 inches per year. The lack of plant-specific OE with internal degradation of carbon steel valve bodies over 40 years indicates that the actual corrosion rate in this system is much lower. The staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination. The staff also finds the applicant's proposal to manage the effects of aging acceptable because the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program prescribes inspections on a frequency that can detect loss of material prior to a loss of intended function for these components.

3.3.2.3.5 Fire Protection System – Summary of Aging Management Evaluation

<u>Asbestos Cement Piping and Piping Components Exposed to Raw Water</u>. As supplemented by letters dated October 14, 2024 (ML24289A118), and February 25, 2025 (ML25056A500), LRA Table 3.3-1, AMR item 3.3-1, 032 addresses cracking and change in material properties for reinforced concrete and asbestos cement piping, piping components, and piping elements exposed to raw water. For the LRA Table 2 AMR item, which cites generic note H, the LRA credits the Fire Water System program to manage cracking, flow blockage, and loss of material for asbestos cement piping and piping components exposed internally to raw water. The AMR line item cites plant-specific note 4 which states, "DCPP will manage the flow blockage and loss of material aging effects instead of the changes in material properties aging effect for asbestos cement piping, piping components exposed to raw water based on the updated guidance in NUREG-2192, Table 3.3-1, Item 195. The DCPP Fire Water System AMP (B.2.3.15) is used to monitor piping and piping components fabricated from asbestos cement with an internal environment of raw water for cracking, flow blockage, and loss of material."

Based on its review of components associated with AMR item 3.3-1, 032 for which the applicant cited generic note H, the NRC staff finds the applicant's proposal to manage the effects of aging acceptable because the Fire Water System program's inspections and tests are capable of identifying cracking, flow blockage, and loss of material before a loss of intended function. Furthermore, using the Fire Water System program to manage cracking, flow blockage, and loss of material of the asbestos cement piping and piping components is consistent with the guidance in NUREG-2192. For additional information, see the discussion of *Exception 1* and RAI 10465-R1 in SE Section 3.0.3.2.10. On the basis of its review, the NRC staff finds that the applicant has appropriately evaluated the AMR results of material, environment, AERM, and AMP combinations not addressed in the GALL-LR Report. The staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Polyvinyl Chloride Piping and Piping Components Exposed to a Buried Environment</u>. In LRA Table 3.3.2-12, the applicant stated that for polyvinyl chloride (PVC) pipe exposed to a buried

environment there are no aging effects, and no AMP is proposed. Although the AMR line item cites generic note F, the NRC staff notes that components comprised of this material are included in the GALL-LR Report, but not in a buried environment. The applicant's proposal that there are no aging effects requiring management better aligns with generic note I. The staff reviewed the associated line item in the LRA and notes that the ASM Handbook 13C, "Corrosion: Environments and Industries," states that PVC has excellent corrosion resistance; however, Table IX.F in Volume 2 of NUREG-2191 (ML17187A204) states that "[l]oss of material due to wear can also occur in polymeric components buried in soil containing deleterious materials that move over time due to seasonal change effects on the soil."

The NRC staff finds the applicant's proposal acceptable because industry experience and academic studies have shown PVC to be resistant to both chemical attack and thermal degradation. Expected rates of degradation of PVC in the chemical and thermal environment in a buried environment are expected to be sufficiently low, such that deterioration of PVC piping and loss of component function is not expected through the period of extended operation. In addition, as supplemented by letter dated October 14, 2024 (ML24289A118), plant-specific note 2 for Table 3.5.2-14 states that DCPP is in a negligible weathering region, with no significant seasonal changes on the soil. Therefore, loss of material due to wear from soil movement over time is not expected.

<u>Polyvinyl Chloride Piping and Piping Components Exposed to Raw Water</u>. In addition, in LRA Table 3.3.2-12, the applicant credits the Fire Water System program to manage flow blockage and loss of material for PVC piping and piping components exposed to raw water (internal). The AMR line items cite generic note G and plant-specific note 8, which states, "[c]onsistent with OE reflected in NUREG-2191 (Aging items are taken from Table G in NUREG-2191, SLR GALL Report), aging of the component materials is managed by the DCPP Fire Water System AMP (B.2.3.15)." The NRC staff reviewed the associated line items in the LRA and confirmed that the applicant has identified the correct aging effects for PVC pipe and piping components exposed internally to raw water because they are consistent with the aging effects (i.e., loss of material due to wear and flow blockage due to fouling) identified in Volume 1 of NUREG-2191 (ML17187A031). In addition, the staff finds the applicant's proposal to manage the effects of aging acceptable because the Fire Water System program's inspections and tests are capable of identifying loss of material and flow blockage before a loss of intended function. Furthermore, using the Fire Water System program to manage loss of material and flow blockage of PVC piping and piping components exposed to raw water is consistent with the guidance in Volume 1 of NUREG-2191.

On the basis of its review, the NRC staff finds that the applicant has appropriately evaluated the AMR results of material, environment, AERM, and AMP combinations not addressed in the GALL-LR Report. The staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.3.6 Saltwater and Chlorination System – Summary of Aging Management Evaluation

<u>Elastomeric Expansion Joints Exposed to a Buried Environment</u>. As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.3.2-3, "Saltwater and Chlorination System – Summary of Aging Management Evaluation," states that hardening, loss of strength, and loss of material for elastomeric expansion joints exposed to a buried environment will be managed by the Buried and Underground Piping and Tanks program. The AMR items cite generic note J.

During its review, the NRC staff determined the need for additional information with respect to why physical manipulation is not used to augment visual inspections to confirm the absence of elastomer hardening and loss of strength, resulting in the issuance of RAI B.2.3.26-1 (ML24339B881). In its response to RAI B.2.3.26-1 (ML25002A050), the applicant: (1) clarified that the subject components are consumables that do not require aging management review; and (2) removed these generic note J items from LRA Table 3.3.2-3 and removed references to elastomeric components in LRA Sections A.2.2.26 and B.2.3.26. Therefore, the staff's concerns described in RAI B.2.3.26-1 are moot.

<u>Polyvinyl Chloride piping, piping components, and valve bodies exposed to closed-cycle cooling water and raw water</u>. LRA Table 3.3.2-3 identifies no aging effects/mechanisms and no aging management programs for PVC piping, piping components, and valve bodies exposed internally to closed-cycle cooling water and raw water. The AMR items cite generic note H.

LRA Table 3.0-1 describes the closed-cycle cooling water environment as "water for component cooling that is treated and monitored for quality under the Closed-Cycle Cooling Water System program." In response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant stated that the internal environment temperature for PVC piping, piping components, and valve bodies in the Saltwater and Chlorination System is less than 95°F. For the items in the LRA associated with PVC piping, piping components, and valve bodies exposed internally to closed-cycle cooling water, the NRC staff reviewed the associated items in the LRA and concluded that there are no aging effects requiring management and no recommended aging management program based on ASM Handbook, Volume 13C, "Corrosion: Environments and Industries," which states that PVC has excellent corrosion resistance and, therefore, the rates of degradation of PVC in the chemical and thermal environment of the closed-cycle cooling water, which is treated, monitored for quality, and less than 95°F, is expected to be sufficiently low, such that deterioration of PVC piping, piping components, and valve bodies and loss of component function is not expected through the period of extended operation. Therefore, the staff finds the applicant's proposal that there are no aging effects for these component, material, and environment combinations acceptable.

The NRC staff notes that NUREG-2192 identifies loss of material due to wear and flow blockage due to fouling as potential aging effects for PVC piping and piping components exposed to raw water. The staff notes that Table IX.E in Volume 2 of NUREG-2191 states that flow blockage can affect the pressure boundary, heat transfer, spray, and throttle intended functions. Therefore, flow blockage is not applicable to the PVC piping, piping components, and valve bodies exposed internally to raw water in the Saltwater and Chlorination System because they have a leakage boundary (spatial) intended function. In response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant revised LRA Table 3.3.2-3 to cite loss of material as an applicable aging effect for PVC piping, piping components, and valve bodies exposed internally to raw water. The AMR items in the LRA cite plant-specific note 5, which states, "[c]onsistent with the guidance in NUREG-2191 Items VII.C1.A-461 and VII.C1.A-787c, fiberglass and PVC components, respectively, in the raw water environment require management for loss of material due to wear. The DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) will be used to manage fiberglass and PVC exposed internally to raw water." The staff finds the applicant's proposal acceptable because managing loss of material due to wear for PVC piping, piping components, and valve bodies exposed internally to raw water by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is consistent with the GALL-SLR and, as stated above, flow blockage is not applicable because the components have a leakage boundary (spatial) intended function.

<u>Fiberglass piping and piping components exposed to closed-cycle cooling water and plant indoor air</u>. LRA Table 3.3.2-3 identifies no aging effects/mechanisms and no aging management programs for fiberglass piping and piping components exposed internally to closed-cycle cooling water and externally to plant indoor air. The AMR items cite generic note H.

LRA Table 3.0-1 describes the closed-cycle cooling water environment as “water for component cooling that is treated and monitored for quality under the Closed-Cycle Cooling Water System program.” In response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant stated that the internal temperature for fiberglass piping and piping components in the Saltwater and Chlorination System is less than 95°F. For the items in the LRA associated with fiberglass piping and piping components exposed internally to closed-cycle cooling water, the NRC staff reviewed the associated item in the LRA and concluded that there are no aging effects requiring management and no recommended aging management program based on ASM Handbook, Volume 13C, “Corrosion: Environments and Industries,” which states that fiberglass reinforced plastic has excellent corrosion resistance and, therefore, the rates of degradation of fiberglass in the chemical and thermal environment of closed-cycle cooling water is expected to be sufficiently low, such that deterioration of fiberglass piping and piping components and loss of component function is not expected through the period of extended operation. Therefore, the staff finds the applicant’s proposal that there are no aging effects for this component, material, and environment combination acceptable.

Table 2-6 in NUREG-2221 for item VII.I.A-720 states, in part, “*Fibres, Plastics, and Rubbers: A Handbook of Common Polymers*, Roff, W.J., Academic Press Inc., New York, 1956, Plastic Piping Institute, Recommended Design Factors and Design Coefficients for Thermoplastic Pressure Pipe, TR-9/2002, October 2002, states that stressors for fiberglass reinforced piping and piping components include light, high radiation, or ozone concentrations” and NUREG-2192 identifies cracking, blistering, and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture of fiberglass as potential aging effects for fiberglass piping and piping components exposed to air. The NRC staff finds the applicant’s proposal that there are no aging effects for this component, material, and environment combination acceptable because in the response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant stated that the fiberglass piping and piping components exposed externally to plant indoor air in the Saltwater and Chlorination System are not exposed to substantial levels of ultraviolet light, measurable ozone, radiation, or internal temperatures greater than 95°F; the external temperatures rarely exceed 95°F; they are not located near heat sources; and the surfaces are normally dry.

<u>Fiberglass reinforced plastic pump casing exposed to plant indoor air and raw water</u>. LRA Table 3.3.2-3 identifies no aging effects/mechanisms and no aging management programs for the fiberglass reinforced plastic pump casing exposed externally to plant indoor air and internally to raw water.

Table 2-6 in NUREG-2221 for item VII.I.A.720 states, in part, “*Fibres, Plastics, and Rubbers: A Handbook of Common Polymers*, Roff, W.J., Academic Press Inc., New York, 1956, Plastic Piping Institute, Recommended Design Factors and Design Coefficients for Thermoplastic Pressure Pipe, TR-9/2002, October 2002, states that stressors for fiberglass reinforced piping and piping components include light, high radiation, or ozone concentrations” and NUREG-2192 identifies cracking, blistering, and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture of fiberglass as potential aging effects for fiberglass piping and piping components exposed to air. In the response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant revised LRA Table 3.3.2-3 to cite cracking, blistering, and loss of material as applicable aging effects for the fiberglass reinforced plastic pump casing exposed externally to plant indoor air in the Saltwater and Chlorination System because it is located in an area that can experience periodic wetting. As revised by the applicant's letter dated February 25, 2025, the AMR items cite generic note F and plant-specific note 6, which states that "[c]onsistent with the guidance in NUREG-2191 Item VII.I.A-720, fiberglass components in an air environment requires management for cracking, blistering, and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture. The DCPP External Surfaces Monitoring of Mechanical Components AMP (B.2.3.22) will be used to manage fiberglass reinforced plastic components exposed externally to plant indoor air." The NRC staff finds the applicant's proposal acceptable because managing cracking, blistering, and loss of material for the fiberglass reinforced plastic pump casing exposed externally to plant indoor air by the External Surfaces Monitoring of Mechanical Components program is consistent with the GALL-SLR Report.

The NRC staff notes that NUREG-2192 identifies loss of material due to wear and flow blockage due to fouling as potential aging effects for fiberglass piping and piping components exposed to raw water. The staff notes that Table IX.E in Volume 2 of NUREG-2191 states that flow blockage can affect the pressure boundary, heat transfer, spray, and throttle intended functions. Therefore, flow blockage is not applicable to the fiberglass reinforced plastic pump casing exposed internally to raw water in the Saltwater and Chlorination System because they have a leakage boundary (spatial) intended function. In response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant revised LRA Table 3.3.2-3 to cite loss of material as an applicable aging effect for the fiberglass reinforced plastic pump casing exposed internally to raw water. The AMR items cite generic note H and plant-specific note 5, which states that "[c]onsistent with the guidance in NUREG-2191 Items VII.C1.A-461 and VII.C1.A-787c, fiberglass and PVC components, respectively, in the raw water environment require management for loss of material due to wear. The DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) will be used to manage fiberglass and PVC exposed internally to raw water." The staff finds the applicant's proposal acceptable because managing loss of material due to wear for the fiberglass reinforced plastic pump casing exposed internally to raw water by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is consistent with the GALL-SLR Report and, as stated above, flow blockage is not applicable because the components have a leakage boundary (spatial) intended function.

3.3.2.3.7 Makeup Water System – Summary of Aging Management Evaluation

<u>Asbestos Cement Piping and Piping Components Exposed to a Buried Environment</u>. As modified by letter dated October 14, 2024 (ML24289A118), LRA Tables 3.3.2-5, "Makeup Water System – Summary of Aging Management Evaluation," and 3.3.2-12, "Fire Protection System – Summary of Aging Management Evaluation," state that cracking and loss of material for asbestos cement piping and piping components exposed to a buried environment will be managed by the Buried and Underground Piping and Tanks program. The AMR items cite generic note H and item 3.3-1, 103, for which the applicant has identified cracking and loss of material as aging effects requiring management (in lieu of change in material properties). The NRC staff finds the applicant's proposal to manage cracking and loss of material acceptable because it is consistent with SRP-SLR Report Table 3.3-1, "Summary of Aging Management Programs for Auxiliary Systems Evaluated in Chapter VII of the GALL-SLR Report," item 103.

3.3.2.3.8 Chemical and Volume Control System – Summary of Aging Management Evaluation

Carbon Steel Heater Components Exposed to Treated Borated Water. LRA Table 3.3.2-8 states that loss of material for carbon steel heater components exposed to treated borated water will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The AMR items cite generic note G. Plant-specific note 3 states that carbon steel heater components are mounting flanges that are isolated from the borated water with gaskets, but were included because the gaskets may leak, exposing them to the borated water environment. The NRC staff reviewed the associated items in the LRA 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 also reviewed the Boric Acid Corrosion Guidebook, Revision 1, which states that at temperatures less than 140°F, corrosion rates in aerated boric acid solutions, with a concentration slightly greater than PWR primary water, did not exceed 0.015 inches per year. The staff finds that the applicant has identified all applicable aging effects for these component, material, and environment combinations. The staff also finds the applicant's proposal to manage the effects of aging acceptable because the components are isolated from the borated water environment and if leakage occurs, the low corrosion rate will limit the loss of material.

3.3.2.3.9 Control Room HVAC System – Summary of Aging Management Evaluation

Copper Alloy Heat Exchanger Tubes Exposed to Plant Indoor Air. LRA Tables 3.3.2-10 and 3.3.2-14 state that reduction of heat transfer for copper alloy heat exchanger tubes exposed to plant indoor air will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. The AMR item cites generic note H. As documented in SE Section 3.2.2.3.3, the NRC staff found that reduction of heat transfer can be adequately managed by the cited program for this material, component, and environment combination.

3.3.2.3.10 Diesel Generator System – Summary of Aging Management Evaluation

Polyphenylene Sulfide pump casing exposed to plant indoor air and fuel oil. LRA Table 3.3.2-14 identifies no aging effects/mechanisms and no aging management programs for the polyphenylene sulfide (PPS) pump casing exposed externally to plant indoor air and internally to fuel oil. The AMR items cite generic note F and plant-specific note 3, which states that PPS "is a thermoplastic and has been evaluated for ionizing radiation, ozone, [ultraviolet], thermal exposure, and loss of material due to aggressive chemical attack. No aging effects are expected for this material relative to its operating environment." The NRC staff reviewed the associated items in the LRA and considered whether the aging effects proposed by the applicant constitute all the applicable aging effects for the component, material, and environment descriptions. Based on a review of material information at https://www.syensqo.com/en/brands/ryton-pps (accessed on March 18, 2025), PPS is resistant to chemical attack and thermal degradation. However, the staff notes that thermoplastics exposed to ozone, ultraviolet light, or radiation can experience hardness and loss of strength. The staff finds the applicant's proposal acceptable because, as discussed in the 2011 SER (ML11153A103), in the diesel generator compartment of the turbine building: the radiation levels are not sufficient to cause significant aging effects; there is no measurable ozone in the vicinity of these components; there are no substantial levels of ultraviolet light; and during normal operation the average room temperature is 76°F and temperatures rise to approximately 90°F during operation of the diesel generators. In addition, because PPS is resistant to chemical attack and thermal degradation, the expected rates of degradation of PPS in the chemical and thermal environment of fuel oil (internal) are expected to be sufficiently low, such that deterioration of PPS and loss of component function is not expected through the period of extended operation.

3.3.2.3.11 Secondary Sampling System – Summary of Aging Management Evaluation

Plexiglass piping and piping components exposed to plant indoor air and secondary water. LRA Table 3.3.2-21 identifies no aging effects/mechanisms and no aging management programs for plexiglass piping and piping components exposed externally to plant indoor air and internally to secondary water. The AMR items in the LRA cite generic note F and plant-specific note 1, which states that "NUREG-1801 does not address plexiglass components. Plexiglass is evaluated as a thermoplastic." The NRC staff notes that thermoplastics exposed to ozone, ultraviolet light, or radiation can experience hardness and loss of strength. The staff finds the applicant's proposal that there are no aging effects for plexiglass piping and piping components exposed externally to plant indoor air acceptable because, in the response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant stated that the plexiglass piping and piping components exposed externally to plant indoor air in the Secondary Sampling System are not exposed to substantial levels of ultraviolet light, measurable ozone, radiation, or internal temperatures greater than 95°F; the external temperatures rarely exceed 95°F; they are not located near heat sources; and the surfaces are normally dry.

LRA Table 3.0-1 describes the secondary water environment as water that is "treated and monitored for quality under the Water Chemistry program." In response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant stated that the internal environment temperature for the plexiglass piping and piping components in the Secondary Sampling System is less than 95°F. For the AMR items in the LRA associated with plexiglass piping and piping components exposed internally to secondary water, the NRC staff reviewed the associated items in the LRA and concluded that there are no aging effects requiring management and no recommended aging management program because industry experience has shown plexiglass to be resistant to both chemical attack and thermal degradation, as discussed in the 2011 SER (ML11153A103). Therefore, the rates of degradation of plexiglass in the chemical and thermal environment of the secondary water, which is treated, monitored for quality, and less than 95°F, is expected to be sufficiently low, such that deterioration of plexiglass piping and piping components and loss of component function is not expected through the period of extended operation. Accordingly, the staff finds the applicant's proposal that there are no aging effects for these component, material, and environment combinations acceptable.

3.3.2.3.12 Solid Radwaste System – Summary of Aging Management Evaluation

Plexiglass piping and piping components exposed to plant indoor air and raw water. LRA Table 3.3.2-23 identifies no aging effects/mechanisms and no aging management programs for plexiglass piping and piping components exposed externally to plant indoor air and internally to raw water.

The AMR item in the LRA associated with plexiglass piping and piping components exposed externally to plant indoor air cites generic note F and plant-specific note 2, which states that "[p]lexiglass is evaluated as a thermoplastic. Consistent with the guidance in NUREG-2191 Item VII.C1.A-787c, plexiglass components in a raw water environment require management for loss of material due to wear. The DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) will be used to manage plexiglass components exposed internally to raw water." The NRC staff notes that thermoplastics exposed to ozone, ultraviolet light, or radiation can experience hardness and loss of strength. The staff finds the applicant's proposal that there are no aging effects for plexiglass piping and piping components exposed externally to plant indoor air acceptable because, in the response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant stated the plexiglass piping and piping components exposed externally to plant indoor air in the Solid Radwaste System are not exposed to substantial levels of ultraviolet light, measurable ozone, radiation, or internal temperatures greater than 95°F; the external temperatures rarely exceed 95°F; they are not located near heat sources; and the surfaces are normally dry.

In response to RAI 10475-R1, by letter dated February 25, 2025 (ML25056A500), the applicant revised LRA Table 3.3.2-23 to cite loss of material as an applicable aging effect for plexiglass piping and piping components exposed internally to raw water. The AMR item cites generic note H and plant-specific note 2, which is quoted above. The NRC staff notes that NUREG-2191 Item VII.C1.A-787c identifies both loss of material and flow blockage as potential aging effects. The staff also notes that Table IX.E in Volume 2 of NUREG-2191 states that flow blockage can affect the pressure boundary, heat transfer, spray, and throttle of intended functions. Therefore, flow blockage is not applicable to the plexiglass piping and piping components exposed internally to raw water in the Solid Radwaste System because they have a leakage boundary (spatial) intended function. The staff finds the applicant's proposal acceptable because managing loss of material due to wear for plexiglass piping and piping components exposed internally to raw water by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is consistent with GALL-SLR, and as stated above, flow blockage is not applicable because the components have a leakage boundary (spatial) intended function.

3.4 Aging Management of Steam and Power Conversion Systems

3.4.1 Summary of Technical Information in the Application

LRA Section 3.4 provides AMR results for those components that the applicant identified in LRA Section 2.3.4, "Steam and Power Conversion Systems," as being subject to an AMR. LRA Table 3.4-1, "Summary of Aging Management Evaluations for Steam and Power Conversion Systems," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-LR Report for the steam and power conversion systems components and component groups.

3.4.2 Staff Evaluation

SE Table 3.4-1, below, summarizes the NRC staff's evaluation of the component groups listed in LRA Section 3.4 and addressed in the GALL-LR Report.

Table 3.4-1 Staff Evaluation for Steam and Power Conversion Systems Components in the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.4-1, 001	Consistent with the GALL-LR Report (see SE Section 3.4.2.2.1)
3.4-1, 002	Consistent with the GALL-LR Report (see SE Section 3.4.2.2.2)
3.4-1, 003	Consistent with the GALL-LR Report (see SE Section 3.4.2.2.3)
3.4-1, 004	Not applicable to DCPP
3.4-1, 005	Consistent with the GALL-LR Report
3.4-1, 006	Not applicable to DCPP

Component Group (SRP-LR Item No.)	Staff Evaluation
3.4-1, 007	Not applicable to DCPP
3.4-1, 008	Consistent with the GALL-LR Report
3.4-1, 009	Not Used (addressed by 3.4-1, 008)
3.4-1, 010	Consistent with the GALL-LR Report
3.4-1, 011	Consistent with the GALL-LR Report
3.4-1, 012	Consistent with the GALL-LR Report (see SE Section 3.4.2.1.2)
3.4-1, 013	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.15 and 3.4.2.1.2)
3.4-1, 014	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.16 and 3.4.2.1.2)
3.4-1, 015	Consistent with the GALL-LR Report
3.4-1, 016	Consistent with the GALL-LR Report (see SE Section 3.4.2.1.3)
3.4-1, 017	Consistent with the GALL-LR Report
3.4-1, 018	Consistent with the GALL-LR Report
3.4-1, 019	Not applicable to DCPP
3.4-1, 020	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.2)
3.4-1, 021	Not applicable to DCPP
3.4-1, 022	Not applicable to DCPP
3.4-1, 023	Consistent with the GALL-LR Report
3.4-1, 024	Consistent with the GALL-LR Report
3.4-1, 025	Consistent with the GALL-LR Report (see SE Section 3.3.2.1.3)
3.4-1, 026	Consistent with the GALL-LR Report
3.4-1, 027	Consistent with the GALL-LR Report
3.4-1, 028	Not applicable to DCPP
3.4-1, 029	Not applicable to DCPP
3.4-1, 030	Not applicable to DCPP
3.4-1, 031	Not applicable to DCPP
3.4-1, 032	Not applicable to DCPP
3.4-1, 033	Consistent with the GALL-LR Report
3.4-1, 034	Consistent with the GALL-LR Report
3.4-1, 035	Not applicable to DCPP
3.4-1, 036	Consistent with the GALL-LR Report
3.4-1, 037	Consistent with the GALL-LR Report
3.4-1, 038	Consistent with the GALL-LR Report (see SE Section 3.4.2.1.4)
3.4-1, 039	Consistent with the GALL-LR Report
3.4-1, 040	Consistent with the GALL-LR Report (see SE Section 3.4.2.1.5)
3.4-1, 041	Consistent with the GALL-LR Report
3.4-1, 042	Consistent with the GALL-LR Report
3.4-1, 043	Consistent with the GALL-LR Report
3.4-1, 044	Consistent with the GALL-LR Report
3.4-1, 045	Consistent with the GALL-LR Report
3.4-1, 046	Consistent with the GALL-LR Report
3.4-1, 047	Not applicable to DCPP
3.4-1, 048	Not applicable to DCPP
3.4-1, 049	Not applicable to DCPP

Component Group (SRP-LR Item No.)	Staff Evaluation
3.4-1, 050	Not applicable to DCPP
3.4-1, 050.5	Not applicable to DCPP
3.4-1, 051	Not applicable to DCPP
3.4-1, 052	Not applicable to DCPP
3.4-1, 053	Not applicable to DCPP
3.4-1, 054	Consistent with the GALL-LR Report
3.4-1, 055	Consistent with the GALL-LR Report
3.4-1, 056	Consistent with the GALL-LR Report
3.4-1, 057	Not applicable to DCPP
3.4-1, 058	Consistent with the GALL-LR Report
3.4-1, 059	Consistent with the GALL-LR Report
3.4-1, 060	Consistent with the GALL-LR Report
3.4-1, 061	Not applicable to DCPP (see SE Section 3.4.2.2.6)
3.4-1, 062	Not applicable to DCPP
3.4-1, 063	Consistent with the GALL-LR Report
3.4-1, 064	Consistent with the GALL-LR Report
3.4-1, 065	Consistent with the GALL-LR Report
3.4-1, 066	Consistent with the GALL-LR Report
3.4-1, 067	Consistent with the GALL-LR Report
3.4-1, 068	Not applicable to DCPP

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 stated are either not applicable to DCPP or are consistent with the GALL-LR Report. Section 3.4.2.1.1 summarizes the staff's review of items that are not applicable or not used and documents any RAIs issued and the staff's conclusions. The remaining subsections in SE Section 3.4.2.1 document the staff's review of components that required additional information or otherwise required explanation.
2. SE Section 3.4.2.2 discusses AMR results for which the GALL-LR Report and SRP-LR 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-LR Report. These AMR results typically are identified by generic notes F through J and plant-specific notes in the LRA.

3.4.2.1 Aging Management Review Results Consistent with the GALL-LR Report

This subsection documents the NRC staff's review of AMR results listed in LRA Tables 3.4.2-1 through 3.4.2-5 that the applicant determined to be consistent with the GALL-LR Report. The staff audited and reviewed the information in the LRA. The staff did not repeat its review of the matters described in the GALL-LR Report (including exceptions to the GALL-LR Report); however, the staff did verify that the material presented in the LRA was applicable and that the applicant identified the appropriate GALL-LR Report AMRs. For those AMR items that the staff found to be consistent with the GALL-LR Report and for which no additional evaluation or RAI applies, the staff's review and conclusions, as documented in the GALL-LR Report, are considered to be the basis for the acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-LR Report" is documented in SE Table 3.4-1, and no separate writeup is required or provided.

SE Section 3.4.2.1.1 documents the NRC staff's review of AMR items that the applicant determined to be not applicable or not used.

For the AMR items that required additional evaluation (such as responses to RAIs), the NRC staff's evaluation is documented in SE Sections 3.4.2.1.2 through 3.4.2.1.5.

3.4.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

For LRA Table 3.4-1, items 3.4-1, 004; 3.4-1, 006; 3.4-1, 007; 3.4-1, 019; 3.4-1, 021; 3.4-1, 022; 3.4-1, 028; 3.4-1, 029; 3.4-1, 030; 3.4-1, 031; 3.4-1, 032; 3.4-1, 035; 3.4-1, 047; 3.4-1, 048; 3.4-1, 049; 3.4-1, 050; 3.4-1, 050.5; 3.4-1, 051; 3.4-1, 052; 3.4-1, 053; 3.4-1, 061; 3.4-1, 062; and 3.4-1, 068, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable to DCPP. The NRC staff reviewed the LRA, the description of the material and environment associated with each AMR item, and the associated AMP and plant-specific documents and finds the applicant's claim acceptable.

For the following LRA Table 3.4-1 item, the applicant claims that the corresponding item in the GALL-LR Report is not used and is addressed by another LRA Table 1 AMR item: 3.4-1, 009 (addressed by 3.4-1, 008). The NRC staff reviewed the LRA and confirmed that the aging effects for this item will be addressed by another LRA Table 1 AMR item. Therefore, the staff finds the applicant's proposal to use alternate items acceptable.

3.4.2.1.2 Loss of Material Due to General, Pitting and Crevice Corrosion

LRA Table 3.4-1, AMR item 3.4-1, 012 addresses loss of material due to general (steel only), pitting, and crevice corrosion for steel stainless steel tanks exposed to treated water. LRA Table 3.4-1, AMR item 3.4-1, 013 addresses loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements exposed to treated water. LRA Table 3.4-1, AMR item 3.4-1, 014 addresses loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements, PWR heat exchanger components exposed to treated water and steam. For LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program to manage the aging effects of these AMR items.

LRA Table 3.4.2-1, "Turbine Steam Supply System," as modified by letter dated October 14, 2024 (ML24289A118), item 3.4-1, 013 addresses carbon steel valve body exposed to a demineralized water internal environment. These items cite Table 3.4.2-1 plant-specific note 1, which states that "[a]ging of piping, and piping components in SGBD [steam generator blowdown] treatment demineralizer system fabricated of carbon steel with no internal lining/coating, gray cast iron, or stainless steel, with an internal environment of demineralized water will be managed using the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24)." Item 3.4-1, 013 also addresses loss of material for carbon steel piping, piping components exposed to a demineralized water internal environment. These items cite Table 3.4.2-1 plant-specific notes 1 and 2. Table 3.4.2-1 plant-specific note 2, as modified by letter dated October 14, 2024 (ML24289A118), states that "[t]hese piping, piping components are in the SGBD treatment demineralizer system. This system was designed to handle sulfuric acid, sodium hydroxide, or secondary water at 110°F for short periods of time in the event of a SG tube leak. The system has been laid up and the normal long-term internal environment will be demineralized water, plant indoor air, or dry gas. It is possible to use sulfuric acid and sodium hydroxide to regenerate the demineralizer resins, but the UFSAR requires the SGBD treatment demineralizer resins to be replaced (i.e., not regenerated). Therefore, sulfuric acid and sodium hydroxide will not be introduced into this system."

LRA Table 3.4.2-2, "Auxiliary Steam System," item 3.4-1, 012 addresses loss of material for carbon steel tanks (Boric Acid Batching Tanks) and stainless steel tanks (Radwaste Concentrator Drip Tanks) exposed to a secondary water internal environment. Item 3.4-1, 013 addresses loss of material for carbon steel heat exchanger shell-side components, piping, piping components and valve body exposed to a secondary water internal environment. Table 3.4.2-2 plant-specific note 2 states that "[c]omponents are associated with the Boric Acid Evaporator subsystem which is abandoned-in-place. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24)."

LRA Table 3.4.2-4, "Condensate System," as modified by letter dated October 14, 2024 (ML24289A118), item 3.4-1, 013 addresses loss of material for carbon steel piping, piping components and valve body exposed to a secondary water internal environment. Table 3.4.2-4 plant-specific note 2, as modified by letter dated October 14, 2024 (ML24289A118), states that "[t]he in-scope [Condensate] System components, which may have a raw water or secondary water environment, are abandoned-in-place. Thus, the DCPP Open Cycle Cooling Water System AMP (B.2.3.11), Water Chemistry AMP (B.2.3.2), and One-Time Inspection AMP (B.2.3.19) do not apply. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24)." Item 3.4-1, 014 manages loss of material for carbon steel heat exchanger (Main Condenser) shell-side components exposed to a secondary water or steam internal environment. Table 3.4.2-4 plant-specific note 1 states that "[a] different AMP is credited for the main condenser shell and hotwell internal surfaces. The aging of main condenser shell and hotwell internal surfaces exposed to the treated water and steam environment is managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) to provide periodic inspection. Use of the DCPP Water Chemistry AMP (B.2.3.2) and the DCPP One-Time Inspection AMP (B.2.3.19) is not deemed appropriate due to DCPP OE supporting anticipated condenser wall thickness reduction."

Based on its review of the components associated with items 3.4-1, 012, 3.4-1, 013, and 3.4-1, 014, which cite generic note E in Tables 3.4.2-1, 3.4.2-2, and 3.4.2-4, the NRC staff finds the applicant's proposal of using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program acceptable because the associated periodic inspections are capable of detecting loss of material for these components.

3.4.2.1.3 Loss of Material Due to Pitting, Crevice Corrosion

LRA Table 3.4-1, AMR item 3.4-1, 016, as modified by letter dated October 14, 2024 (ML24289A118), addresses loss of material due to pitting, crevice corrosion for copper alloy; stainless steel; nickel alloy; aluminum piping; piping components and piping elements, heat exchanger components and tubes; and PWR heat exchanger components exposed to treated water and steam. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program to manage the aging effects of these AMR items.

LRA Table 3.4.2-1, “Turbine Steam Supply System,” as modified by letters dated October 14, 2024 (ML24289A118), and March 6, 2025 (ML25069A508), item 3.4-1, 016 addresses loss of material for stainless steel valve body exposed to a demineralized water internal environment. These items cite Table 3.4.2-1 plant-specific notes 1 and 2. Table 3.4.2-1 plant-specific note 1 states that “[a]ging of piping, and piping components in SGBD treatment demineralizer system fabricated of carbon steel with no internal lining/coating, gray cast iron, or stainless steel, with an internal environment of demineralized water will be managed using the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24).” LRA Table 3.4.2-1 plant-specific note 2, as modified by letter dated October 14, 2024 (ML24289A118), states that “[t]hese piping, piping components are in the SGBD treatment demineralizer system. This system was designed to handle sulfuric acid, sodium hydroxide, or secondary water at 110°F for short periods of time in the event of a steam generator tube leak. The system has been laid up and the normal long-term internal environment will be demineralized water, plant indoor air, or dry gas. It is possible to use sulfuric acid and sodium hydroxide to regenerate the demineralizer resins, but the UFSAR requires the SGBD treatment demineralizer resins to be replaced (i.e., not regenerated). Therefore, sulfuric acid and sodium hydroxide will not be introduced into this system.” Lastly, item 3.4-1, 016 addresses loss of material for stainless steel heat exchanger (Abandoned Steam Purity Analyzer Sample Cooler) shell-side components and heat exchanger (Abandoned Steam Purity Analyzer Sample Cooler) tube-side components exposed to a steam internal environment. These items cite Table 3.4.2-1 plant-specific note 6 which states that “[t]he aging effects will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) because water chemistry is not maintained for the abandoned-in-place components.”

LRA Table 3.4.2-2 “Auxiliary Steam System,” item 3.4-1, 016 addresses loss of material for stainless steel piping, piping components exposed to a secondary water internal environment. Table 3.4.2-2 plant-specific note 2 states that “[c]omponents are associated with the Boric Acid Evaporator subsystem which is abandoned-in-place. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24).”

LRA Table 3.4.2-4 “Condensate System,” as modified by letter dated October 14, 2024 (ML24289A118), item 3.4-1, 016 addresses loss of material for stainless steel piping, piping components and valve body exposed to a secondary water internal environment. Table 3.4.2-4 plant-specific note 2, as modified by letter dated October 14, 2024 (ML24289A118), states that “[t]he in-scope [Condensate] System components, which may have a raw water or secondary water environment, are abandoned-in-place. Thus, the DCPP Open Cycle Cooling Water System AMP (B.2.3.11), Water Chemistry AMP (B.2.3.2), and One-Time Inspection AMP (B.2.3.19) do not apply. Thus, aging of the components will be managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24).”

Based on its review of the components associated with item 3.4-1, 016, which cites generic note E in Tables 3.4.2-1, 3.4.2-2, and 3.4.2-4, the NRC staff finds the applicant’s proposal of using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program acceptable because the associated periodic inspections are capable of detecting loss of material for these components.

3.4.2.1.4 Loss of Material Due to General, Pitting, Crevice, Galvanic, and Microbiologically Influenced Corrosion; Fouling that Leads to Corrosion

LRA Table 3.4-1, AMR item 3.4-1, 038 addresses: (1) loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion; and (2) fouling that leads to corrosion for steel piping, piping components, and piping elements exposed to raw water. During its review of components associated with AMR item 3.4-1, 038 for which the applicant cited generic note B, the NRC staff determined the need for additional information with respect to why fouling was not cited in addition to loss of material for carbon steel valve bodies exposed to raw water in LRA Table 3.4.2-5, "Auxiliary Feedwater System – Summary of Aging Management Evaluation." However, prior to the issuance of an RAI, the applicant modified the LRA by letter dated October 14, 2024 (ML24289A118), which added fouling as an AERM for carbon steel piping and piping components exposed to raw water in LRA Table 3.4.2-5, thereby addressing the staff's concern.

3.4.2.1.5 Loss of Material Due to General, Pitting, and Crevice Corrosion

LRA Section 3.4.2.2.3 Table 3.4-1, AMR item 3.4-1, 040 addresses the aging effect of loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements exposed to lubricating oil. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) to manage the aging effect for carbon steel piping, piping components loss of material of steel piping and piping components. In addition, tanks exposed to lubricating oil that are abandoned-in-place in the Auxiliary Steam System (AXS) is managed by the DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24), which takes exception to NUREG-1801. The AMR items cite generic note E, which states that "[c]onsistent with NUREG-1801 material, environment, and aging effect but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP," and site-specific note 3, which states that "[t]he in-scope AXS components which may have an oil environment are abandoned-in-place. Thus, the DCPP Lubricating Oil Analysis AMP (B.2.3.25) does not apply."

Based on its review of components associated with AMR item 3.4-1, 040 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP acceptable because the credited program requires visual inspections that are capable of detecting loss of material in the associated components. The staff finds the applicant's proposal acceptable for the following reasons:

1. The abandoned components are in-scope for license renewal due to their spatial relation to other components in the same building and do not perform a safety function.
2. The proposed program includes visual inspections of the internal surfaces of components, which are appropriate to detect loss of material and fouling for these components and will be performed based upon assessment of the potential for degradation and OE.

The NRC staff reviewed LRA Section 3.4.2.2.3 against the criteria in SRP-LR Section 3.4.2.2.8, which states that loss of material due to general, pitting, and crevice corrosion could occur in steel piping, piping components, and piping elements exposed to lubricating oil. The existing program relies on the periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. However, control of lube oil contaminants may not always have been adequate to prevent corrosion. Therefore, the effectiveness of lubricating oil control should be verified to ensure that corrosion is not occurring. The GALL-LR Report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the Lubricating Oil Analysis program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

3.4.2.1.6 Cracking Due to Stress Corrosion Cracking in Heat Exchanger Components Exposed to Steam

LRA Table 3.4.2-1, “Turbine Steam Supply System,” as modified by letter dated October 14, 2024 (ML24289A118), item 3.4-1, 011 addresses cracking for stainless steel heat exchanger (Abandoned Steam Purity Analyzer Sample Cooler) shell-side components and heat exchanger (Abandoned Steam Purity Analyzer Sample Cooler) tube-side components exposed to a steam internal environment. These items cite Table 3.4.2-1 plant-specific note 6 which states that the aging effects will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP (B.2.3.24) because water chemistry is not maintained for the abandoned-in-place components. Based on its review of the components associated with item 3.4-1, 011 that cite plant-specific note 6 and generic note E in Table 3.4.2-1, the NRC staff finds the applicant’s proposal of using the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program acceptable because the associated periodic inspections are capable of detecting cracking for these components.

3.4.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-LR Report

In LRA Section 3.4.2.2, the applicant further evaluates aging management for certain steam and power conversion components, as recommended by the GALL-LR Report, and provides information on 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-LR Section 3.4.2.2. The following subsections document the staff’s review.

3.4.2.2.1 Cumulative Fatigue Damage

LRA Section 3.4.2.2.1, associated with LRA Table 3.4-1, AMR item 3.4-1, 001, indicates that the TLAA on cumulative fatigue damage in the components of steam and power conversion systems is evaluated in accordance with 10 CFR 54.21(c)(1) and is addressed in LRA Section 4.3. This is consistent with SRP-LR Section 3.4.2.2.1 and is, therefore, acceptable. The NRC staff’s evaluation of the TLAA for the components of steam and power conversion systems is documented in SE Section 4.3.

3.4.2.2.2 Cracking Due to Stress Corrosion Cracking

LRA Section 3.4.2.2.2, associated with LRA Table 3.4-1, AMR item 3.4-1, 002, addresses cracking due to SCC for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, which will be managed by the External Surfaces Monitoring of Mechanical Components program. The NRC staff reviewed the applicant’s proposal against the criteria in SRP-LR Section 3.4.2.2.2. In its review of components associated with AMR item 3.4-1, 002, the staff finds that the applicant has met the further evaluation criteria and that the applicant’s proposal to manage the effects of aging using the External Surfaces

Monitoring of Mechanical Components program is acceptable because the proposed periodic inspections are capable of detecting cracking.

Based on the program identified, the NRC staff determined that the applicant's program meets the SRP-LR Section 3.4.2.2.2 criteria. For those AMR items associated with LRA Section 3.4.2.2.2, the staff concludes that the LRA is consistent with the GALL-LR 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 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

LRA Section 3.4.2.2.3, associated with LRA Table 3.4-1, AMR item 3.4-1, 003, addresses loss of material due to pitting and crevice corrosion for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, which will be managed by the External Surfaces Monitoring of Mechanical Components program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.4.2.2.3. In its review of components associated with AMR item 3.4-1, 003, the staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the External Surfaces Monitoring of Mechanical Components program is acceptable because the proposed periodic inspections are capable of detecting loss of material.

Based on the program identified, the NRC staff determined that the applicant's program meets the SRP-LR Section 3.4.2.2.3 criteria. For those AMR items associated with LRA Section 3.4.2.2.3, the staff concludes that the LRA is consistent with the GALL-LR 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 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 NRC 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 NRC staff's evaluation of the applicant's ongoing review of OE.

3.4.2.2.6 Loss of Material Due to Recurring Internal Corrosion

LRA Section 3.4.2.2.6, associated with LRA Table 3.4-1, AMR item 3.4-1, 061, addresses recurring internal corrosion for metallic piping, piping components, and tanks exposed to raw water or wastewater. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.4.2.2.6. The applicant stated that its review of OE documentation did not find any instances that met the criteria of recurring internal corrosion in the steam and power conversion systems. Based on this review, the applicant stated that item 3.4-1, 061 was not applicable. The staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.4.2.2.6 and finds it acceptable because the staff also did not identify any examples of recurring internal corrosion in steam and power conversion systems during its review of the applicant's OE information.

3.4.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-LR Report

The following subsections document the NRC staff's review of those AMR results listed in LRA Tables 3.4.2-1 through 3.4.2-5 that are either not consistent with, or not addressed in, the GALL-LR Report and that 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 SRP-LR Table 1 item, the subsections are organized by applicable AMR sections and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-LR Report, the NRC 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 period of extended operation. The following sections document the staff's evaluation.

3.4.2.3.1 Chemical and Volume Control System – Summary of Aging Management Evaluation

Nickel Alloys Exposed Externally to Closed-Cycled Cooling Water. LRA Table 3.3.2-8 states that loss of material for nickel alloys heat exchangers exposed to closed-cycle cooling water will be managed by the Closed Treated Water Systems program. The AMR item cites generic note G.

The NRC staff reviewed the associated items in the LRA 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 noted that the applicant addressed loss of material for this component, material, and environment combination in other AMR items. Based on the GALL-LR Report, the Closed Treated Water Systems program includes:

- water treatment, including the use of corrosion inhibitors, to modify the chemical composition of the water such that the function of the equipment is maintained and such that the effects of corrosion are minimized;
- chemical testing of the water to ensure that the water treatment program maintains the water chemistry within acceptable guidelines; and
- inspections to determine the presence or extent of corrosion and/or cracking.

Additionally, the DCPP Closed Treated Water Systems AMP implements water treatment, which includes: the use of a corrosion inhibitor to minimize the corrosion; chemical testing of water to ensure and maintain the water chemistry within an acceptable level; and condition monitoring or visual inspections of components to determine the presence of corrosion, cracking, or fouling. The NRC staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination. The staff finds the applicant's proposal to manage the effects of aging acceptable because use of the Closed Treated Water Systems program to manage loss of material in nickel-alloy components exposed to closed-cycle cooling water is consistent with the recommendations of the GALL-LR Report.

3.4.2.3.2 Supports and Commodities – Summary of Aging Management Evaluation

PVC Conduit and Supports Encased in Concrete, Buried, and Exposed to Plant Indoor Air. As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.5.2-14 identifies no aging effects/mechanisms and no aging management programs for PVC conduit and supports encased in concrete, buried, and exposed to plant indoor air. The AMR items cite generic note G and plant-specific notes 2, 3, and 10, which state the following:

- Plant-specific note 2: "For the external PVC buried environment, NUREG-2192, Table IX.F, includes the following with regards to defining wear: 'Loss of material due to wear can also occur in polymeric components buried in soil containing deleterious materials that move over time due to seasonal change effects on soil.' DCPP is located in a negligible weathering region, as defined in ASTM C33/C33M-23, Figure 1. A negligible weathering region is defined as a climate where concrete is rarely exposed to freezing in the presence of moisture. Due to DCPP's location in a negligible weathering region, there are no significant seasonal changes on the soil, and no movement over time that would induce loss of material due to wear on the buried PVC conduit." [Note: Table IX.F is located in NUREG-2191, Volume 2 (ML17187A204), not in NUREG-2192 as stated in Footnote 2.]
- Plant-specific note 3: "Consistent with guidance in NUREG-2191, PVC encased in concrete has no applicable aging effect requiring management."
- Plant-specific note 10: "Consistent with guidance in NUREG-2191, PVC exposed to air – outdoor is susceptible to reduction in impact strength due to photolysis and PVC exposed to air – indoor uncontrolled has no aging effects requiring management. The DCPP External Surfaces Monitoring of Mechanical Components AMP (B.2.3.22) will be used to manage PVC conduit exposed atmosphere/weather."

For the items in the LRA associated with buried PVC, the NRC staff finds the applicant's proposal acceptable because DCPP is located in a negligible weathering region with no significant seasonal changes, therefore, loss of material due to wear from soil movement over time is not expected. In addition, NUREG-2221 states, in part, "Based on a review of 'PVC Degradation and Stabilization,' George Wypych, Chem Tec Publishing, 2008, and 'Advances in Polymer Nanocomposites - Types and Applications,' Fengge Gao, Woodhead Publishing, 2012; buried PVC is not susceptible to thermal, [ultraviolet], or radiation related degradation. In addition, based on the typical range of environments within the pipe and soil composition, PVC is not susceptible to chemical degradation." For the items in the LRA associated with PVC encased in concrete and exposed to plant indoor air, the staff finds the applicant's proposal acceptable because consistent with the guidance in NUREG-2191, PVC encased in concrete and exposed to plant indoor air have no applicable aging effects requiring management. Therefore, the staff finds the applicant's proposal that there are no aging effects for this component, material, and environment combination acceptable.

3.5 Aging Management of Containments, Structures, and Component Supports

3.5.1 Summary of Technical Information in the Application

LRA Section 3.5 provides AMR results for those components that the applicant identified in LRA Section 2.4, "Scoping and Screening Results - Structures," as being subject to an AMR. LRA Table 3.5-1, "Summary of Aging Management Evaluations for the Containments, Structures and Component Supports," is a summary comparison of the applicant's AMRs with those evaluated in the GALL-LR Report for the containments, structures, and component supports components and component groups.

3.5.2 Staff Evaluation

SE Table 3.5-1, below, summarizes the NRC staff's evaluation of the component groups listed in LRA Section 3.5 and addressed in the GALL-LR Report.

Table 3.5-1 Staff Evaluation for Containments, Structures, and Component Supports Components in the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.5.1-001	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.1)
3.5.1-002	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.1)
3.5.1-003	Not applicable to DCPP (see SE Section 3.5.2.2.1.2)
3.5.1-004	Not applicable to PWRs (see SE Section 3.5.2.2.1.3, item 1)
3.5.1-005	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.3, item 1)
3.5.1-006	Not applicable to PWRs (see SE Section 3.5.2.2.1.3, item 2)
3.5.1-007	Not applicable to PWRs (see SE Section 3.5.2.2.1.3, item 3)
3.5.1-008	Not applicable to DCPP (see SE Section 3.5.2.2.1.4)
3.5.1-009	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.5)
3.5.1-010	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.6)
3.5.1-011	Not applicable to DCPP (see SE Section 3.5.2.2.1.7)
3.5.1-012	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.8)
3.5.1-013	Not Used (addressed by 3.5-1, 014) (see SE Section 3.5.2.2.1.9)
3.5.1-014	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.9)
3.5.1-015	Not Used
3.5.1-016	Not Used (see SE Section 3.5.2.1.1)
3.5.1-017	Consistent with the GALL-LR Report
3.5.1-018	Not applicable to DCPP
3.5.1-019	Consistent with the GALL-LR Report
3.5.1-020	Consistent with the GALL-LR Report
3.5.1-021	Consistent with the GALL-LR Report
3.5.1-022	Not applicable to PWRs
3.5.1-023	Not Used (addressed by 3.5-1, 025)
3.5.1-024	Consistent with the GALL-LR Report
3.5.1-025	Consistent with the GALL-LR Report
3.5.1-026	Consistent with the GALL-LR Report
3.5.1-027	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.1.6)
3.5.1-028	Consistent with the GALL-LR Report
3.5.1-029	Consistent with the GALL-LR Report
3.5.1-030	Consistent with the GALL-LR Report
3.5.1-031	Consistent with the GALL-LR Report
3.5.1-032	Not applicable to DCPP
3.5.1-033	Consistent with the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.5.1-034	Consistent with the GALL-LR Report
3.5.1-035	Consistent with the GALL-LR Report
3.5.1-036	Not applicable to PWRs
3.5.1-037	Not applicable to PWRs
3.5.1-038	Not applicable to PWRs
3.5.1-039	Not applicable to PWRs
3.5.1-040	Not applicable to PWRs
3.5.1-041	Not applicable to PWRs
3.5.1-042	Not applicable to DCPP (see SE Section 3.5.2.2.2.1, item 1)
3.5.1-043	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.2.1, item 2)
3.5.1-044	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.2.1, item 3)
3.5.1-045	Not applicable to DCPP
3.5.1-046	Not Used (addressed by 3.5-1, 044) (see SE Section 3.5.2.2.2.1, item 3)
3.5.1-047	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.2.1, item 4)
3.5.1-048	Not applicable to DCPP (see SE Section 3.5.2.2.2.2)
3.5.1-049	Not applicable to DCPP (see SE Section 3.5.2.2.2.3, item 1)
3.5.1-050	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.2.3, item 2)
3.5.1-051	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.2.3, item 3)
3.5.1-052	Not Used (addressed by 3.2-1, 068 and 3.2-1, 070) (see SE Section 3.5.2.2.2.4)
3.5.1-053	Consistent with the GALL-LR Report (see SE Section 3.5.2.2.2.5)
3.5.1-054	Consistent with the GALL-LR Report
3.5.1-055	Consistent with the GALL-LR Report
3.5.1-056	Consistent with the GALL-LR Report
3.5.1-057	Consistent with the GALL-LR Report
3.5.1-058	Consistent with the GALL-LR Report
3.5.1-059	Consistent with the GALL-LR Report
3.5.1-060	Not applicable to DCPP
3.5.1-061	Consistent with the GALL-LR Report
3.5.1-062	Not applicable to DCPP
3.5.1-063	Consistent with the GALL-LR Report
3.5.1-064	Not applicable to DCPP
3.5.1-065	Consistent with the GALL-LR Report
3.5.1-066	Consistent with the GALL-LR Report
3.5.1-067	Consistent with the GALL-LR Report
3.5.1-068	Consistent with the GALL-LR Report
3.5.1-069	Not Used
3.5.1-070	Consistent with the GALL-LR Report (see SE Section 3.5.2.1.2)
3.5.1-071	Not applicable to DCPP
3.5.1-072	Consistent with the GALL-LR Report
3.5.1-073	Not Used (addressed by 3.5-1, 034)
3.5.1-074	Consistent with the GALL-LR Report
3.5.1-075	Consistent with the GALL-LR Report
3.5.1-076	Not applicable to PWRs

Component Group (SRP-LR Item No.)	Staff Evaluation
3.5.1-077	Consistent with the GALL-LR Report
3.5.1-078	Consistent with the GALL-LR Report (see SE Section 3.5.2.1.3)
3.5.1-079	Consistent with the GALL-LR Report
3.5.1-080	Consistent with the GALL-LR Report
3.5.1-081	Consistent with the GALL-LR Report
3.5.1-082	Consistent with the GALL-LR Report
3.5.1-083	Consistent with the GALL-LR Report
3.5.1-084	Consistent with the GALL-LR Report
3.5.1-085	Not Used (addressed by 3.5-1, 084)
3.5.1-086	Not applicable to DCPP
3.5.1-087	Consistent with the GALL-LR Report
3.5.1-088	Consistent with the GALL-LR Report
3.5.1-089	Consistent with the GALL-LR Report
3.5.1-090	Not applicable to DCPP
3.5.1-091	Consistent with the GALL-LR Report
3.5.1-092	Consistent with the GALL-LR Report (see SE Section 3.5.2.1.3)
3.5.1-093	Consistent with the GALL-LR Report
3.5.1-094	Not applicable to DCPP
3.5.1-095	Consistent with the GALL-LR 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 3.5.2.1 discusses AMR results for components that the applicant stated are either not applicable to DCPP or are consistent with the GALL-LR Report. Section 3.5.2.1.1 summarizes the staff's review of items that are not applicable or not used and documents any RAIs issued and the staff's conclusions. The remaining subsections in SE Section 3.5.2.1 document the review of components that required additional information or otherwise required explanation.
2. SE Section 3.5.2.2 discusses AMR results for which the GALL-LR Report and SRP-LR 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-LR Report. These AMR results typically are identified by generic notes F through J and plant-specific notes in the LRA.

3.5.2.1 Aging Management Review Results Consistent with the GALL-LR Report

This subsection documents the NRC staff's review of AMR results listed in LRA Tables 3.5.2-1 through 3.5.2-14 that the applicant determined to be consistent with the GALL-LR Report. The staff audited and reviewed the information in the LRA. The staff did not repeat its review of the matters described in the GALL-LR Report (including exceptions to the GALL-LR Report); however, the staff did verify that the material presented in the LRA was applicable and that the applicant identified the appropriate GALL-LR Report AMRs. For those AMR items that the staff found to be consistent with the GALL-LR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions, as documented in the GALL-LR Report, are considered the basis for the acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-LR Report" is documented in SE Table 3.5-1, and no separate writeup is required or provided.

SE Section 3.5.2.1.1 documents the NRC staff's review of AMR items that the applicant determined to be not applicable or not used.

For the AMR items that required additional evaluation (such as responses to RAIs), the NRC staff's evaluation is documented in SE Sections 3.5.2.1.2 through 3.5.2.1.4.

3.5.2.1.1 Aging Management Review Results Identified as not Applicable or Not Used

For LRA Table 3.5-1, items 3.5-1, 003; 3.5-1, 008; 3.5-1, 011; 3.5-1, 018; 3.5-1, 032; 3.5-1, 042; 3.5-1, 045; 3.5-1, 048; 3.5-1, 049; 3.5-1, 060; 3.5-1, 062; 3.5-1, 064; 3.5-1, 071; 3.5-1, 086; 3.5 1, 086; and 3.5-1, 094, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable to DCPP. The NRC staff reviewed the LRA, the description of the material and the environment associated with each AMR item, and the associated AMP and plant-specific documents and finds the applicant's claim acceptable.

For LRA Table 3.5-1, items 3.5-1, 004; 3.5-1, 006; 3.5-1, 007; 3.5-1, 022; 3.5-1, 036 through 3.5-1, 041; and 3.5-1, 076, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable because the associated items are only applicable to BWRs. The NRC staff reviewed the SRP-LR, confirmed that these items apply only to BWRs, and finds that these items are not applicable to DCPP because it is a PWR.

For the following LRA Table 3.5-1 items, the applicant claims that the corresponding items in the GALL-LR Report are not used and are addressed by other LRA Table 1 AMR items: 3.5-1, 013 (addressed by 3.5-1, 014); 3.5-1, 023 (addressed by 3.5-1, 025); 3.5-1, 046 (addressed by 3.5-1, 044); 3.5 1, 052 (addressed by 3.2-1, 068 and 3.2-070); 3.5-1, 073 (addressed by 3.5-1, 034); and 3.5-1, 085 (addressed by 3.5-1, 084). The NRC staff reviewed the LRA and confirmed that the aging effects for each of these items will be addressed by other LRA Table 1 AMR items. Therefore, the staff finds the applicant's proposal to use alternate items acceptable.

LRA Table 3.5.1, AMR item 3.5-1, 016 addresses managing increase in porosity and permeability; cracking; loss of material due to aggressive chemical attack for accessible concrete basemat, containment; and walls exposed to groundwater and soil. The applicant stated that this item is not used. The NRC staff evaluated the applicant's claim and finds it acceptable because the GALL-LR XI.S2 program scope includes visual examinations of accessible concrete surfaces in accordance with ASME Section XI, Subsection IWL, Table IWL-2500-1. Although the material, environment, and aging effect combination exists, the portions of the reinforced concrete basemat and walls exposed to groundwater and soil are completely below-grade and not accessible for visual inspections; therefore, this AMR item is not used.

LRA Table 3.5-1, AMR item 3.5-1, 086 addresses managing loss of material due to corrosion for steel structural bolting exposed to air-outdoor environment. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's claim and finds it acceptable because there are no structural bolts exposed to an atmosphere/weather (air-outdoor) environment in the DCPP spent fuel pool.

LRA Table 3.5-1, AMR item 3.5-1, 090 addresses managing loss of material due to corrosion for support members of steel or stainless exposed to treated water. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant’s claim and finds it acceptable because DCPP does not have piping or component supports exposed to treated or borated water.

LRA Table 3.5-1, AMR item 3.5-1, 094 addresses managing reduction or loss of isolation function for nonmetallic vibration isolation elements of Class 1, 2, 3 component supports exposed to air-indoor, uncontrolled or air-outdoor. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant’s claim and finds it acceptable because, as stated in Attachment GG of LRA Amendment 1 (ML24289A118) and verified by the staff during the audit, there are no elastomeric vibration isolation elements installed in DCPP component supports.

LRA Table 3.5.1, AMR item 3.5-1, 071 addresses spalling, scaling, and cracking due to freeze-thaw exposed to outdoor air. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant’s claim and finds it acceptable because DCPP is located in a region of mild climate which generally lacks freezing temperatures. As noted in UFSAR Section 2.3.3.2.2, the lowest hourly temperature recorded at the DCPP site was 33°F; therefore, freezing temperatures for durations sufficient to cause freeze-thaw aging effects do not occur at the DCPP site.

LRA Table 3.5-1, AMR item 3.5-1, 018 addresses the aging effects of loss of material (e.g., scaling, spalling) and cracking due to freeze-thaw in accessible areas of concrete components (e.g., dome, wall, basemat, ring girders, buttresses) of concrete structures exposed to an air-outdoor environment. The applicant stated that this AMR item is not applicable. The NRC staff evaluated the applicant’s claim and finds it acceptable because DCPP is located in a “negligible” weathering region as determined by ASTM C33, Figure 1 and the exterior concrete is not exposed to temperatures of 32°F or less as is required for this aging effect to occur.

LRA Table 3.5-1, AMR item 3.5-1, 015 addresses the aging effects of increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation for accessible concrete areas of the basemat. The applicant stated that this item is not used. The staff evaluated the applicant’s claim and finds it acceptable because the reinforced concrete basemat for the containment is completely below-grade and is not accessible.

LRA Table 3.5-1, AMR item 3.5-1, 064 addresses the aging effects of loss of material (scaling, spalling) and cracking due to freeze-thaw in accessible exterior above-grade and below-grade areas as well as foundations of Groups 1–3, 5, 7–9 concrete structures exposed to an air-outdoor environment. The applicant stated that this AMR item is not applicable. The NRC staff evaluated the applicant’s claim and finds it acceptable because DCPP is located in a “negligible” weathering region as determined by ASTM C33, Figure 1 and the exterior concrete is not exposed to temperatures of 32°F or less as is required for this aging effect to occur.

LRA Table 3.5-1, AMR item 3.5-1, 023 addresses the aging effects of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel for inaccessible containment concrete components exposed to air-indoor uncontrolled or air-outdoor environment. The applicant stated that this item is not used. The NRC staff evaluated the applicant’s claim and finds it acceptable because the aging effects of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel for inaccessible containment concrete components exposed to air-indoor uncontrolled or air-outdoor environment is managed by the ASME Section XI, Subsection IWL program and is further addressed under AMR item 3.5-1, 025.

LRA Table 3.5-1, AMR item 3.5-1, 060 addresses loss of material (spalling, scaling) and cracking due to freeze-thaw of Group 6: concrete (accessible areas): exterior above-grade and below-grade; and foundation, exposed to outdoor air. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's claim and finds it acceptable because DCPP is in a region where weathering conditions are considered negligible as shown in ASTM C33-90, Figure 1; therefore, the concrete elements are not subject to the listed aging effects due to freeze-thaw.

LRA Table 3.5-1, AMR item 3.5-1, 062 addresses loss of material; change in material properties due to weathering, chemical degradation, and insect infestation repeated wetting and drying, fungal decay of Group 6: wooden piles; and sheeting. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's claim and finds it acceptable because DCPP has no wooden piles or sheeting for Group 6.

3.5.2.1.2 Cracking Due to Restraint Shrinkage, Creep, and Aggressive Environment

LRA Table 3.5-1, AMR item 3.5-1, 070 addresses cracking for masonry walls exposed to uncontrolled air-indoor or air-outdoor. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Fire Protection and Masonry Walls programs to manage the aging effect for masonry walls in the turbine buildings and auxiliary buildings. The AMR items cite plant-specific note 1, which states that "[t]he DCPP Fire Protection AMP (B.2.3.14) and the DCPP Masonry Walls AMP (B.2.3.32) will be used to manage cracking in masonry walls; consistent with guidance in NUREG-2191." Based on its review of components associated with AMR item 3.5-1, 070 for which the applicant cited generic note E, the NRC staff finds the applicant's proposal to manage the effects of aging using the Fire Protection and Masonry Walls programs consistent with guidance in Volume 1 of NUREG-2191, which credits both programs to manage cracking of masonry walls used as structural fire barriers.

3.5.2.1.3 Cracking Due to Stress Corrosion Cracking and Loss of Material due to Pitting and Crevice Corrosion

LRA Table 3.5-1, AMR item 3.5-1, 078, as modified by letter dated October 14, 2024 (ML24289A118), addresses cracking due to SCC and loss of material due to pitting and crevice corrosion for steel components: fuel pool liner. For the LRA Table 2 AMR items that cite generic note E, the LRA credits the Water Chemistry and One-Time Inspection programs to manage the aging effects for those AMR items. In LRA Table 3.5.2-1, "Containment Building," as modified by letter dated October 14, 2024 (ML24289A118), AMR item 3.5-1, 078 addresses cracking and loss of material for stainless steel liner refueling exposed to a submerged external environment. Table 3.5.2-1 plant-specific note 5 states, "Addresses refueling cavity liner and fuel transfer tube inside Containment during infrequent exposure to borated water and managed in accordance with LR-ISG-2011-01: Aging Management of Stainless Steel Structures and Components in Treated Borated Water, Revision 1." Item 3.5-1, 078 also addresses cracking and loss of material for stainless steel reactor vessel permanent cavity seal ring assembly exposed to a submerged external environment. Table 3.5.2-1 plant-specific note 11 states, "The reactor vessel permanent cavity seal ring assembly will be managed by the DCPP Water Chemistry (B.2.3.2) and One-Time Inspection (B.2.3.19) AMP in accordance with LR-ISG-2011-01: Aging Management of Stainless Steel Structures and Components in Treated Borated Water, Revision 1."

Based on its review of components associated with AMR item 3.5-1, 078 for which the applicant cited generic note E in Table 3.5.2-1, the NRC staff finds the applicant's proposal to manage the effects of aging using the Water Chemistry and One-Time Inspection programs acceptable because these specific components are not addressed in the GALL-LR Report or GALL-SLR Report, and use of the Water Chemistry and One-Time Inspection programs is consistent with the guidance in LR-ISG-2011-01 for managing loss of material and cracking for stainless steel components exposed to treated borated water.

3.5.2.1.4 Loss of Material Due to General and Pitting Corrosion

LRA Table 3.5-1, AMR item 3.5-1, 092 addresses loss of material for support members, welds, bolted connections, and support anchorage to building structure. For the LRA Table 2 AMR item that cites generic note E, as modified by letter dated October 14, 2024 (ML24289A118), the LRA credits the Fire Protection and Structures Monitoring programs to manage loss of material for carbon steel cable trays and supports (including tube track) exposed externally to atmosphere/weather and plant indoor air. The AMR item cites plant-specific note 1, which states, “The DCPP Structures Monitoring AMP (B.2.3.33) will be used to manage loss of material for all in-scope cable trays and supports (including tube track). The DCPP Fire Protection AMP (B.2.3.14) will manage loss of material for cable trays credited for fire protection.” Based on its review of components associated with AMR item 3.5-1, 092 for which the applicant cited generic note E, the NRC staff finds the applicant’s proposal to manage the effects of aging using the Fire Protection and Structures Monitoring programs acceptable because periodic visual inspections in accordance with the Fire Protection program can identify loss of material before a loss of intended function and using the Structures Monitoring program is consistent with GALL-LR.

3.5.2.1.5 Loss of Material Due to General, Pitting, and Crevice Corrosion

LRA Table 3.5-1, AMR item 3.5-1, 080, as modified by letter dated October 14, 2024 (ML24289A118), and AMR item 3.5-1, 082 address loss of material due to general, pitting, and crevice corrosion for carbon steel structural bolting exposed to plant indoor air and atmosphere/weather environments, respectively. For the AMR Table 2 items that cite generic note E, the LRA credits the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP to manage the aging effect for carbon steel structural bolting. The AMR items cite plant-specific note 1, which states, “The DCPP Inspection of Overhead Heavy Load and Light Load (Related to Fuel Handling) Systems AMP (B.2.3.13) is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. Reference NUREG-2191, line VII.B.A-730.”

Based on its review of components associated with AMR items 3.5-1, 080 and 3.5-1, 082 for which the applicant cited generic note E , the NRC staff finds the applicant’s proposal to manage the effects of aging using the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP acceptable because the enhanced AMP periodically inspects carbon steel structural bolting for loss of material on an inspection frequency in accordance with ASME B30.2, “Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist), American Society of Mechanical Engineers,” 2005 Edition, or other appropriate standards in the ASME B30 series, in a manner that is consistent with the GALL-LR Report recommendations for this material and environment combination, so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

3.5.2.1.6 Loss of Preload Due to Self-Loosening

LRA Table 3.5-1, AMR item 3.5-1, 088 addresses loss of preload due to self-loosening for carbon steel structural bolting exposed to plant indoor air and atmosphere/weather environments. For the AMR Table 2 item that cites generic note E, the LRA credits the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP to manage the aging effect for carbon steel structural bolting. The AMR item cites plant-specific note 1, which states, “The DCPP Inspection of Overhead Heavy Load and Light Load (Related to Fuel Handling) Systems AMP (B.2.3.13) is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. Reference NUREG-2191, line VII.B.A-730.”

Based on its review of components associated with AMR item 3.5-1, 088 for which the applicant cited generic note E, the NRC staff finds the applicant’s proposal to manage the effects of aging using the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP acceptable because the enhanced AMP periodically inspects carbon steel structural bolting for loose bolts, missing or loose nuts, or other indications of loss of preload and cracking for bolted connections of the containment dome service crane on an inspection frequency in accordance with ASME B30.2, “Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist), American Society of Mechanical Engineers,” 2005 Edition, or other appropriate standards in the ASME B30 series, in a manner that is consistent with the GALL-LR Report recommendations for this material and environment combination, so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

In addition, LRA Table 3.5-1, AMR item 3.5-1, 088 addresses loss of preload due to self-loosening for carbon steel and stainless steel structural bolting exposed to submerged environment. For the AMR Table 2 item that cites generic note E, the LRA credits the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP to manage the aging effect for carbon steel and stainless steel structural bolting. The AMR item cites plant-specific note 3, which states, “Submerged structural bolting will be managed by the DCPP RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP (B.2.3.34).”

Based on its review of components associated with AMR item 3.5-1, 088 for which the applicant cited generic note E, the NRC staff finds the applicant’s proposal to manage the effects of aging using the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP acceptable because the enhanced AMP periodically inspects loss of preload due to self-loosening for carbon steel and stainless steel structural bolting exposed to submerged environment on a frequency not to exceed five years in a manner that is consistent with the GALL-LR Report recommendations for this material and environment combination, so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

3.5.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-LR Report

In LRA Section 3.5.2.2, the applicant further evaluates aging management for certain containment, structure, and component support components as recommended by the GALL-LR 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-LR Section 3.5.2.2. The following subsections document the staff's review.

3.5.2.2.1 Pressurized-Water Reactor and Boiling-Water Reactor Containments

3.5.2.2.1.1 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 Subfoundations

LRA Section 3.5.2.2.1.1, associated with LRA Table 3.5-1, AMR items 3.5-1, 001 and 3.5-1, 002, addresses cracking and distortion due to increased stress levels from settlement for the concrete dome; wall; basemat; ring girders; and buttresses of the containment exposed to soil and reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation exposed to water flowing, which will be managed by the Structures Monitoring program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.5.2.2.1.1. In its review of components associated with AMR item 3.5-1, 001, the staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

1. The use of periodic visual inspections under the Structures Monitoring program will reveal the indications of settlement including cracking and distortion in the containment and components and closure of seismic gap between structures; and
2. DCPP does not rely upon a dewatering system to control settlement.

The NRC staff reviewed the plant-specific OE and did not find any history of significant cracking or distortion that could adversely affect intended function(s) due to increased levels of settlement.

In its review of components associated with AMR item 3.5-1, 002, as modified by letter dated October 14, 2024 (ML24289A118), the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

1. The use of periodic visual inspections under the Structures Monitoring program will reveal the indications of settlement including cracking and distortion in the containment and components and closure of seismic gap between structures;
2. DCPP does not rely upon a dewatering system to control settlement; and
3. DCPP has no porous concrete subfoundations.

Based on the program identified, the NRC staff concludes that the applicant's program meets SRP-LR Section 3.5.2.2.1.1 criteria. For those AMR items associated with LRA Section 3.5.2.2.1.1, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation as required by 10 CFR 54.21(a)(3).

3.5.2.2.1.2 Reduction of Strength and Modulus Due to Elevated Temperature

LRA Section 3.5.2.2.1.2, associated with LRA 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 AMR item is not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.5.2.2.1.2 and finds it acceptable because based on its review of LRA Section 3.5.2.2.1.2, Table 2.4-1, and Table 3.5.2-1:

1. General area temperatures inside containment are maintained by the containment heating, ventilation, and air conditioning system, for which aging effects are managed per LRA Table 3.2.2-4, and will not result in concrete temperatures in excess of 150°F;
2. Containment piping penetrations for pipes that carry hot fluids are designed with thermal insulation, managed by the External Surfaces Monitoring of Mechanical Components program, to keep the local concrete temperatures below 200ºF during normal plant operating conditions; and
3. The OE does not reveal localized concrete temperatures exceeding 200°F.

Thus, the temperatures of the concrete containment components are kept below the GALL-LR 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.

3.5.2.2.1.3 Loss of Material Due to General, Pitting, and Crevice Corrosion

Item 1. LRA Section 3.5.2.2.1.3.1, associated with LRA Table 3.5-1, AMR item 3.5-1, 004, addresses loss of material due to general, pitting, and crevice corrosion for steel elements of inaccessible areas for drywell shell, drywell head, and drywell shell of a BWR exposed to air-indoor uncontrolled or concrete. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's non-applicability claim against the criteria in SRP-LR Section 3.5.2.2.1.3, item 1, and finds it acceptable because this item only applies to BWRs and DCPP is a PWR.

LRA Section 3.5.2.2.1.3.1, associated with LRA Table 3.5-1, AMR item 3.5-1, 005, addresses loss of material due to general, pitting, and crevice corrosion for steel elements of inaccessible areas for liner plate, liner plate anchors, and integral attachments exposed to air-indoor uncontrolled, which will be managed by the ASME Section XI, Subsection IWE program and the 10 CFR Part 50, Appendix J program. The NRC staff reviewed the applicant's proposal against criteria in SRP-LR Section 3.5.2.2.1.3, item 1.

In its review of components associated with AMR item 3.5-1, 005, the NRC staff finds that the applicant has met the further evaluation criteria and that 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 for the following reasons:

- A review of plant OE and IWE inspection reports has not identified instances of significant liner corrosion beyond minor surface corrosion that was evaluated and corrected and has not identified any degradation that originated on the inaccessible side of the liner; and

- The use of the ASME Section XI, Subsection IWE and the 10 CFR Part 50, Appendix J AMPs to manage the loss of material of steel elements of the containment, with inspection of accessible areas including augmented examination of areas likely to experience accelerated degradation, as the leading indicator for inaccessible areas, and evaluation of inaccessible areas based on conditions found in augmented accessible areas, will allow for degradations to be detected and corrective action to be taken prior to a loss of intended function.

Item 2. LRA Section 3.5.2.2.1.3.2, associated with LRA Table 3.5-1, AMR item 3.5-1, 006, addresses loss of material due to general, pitting, and crevice corrosion for torus shell steel elements of Mark I containments exposed to air-indoor uncontrolled or treated water. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's non-applicability claim against the criteria in SRP-LR Section 3.5.2.2.1.3, item 2, and finds it acceptable because this item only applies to BWRs with Mark I containments and DCPP is a PWR.

Item 3. LRA Section 3.5.2.2.1.3.2, associated with LRA Table 3.5-1, AMR item 3.5-1, 007, addresses loss of material due to general, pitting, and crevice corrosion for steel torus ring girders and downcomers of Mark I containments, downcomers of Mark II containments, and the interior surface of the suppression chamber shell of Mark III containments exposed to air-indoor uncontrolled or treated water. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's non-applicability claim against the criteria in SRP-LR Section 3.5.2.2.1.3, item 3, and finds it acceptable because this item only applies to BWRs with Mark I, Mark II, or Mark III containments and DCPP is a PWR.

3.5.2.2.1.4 Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature

LRA Section 3.5.2.2.1.4, associated with LRA Table 3.5-1, AMR item 3.5-1, 008, addresses loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for prestressed concrete containment tendons. The applicant stated that this item is not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.5.2.2.1.4 and finds it acceptable because the DCPP containments are steel-lined, reinforced concrete buildings that do not use prestress tendons. Therefore, a TLAA for prestressed tendons is not necessary.

3.5.2.2.1.5 Cumulative Fatigue Damage

LRA Section 3.5.2.2.1.5, associated with LRA Table 3.5-1, AMR item 3.5-1, 009, states that fatigue analysis or fatigue waiver TLAAs are evaluated for containment penetrations in accordance with 10 CFR 54.21(c)(1). The LRA further states that the evaluation of a fatigue analysis TLAA for the SG blowdown line flued heads, and the fatigue waiver TLAA for containment airlocks, equipment hatches, containment penetration sleeves and endplates, and remaining flued heads, all of carbon steel material, are addressed in LRA Section 4.6.2. This is consistent with SRP-LR Section 3.5.2.2.1.5 and, therefore, is acceptable. The NRC staff's evaluation regarding the TLAAs for carbon steel containment airlocks, equipment hatches, penetration sleeves and end plates, and flued heads (including those for SG blowdown lines) is documented in SE Section 4.6.2.

3.5.2.2.1.6 Cracking Due to Stress Corrosion Cracking

LRA Section 3.5.2.2.1.6, as modified by letter dated October 14, 2024 (ML24289A118), associated with LRA Table 3.5-1, AMR item 3.5-1, 010, addresses cracking due to SCC in stainless steel hot pipe penetration flued heads and dissimilar metal welds (DMWs) of stainless steel hot process pipes to carbon steel weld caps (i.e., 10 penetrations per unit identified in the LRA) and stainless steel fuel transfer tubes exposed to a temperature exceeding 140°F, which will be managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J programs. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.5.2.2.1.6.

SRP-LR Section 3.5.2.2.1.6 recommends further evaluation of additional appropriate examinations or evaluations implemented to detect the SCC aging effect for the containment penetration bellows, sleeves, and fuel transfer tubes made of stainless steels or DMWs, or both, and exposed to temperatures exceeding 140°F. The existing ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J programs rely on visual examinations and leakage testing to manage the SCC aging effect.

To meet the criteria in SRP-LR Section 3.5.2.2.1.6, the applicant proposed to implement a supplemental one-time inspection for cracking using volumetric, surface, or enhanced visual (EVT-1) examination of a representative sample of DMWs associated with the 10 containment hot penetrations for each unit (identified in the LRA) to confirm the absence of cracking due to SCC. The supplemental one-time inspection is part of the applicant's enhancement of the ASME Section XI, Subsection IWE program (see LRA Section B.2.3.28, as modified by letter dated October 14, 2024). Qualified personnel will perform the supplemental one-time examination of 20 percent of the 10 containment hot penetrations of each unit (i.e., two penetrations per unit, for a total of four penetrations) prior to completion of the first refueling outage after entry into the period of extended operation. The LRA also states that DMWs associated with stainless steel piping penetrations do not have fatigue waivers and, therefore, will also be managed for potential cracking due to cyclic loading using the one-time examination of the high temperature penetrations susceptible to SCC, which would also be leading indicators for cracking due to cyclic loading. If the supplemental one-time inspections do not confirm absence of cracking due to SCC, the applicant will conduct additional or periodic inspections in accordance with the site's corrective action program. As stated in LRA Table 3.5-1, AMR item 3.5-1, 027, as modified, the stainless steel fuel transfer tube welds are subject to pressure testing for cracking.

In its review of components associated with LRA Table 3.5-1, AMR item 3.5-1, 010, the NRC staff finds that the applicant has met the further evaluation criteria because:

- The applicant has not identified DCPP OE of cracking due to SCC or cyclic loading in penetrations with DMWs.
- The proposed one-time volumetric/surface/EVT-1 examination can detect SCC if it is present in the DMWs of the stainless steel containment hot penetrations, and pressure testing of fuel transfer tube welds provides reasonable assurance that the SCC aging effect in the components is adequately managed.
- The one-time examination includes DMWs without CLB fatigue analyses discussed in LRA Section 3.5.2.2.1.5 providing a leading indicator for cracking due to cyclic loading. SE Sections 3.0.3.2.18 and 3.0.3.1.13 document the NRC staff's review of the ASME Section XI, Subsection IWE and the 10 CFR Part 50, Appendix J programs, respectively.

Based on its review and the programs identified, the NRC staff concludes that the applicant meets the SRP-LR Section 3.5.2.2.1.6 criteria. For those AMR items associated with LRA Section 3.5.2.2.1.6, the staff concludes that the LRA is consistent with the GALL-LR 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 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

LRA Section 3.5.2.2.1.7, associated with LRA Table 3.5-1, AMR item 3.5-1, 011, addresses the aging effects of loss of material (scaling, spalling) and cracking due to freeze-thaw in inaccessible areas of concrete components (e.g., dome, wall, basemat, ring girders, buttresses) of containment structures exposed to air-outdoor or groundwater/soil environment. The applicant stated that this AMR item is not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.5.2.2.1.7 and finds it acceptable because DCPP is located in a "negligible" weathering region as determined by ASTM C33, Figure 1, and the exterior concrete is not exposed to temperatures of 32°F or less required for this aging effect to occur.

3.5.2.2.1.8 Cracking Due to Expansion from Reaction with Aggregates

LRA Section 3.5.2.2.1.8, associated with LRA Table 3.5-1, AMR item 3.5-1, 012, addresses the aging effect of cracking due to expansion from reaction with aggregates in inaccessible areas of concrete components (e.g., dome, wall, basemat, ring girder, buttresses) of containment structures exposed to any environment, which will be managed by the ASME Section XI, Subsection IWL program and the Structures Monitoring program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.5.2.2.1.8.

In its review of components associated with AMR item 3.5-1, 012, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWL program and the Structures Monitoring program, as modified by letter dated October 14, 2024 (ML24289A118), is acceptable because:

1. DCPP has no plant-specific OE related to cracking due to expansion from reaction of aggregates; petrographic examinations of aggregates demonstrated that the aggregates do not adversely react within the concrete; and containment was constructed in accordance with ACI-318. Therefore, a plant-specific aging management program is not needed.
2. The enhanced ASME Section XI, Subsection IWL program and the enhanced Structures Monitoring program are 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 the Structures Monitoring program 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 reason.

Based on its review and the programs identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.1.8 criteria. For those AMR items associated with LRA Section 3.5.2.2.1.8, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.2.1.9 Increase in Porosity and Permeability Due to Leaching of Calcium Hydroxide and Carbonation

LRA Section 3.5.2.2.1.9, associated with LRA Table 3.5-1, AMR item 3.5-1, 013, addresses the aging effects of increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation for inaccessible concrete areas of containment structures exposed to water-flowing environment. The applicant stated that this item is not used. The NRC staff evaluated the applicant's claim and finds it acceptable because the aging effects of increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation for inaccessible concrete areas exposed to water-flowing environment is managed by the ASME Section XI, Subsection IWL program and addressed under AMR item 3.5-1, 014.

LRA Section 3.5.2.2.1.9, associated with LRA Table 3.5-1, AMR item 3.5-1, 014, 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 (e.g., dome, wall, basemat, ring girder, buttresses) of containment structures exposed to water-flowing environment, which will be managed by the ASME Section XI, Subsection IWL program and the Structures Monitoring program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.5.2.2.1.9.

In its review of components associated with AMR item 3.5-1, 014, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the ASME Section XI, Subsection IWL program and the Structures Monitoring program, as modified by letter dated October 14, 2024 (ML24289A118), is acceptable because:

1. The applicant's evaluations confirmed that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure. Therefore, a plant-specific program or plant-specific enhancements to the ASME Section XI, Subsection IWL program and the Structures Monitoring program are not needed.
2. The ASME Section XI, Subsection IWL program and the Structures Monitoring program inspect for evidence of the aging effect in accessible areas (such as AMR item 3.5-1, 020), and the Structures Monitoring program 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 reason.

Based on its review and the programs identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.1.9 criteria. For those items associated with LRA Section 3.5.2.2.1.9, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.2.2 Non-Containment Plant Structures

3.5.2.2.2.1 Aging Management of Inaccessible Areas

Item 1. LRA Section 3.5.2.2.2.1, item 1, associated with LRA Table 3.5-1, AMR item 3.5-1, 042, addresses the aging effects of loss of material (e.g., spalling, scaling) and cracking due to freeze-thaw in below-grade inaccessible concrete areas of Groups 1–3, 5, and 7–9 structures exposed to air-outdoor or groundwater/soil environment. The applicant stated that this AMR item is not applicable. The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.5.2.2.2.1, item 1, and finds it acceptable because DCPP is located in a "negligible" weathering region as determined by ASTM C33, Figure 1 and the exterior concrete is not exposed to temperatures of 32°F or less as is required for this aging effect to occur.

Item 2. LRA Section 3.5.2.2.2.1, item 2, associated with LRA Table 3.5-1, AMR item 3.5-1, 043, addresses the aging effect of cracking due to expansion from reaction with aggregates in inaccessible concrete areas of Groups 1–3, 5, and 7–9 structures exposed to any environment, which will be managed by the Structures Monitoring program. The NRC staff noted that Group 2 and Group 9 structures are not applicable to DCPP since the DCPP containments are PWR designs, and Group 8 structures are included in their respective mechanical systems. The staff reviewed the applicant's proposal, as modified by letter dated October 14, 2024 (ML24289A118), against the criteria in SRP-LR Section 3.5.2.2.2.1, item 2.

In its review of components associated with AMR item 3.5-1, 043, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

1. DCPP has no plant-specific OE related to cracking due to expansion from reaction of aggregates; petrographic examinations of aggregates demonstrated that the aggregates do not adversely react within the concrete; and concrete structures were constructed in accordance with ACI-318. Therefore, a plant-specific aging management program is not needed.
2. The Structures Monitoring program is enhanced to identify 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 its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.1, item 2 criteria. For those AMR items associated with LRA Section 3.5.2.2.2.1, item 2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 3. LRA Section 3.5.2.2.2.1, item 3, is associated with: (1) LRA Table 3.5-1, AMR item 3.5-1, 044, which addresses the aging effects of cracking and distortion due to increased stress levels from settlement in below-grade inaccessible areas of structures for all concrete structure groups exposed to soil environment and will be managed by the Structures Monitoring program; and (2) LRA Table 3.5-1 AMR item 3.5-1, 046, which addresses the aging effects of reduction in foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundations in below-grade inaccessible concrete areas of Groups 1-3 and 5-9 structures exposed to a water-flowing environment. The NRC staff noted that Group 2 and Group 9 structures are not applicable to DCPP because the DCPP containments are PWR designs, and Group 8 structures are included in their respective mechanical systems. The staff reviewed the applicant's proposal, as modified by letter dated October 14, 2024 (ML24289A118), against the criteria in SRP-LR Section 3.5.2.2.2.1, item 3.

In its review of components associated with AMR item 3.5-1, 044, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because the applicant does not credit a dewatering system that is relied on for settlement control at DCPP.

In its review of components associated with AMR item 3.5-1, 046, the NRC staff noted that the applicant stated that this item is not used. The NRC staff evaluated the applicant's claim and finds it acceptable because these aging effects are managed by the Structures Monitoring program and are further addressed under AMR item 3.5-1, 044.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.1, item 3 criteria. For those AMR items associated with LRA Section 3.5.2.2.2.1, item 3, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Item 4</u>. LRA Section 3.5.2.2.2.1, item 4, associated with LRA Table 3.5-1, AMR item 3.5-1, 047, 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 NRC staff noted that Group 2 and Group 9 structures are not applicable to DCPP because the DCPP containments are PWR designs, and Group 8 structures are included in their respective mechanical systems. The staff reviewed the applicant's proposal, as modified by letter dated October 14, 2024 (ML24289A118), against the criteria in SRP-LR Section 3.5.2.2.2.1, item 4.

In its review of components associated with AMR item 3.5-1, 047, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program is acceptable because:

1. The applicant's evaluations confirmed that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure; 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 its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.1, item 4 criteria. For those items associated with LRA Section 3.5.2.2.2.1, item 4, the staff concludes that the LRA is consistent with the GALL-LR 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 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

LRA Section 3.5.2.2.2.2, associated with LRA Table 3.5-1, AMR item 3.5-1, 048, addresses the aging effect of reduction of strength and modulus of elasticity due to elevated temperature in Groups 1–5 concrete structures exposed to air-indoor uncontrolled environment. The NRC staff noted that Group 2 structures are not applicable to DCPP because the DCPP containments are PWR designs. The applicant stated that this item is not applicable. The staff evaluated the applicant's claim, as modified by letter dated October 14, 2024 (ML24289A118), against the criteria in SRP-LR Section 3.5.2.2.2.2 and finds it acceptable because:

1. DCPP's concrete temperatures for DCPP Groups 1, 3, 4, and 5 structures are maintained by their associated heating, ventilation, and air conditioning systems, which their aging effects are managed per LRA Tables 3.3.2-9, 3.3.3-10, and 3.3.3-11 and are kept below the GALL-LR Report recommended threshold limits of 150°F for general areas.
2. Penetrations for pipes carrying hot fluids are designed with insulation, managed by the External Surfaces Monitoring of Mechanical Components program, to maintain the temperature of the concrete adjacent to the sleeve below 200°F under normal operating conditions for local areas.
3. Review of OE has not identified any issues related to elevated temperatures affecting concrete structures. Therefore, the concrete components are not exposed to the temperatures required for this aging effect to occur.

Based on its review, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.2 criteria. For those items associated with LRA Section 3.5.2.2.2.2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3)

3.5.2.2.2.3 Aging Management of Inaccessible Areas for Group 6 Structures

Item 1. LRA Section 3.5.2.2.2.3, item 1, associated with LRA Table 3.5-1, AMR item 3.5-1, 049, addresses the aging effects of loss of material (e.g., spalling, scaling) and cracking due to freeze-thaw in below-grade inaccessible concrete areas of water-control structures (Group 6) exposed to air-outdoor or groundwater/soil environment. The applicant stated that this AMR item is not applicable. The NRC staff evaluated the applicant's claim and finds it acceptable because DCPP is located in a "negligible" weathering region as determined by ASTM C33, Figure 1 and the exterior concrete is not exposed to temperatures of 32°F or less as is required for this aging effect to occur.

Item 2. LRA Section 3.5.2.2.2.3, item 2, associated with LRA 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 NRC staff reviewed the applicant's proposal, as modified by letter dated October 14, 2024 (ML24289A118), against the criteria in SRP-LR Section 3.5.2.2.2.3, item 2.

In its review of components associated with AMR item 3.5-1, 050, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program and the RG 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants program is acceptable because:

1. DCPP has no plant-specific OE related to cracking due to expansion from reaction of aggregates; petrographic examinations of aggregates demonstrated that the aggregates do not adversely react within the concrete; and the intake and discharge structure was constructed in accordance with ACI-318. Therefore, a plant-specific aging management program is not needed.
2. The Structures Monitoring program and the RG 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants program are enhanced to identify 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 require 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 its review and the programs identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.3, item 2 criteria. For those AMR items associated with LRA Section 3.5.2.2.2.3, item 2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

Item 3. LRA Section 3.5.2.2.2.3, item 3, associated with LRA Table 3.5-1, item 3.5-1, 051, addresses increased porosity and permeability and 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 water-flowing environment, which will be managed by the Structures Monitoring program and the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program. The NRC staff reviewed the applicant's proposal, as modified by letter dated October 14, 2024 (ML24289A118), against the criteria in SRP-LR Section 3.5.2.2.2.3, item 3.

In its review of components associated with AMR item 3.5-1, 051, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Structures Monitoring program and the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is acceptable because:

1. The applicant's evaluations confirmed that the observed leaching of calcium hydroxide in accessible areas has no impact on the intended function of the concrete structure and no carbonation effects were observed for in-scope Group 6 structures; therefore, a plant-specific aging management program is not needed.

2. The Structures Monitoring program and the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program inspect for evidence of the aging effect in the accessible concrete areas and require 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 reason.

Based on its review and the programs identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.3, item 3 criteria. For those items associated with LRA Section 3.5.2.2.2.3, item 3, the staff concludes that the LRA is consistent with the GALL-LR 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 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

LRA Section 3.5.2.2.2.4, as modified by letter dated October 14, 2024 (ML24289A118), associated with LRA Table 3.5-1, AMR item 3.5-1, 052, addresses cracking due to SCC and loss of material due to pitting and crevice corrosion for Groups 7 and 8 stainless steel tank liners exposed to water-standing. The applicant stated that this item is not used. The applicant further stated that in-scope stainless steel tank liners at DCPP are for the RWSTs, which are evaluated as tanks in the Safety Injection System using LRA Table 3.2-1, AMR items 3.2-1, 068 and 3.2-1, 070. The applicant clarified that the RWSTs are stainless steel tanks exposed to treated borated water at temperatures less than 140°F, and SCC is not an applicable aging effect at temperatures less than 140°F. However, loss of material is an applicable aging effect that will be managed by the Aboveground Metallic Tanks AMP (LRA B.2.3.16), which is consistent with NUREG-1801, as modified by LR-ISG-2012-02, with exception.

The NRC staff reviewed the applicant’s claim and finds that SCC is not an applicable aging effect for stainless steel RWSTs because the water temperature in the tanks is less than the 140°F general threshold for SCC in stainless steel per GALL-LR Report Section IX.D. In its review of components associated with alternate AMR items 3.2-1, 068 and 3.2-1, 070 used to manage loss of material aging effects for the RWSTs, the staff finds that the applicant has met the further evaluation criteria and that the applicant’s proposal to manage the effects of aging using the Aboveground Metallic Tanks program, described as a condition monitoring program consistent with exception to NUREG-1801 AMP XI.M29, is acceptable using the AMP’s one-time inspections and volumetric inspections, and the staff’s evaluation of the adequacy of the AMP to manage the aging effects is documented in SE Section 3.0.3.2.11.

Based on its review and the program identified to manage the loss of material aging effect, the NRC staff concludes that the applicant meets SRP-LR Section 3.5.2.2.2.4 criteria. For those AMR items associated with LRA Section 3.5.2.2.2.4 and proposed alternate AMR items, the staff concludes that the LRA is consistent, with exception, with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.2.2.2.5 Cumulative Fatigue Damage Due to Fatigue

LRA Section 3.5.2.2.2.5, associated with LRA Table 3.5-1, AMR item 3.5-1, 053, addresses fatigue of support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 component supports of steel exposed to air-indoor uncontrolled environment, only if a CLB fatigue analysis exists. The applicant stated that, with the exception of the DCPP Unit 2 Class 1 pressurizer relief valve support bracket weld, CLB fatigue analysis does not exist for support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 component supports at DCPP. The applicant also stated that the fatigue TLAA for the DCPP Unit 2 Class 1 pressurizer relief valve support bracket weld is evaluated and dispositioned in accordance with 10 CFR 54.21(c)(1)(i) in LRA Section 4.3.2.4.

The NRC staff evaluated the applicant's claim against the criteria in SRP-LR Section 3.5.2.2.2.5 and finds it acceptable. Specifically, the staff confirmed through a review of the LRA and the UFSAR that the applicant's CLB does not identify fatigue analyses for component support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 that are required to be identified as TLAAs in accordance with 10 CFR 54.21(c)(1), with the exception of the DCPP Unit 2 Class 1 pressurizer relief valve support bracket weld, which is a B1.1 support component to which the AMR item applies. The TLAA for this component is addressed as part of LRA Section 4.3.2.4, which is consistent with SRP-LR Section 3.5.2.2.2.5 and, therefore, is acceptable. Further, the staff's evaluation of the fatigue TLAA for the Unit 2 Class 1 pressurizer relief valve support bracket weld is documented in SE Section 4.3.2.4.

3.5.2.2.3 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.

3.5.2.2.4 Ongoing Review of Operating Experience

SE Section 3.0.5 documents the NRC staff's evaluation of the applicant's ongoing review of OE.

3.5.2.3 Aging Management Review Results Not Consistent with or Not Addressed in the GALL-LR Report

The following subsections document the NRC staff's review of those AMR results listed in LRA Tables 3.5.2-1 through 3.5.2-14 that are either not consistent with, or not addressed in, the GALL-LR Report and that 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 SRP-LR Table 1 item, the subsections are organized by applicable AMR sections and then by material and environment combinations.

For component type, material, and environment combinations not evaluated in the GALL-LR Report, the NRC 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 period of extended operation. The following sections document the staff's evaluation.

3.5.2.3.1 Supports and Commodities – Summary of Aging Management Evaluation

<u>Grout Fire Barrier Seals, Cementitious Coatings Fireproofing, Subliming Compounds Fireproofing, Ceramic Fiber Fireproofing, and Gypsum & Plaster Barrier, Plant Indoor Air</u>.

LRA Table 3.5.2-14, as modified by letter dated October 14, 2024 (ML24289A118), states that loss of material, change in material properties, cracking/delamination, and separation for grout fire barrier seals; cementitious coatings, subliming compounds, and ceramic fiber fireproofing; and gypsum and plaster barriers exposed to plant indoor air will be managed by the Fire Protection program. The AMR items cite generic note F and plant-specific notes 5, 6, and 7, or generic note J and plant-specific note 8, which state that the use of the Fire Protection program to manage the effects of aging for the grout fire barrier seals; cementitious coatings, subliming compounds, and ceramic fiber fireproofing; and gypsum and plaster barriers is consistent with the OE reflected in SLR-ISG-2021-02-MECHANICAL, "Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance" (ML20181A434).

The NRC staff reviewed the associated items in the LRA and considered whether the aging effects proposed by the applicant constitute all the applicable aging effects for these component, material, and environment descriptions. Grout and gypsum/plaster are like cementitious coatings and ceramic fiber is like silicates. SLR-ISG-2021-02-MECHANICAL states that the Fire Protection program manages loss of material, cracking/delamination, change in material properties, and separation for cementitious coating, silicate, and subliming compound fireproofing/fire barriers. In addition, SLR-ISG-2021-02-MECHANICAL states that the aging effects are consistent with 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, and those cited by industry as part of subsequent license renewal application lessons learned activities and public comments on the draft AMR item. Therefore, the staff finds that the applicant has identified all applicable aging effects for these component, material, and environment combinations.

The NRC 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 components, materials, and environment noted above.

3.5.2.3.2 Intake Structure and Intake Control Building – Summary of Aging Management Evaluation

<u>Aluminum Hatches and Plugs (Embedment) Encased in Concrete Environment</u>

LRA Table 3.5.2-10, as modified by letter dated October 14, 2024 (ML24289A118), states that loss of material due to pitting and crevice corrosion for aluminum hatches and plugs (embedment) encased in concrete will be managed by the Structures Monitoring program. The AMR item cites generic note J. The AMR item cites plant-specific note 1, which states that "[c]oncrete hatch covers and hatch openings are constructed with aluminum angles forming the corners and edges; used to prevent damage during maintenance. Portions of the aluminum angles are embedded in the concrete hatches. The DCPP Structures Monitoring AMP (B.2.3.33) will inspect the accessible surfaces of the aluminum and the concrete surrounding the embedment for any signs of degradation. If the condition of the accessible aluminum indicates the presence of, or could result in, degradation to the embedded and inaccessible aluminum, the condition will be entered into the [corrective action program] and an evaluation will be performed, as required by the Structures Monitoring AMP (B.2.3.33)."

The NRC staff reviewed the associated items in the LRA 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 noted that the applicant addressed the aging effect of loss of material due to corrosion for this component, material, and environment combination in other AMR items (i.e., AMR item 3.5-1, 093). Based on its review of the AMR items, the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination.

The NRC staff finds the applicant's proposal to manage the effects of aging acceptable because the Structures Monitoring program will periodically inspect the accessible surfaces of the aluminum hatches and plugs (embedment) for any signs of degradation. If the condition of the accessible aluminum hatches and plugs (embedment) indicates the presence of, or could result in, degradation to the embedded and inaccessible aluminum, the condition will be entered into the corrective action program and an evaluation will be performed, as required by the Structures Monitoring program in a manner that is consistent with the GALL-LR Report recommendations for this material and environment combination, so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.

<u>Fiberglass Roofing Panels Exposed to Atmosphere/Weather Environment</u>

LRA Table 3.5.2-4, as modified by letter dated October 14, 2024 (ML24289A118), states that cracking, blistering and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture for fiberglass roofing panels exposed to an atmosphere/weather environment will be managed by the Structures Monitoring program. The AMR item cites generic note J. The AMR item cites plant-specific notes 2 and 3, which state that "[t]he roofing membrane and roofing panel are only applicable to the administration building and elevated walkway between the turbine building and the administration building" and that "[c]onsistent with the guidance in NUREG-2191 Item VII.A-428, cracking, blistering, and loss of material require management for fiberglass components in an air – outdoor environment. The DCPP Structures Monitoring AMP (B.2.3.33) will be used to manage blistering, cracking, and loss of material for fiberglass roof panels," respectively.

The NRC staff reviewed the associated items in the LRA 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 noted that the applicant addressed the aging effect of cracking, blistering, and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture for this component, material, and environment combination in other AMR items (i.e., LRA Table 3.5.2-4 AMR item for roofing panel). The staff also noted that NUREG-2191 recommends managing the aging effects of cracking, blistering, and loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture for fiberglass piping and ducting components exposed to air-outdoor environment in other combinations of the GALL-SLR AMR items and AMPs (i.e., VII.I.A-428 and the External Surfaces Monitoring of Mechanical Components AMP). Based on its review of the AMR items and the NUREG-2191 guidance, the staff finds that the applicant has identified all applicable aging effects for this component, material, and environment combination.

The NRC staff finds the applicant's proposal to manage the effects of aging acceptable because the enhanced Structures Monitoring program periodically inspects fiberglass roofing panels for blistering, cracking, and loss of material on a frequency not to exceed five years in a manner that is consistent with the GALL-LR Report recommendations for this material and environment combination, so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.

3.6 Aging Management of Electrical and Instrumentation and Controls

3.6.1 Summary of Technical Information in the Application

LRA Section 3.6 provides AMR results for those components that the applicant identified in LRA Section 2.5, “Scoping and Screening Results: Electrical and Instrumentation and Controls,” as being subject to an AMR. LRA Table 3.6-1, “Summary of Aging Management Evaluations for Electrical Commodities,” is a summary comparison of the applicant’s AMRs with those evaluated in the GALL-LR Report for electrical components and component groups.

3.6.2 Staff Evaluation

Table 3.6-1, below, summarizes the NRC staff’s evaluation of the component groups listed in LRA Section 3.6 and addressed in the GALL-LR Report.

Table 3.6-1 Staff Evaluation for Electrical Commodities Components in the GALL-LR Report

Component Group (SRP-LR Item No.)	Staff Evaluation
3.6-1, 001	Consistent with the GALL-LR Report (see SE Section 3.6.2.2.1)
3.6-1, 002	Consistent to DCPP (see SE Section 3.6.2.2.2)
3.6-1, 003	Consistent to DCPP (see SE Section 3.6.2.2.2)
3.6-1, 004	Consistent to DCPP (see SE Section 3.6.2.2.3)
3.6-1, 005	Consistent to DCPP (see SE Section 3.6.2.2.3)
3.6-1, 006	Consistent to DCPP (see SE Section 3.6.2.2.3)
3.6-1, 007	Consistent to DCPP (see SE Section 3.6.2.2.3)
3.6-1, 008	Not applicable to DCPP (see SE Sections 3.6.2.1.1 and 3.6.2.3.1)
3.6-1, 009	Consistent with the GALL-LR Report
3.6-1, 010	Consistent with the GALL-LR Report
3.6-1, 011	Consistent with the GALL-LR Report
3.6-1, 012	Consistent with the GALL-LR Report
3.6-1, 013	Consistent with the GALL-LR Report
3.6-1, 014	Consistent with the GALL-LR Report
3.6-1, 015	Consistent with the GALL-LR Report
3.6-1, 016	Not applicable to DCPP (See SE Sections 3.6.2.1.1 and 3.6.2.3.2)
3.6-1, 017	Not applicable to DCPP (See SE Sections 3.6.2.1.1 and 3.6.2.3.2)
3.6-1, 018	Consistent with the GALL-LR Report
3.6-1, 019	Consistent with the GALL-LR Report
3.6-1, 020	Not applicable to DCPP
3.6-1, 021	Consistent with the GALL-LR 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 3.6.2.1 discusses AMR results for components that the applicant stated are either not applicable to DCPP or are consistent with the GALL-LR Report. Section 3.6.2.1.1 summarizes the staff's review of items that are not applicable or not used and documents any RAIs issued and the staff's conclusions.
2. SE Section 3.6.2.2 discusses AMR results for which the GALL-LR Report and SRP-LR recommend further evaluation.
3. SE Section 3.6.2.3 discusses AMR results for components that the applicant states are not consistent with, or not addressed in, the GALL-LR Report. These AMR results typically are identified by generic notes F through J and plant-specific notes in the LRA.

3.6.2.1 Aging Management Review Results Consistent with the GALL-LR Report

This subsection documents the NRC staff's review of AMR results listed in LRA Tables 3.6-1 and 3.6.2-1, "Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components," that the applicant determined to be consistent with the GALL-LR Report. The staff audited and reviewed the information in the LRA. The staff did not repeat its review of the matters described in the GALL-LR Report (including exceptions to the GALL-LR Report); however, the staff did verify that the material presented in the LRA was applicable and that the applicant identified the appropriate GALL-LR Report AMRs. For those AMR items that the staff found to be consistent with the GALL-LR Report, and for which no additional evaluation or RAI applies, the staff's review and conclusions, as documented in the GALL-LR Report, are considered to be the basis for the acceptability of the AMR items. The staff's conclusion of "Consistent with the GALL-LR- Report" is documented in SE Table 3.6-1, and no separate writeup is required or provided. The staff did not identify any AMR items that required additional review with an associated writeup.

SE Section 3.6.2.1.1 documents the NRC staff's review of AMR items that the applicant determined to be not applicable or not used.

3.6.2.1.1 Aging Management Review Results Identified as Not Applicable or Not Used

For LRA Table 3.6-1, AMR items 3.6-1, 008, 3.6-1, 016, 3.6-1, 017, and 3.6-1, 020, the applicant claims that the corresponding AMR items in the GALL-LR Report are not applicable to DCPP. The NRC staff reviewed the LRA and UFSAR and confirmed that the applicant's LRA does not have any AMR results that are applicable for these items.

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.6-1, AMR item 3.6-1, 008 addresses reduced insulation resistance, as well as moisture intrusion and radiation-induced oxidation for various organic polymers of insulated cable and connections (including terminal blocks, fuse holders, etc.) exposed to adverse localized environment caused by heat, radiation, or moisture, which is proposed as not applicable. The AMR item cites generic note I. The AMR item cites plant-specific note 3, which states:

> An adverse localized environment (oil mist) was identified for in scope cables and connections (located in the auxiliary building, elev. 115'). The DCPP Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP (B.2.3.36) will manage the aging effects by periodic inspections and cable surface cleaning until a solution to prevent or divert oil from the affected cables is implemented….

The NRC staff's evaluation of the applicant's claim regarding LRA Table 3.6.2-1 is documented in SE Section 3.6.2.3.1.

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.6-1, AMR item 3.6-1, 016 addresses managing increased resistance of connection due to chemical contamination, corrosion, and oxidation (in an air-indoor controlled environment, increased resistance of connection due to chemical contamination, corrosion, and oxidation do not apply); fatigue due to ohmic heating, thermal cycling, electrical transients 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 NRC staff evaluated the applicant's claim and finds it acceptable because according to the LRA, as modified, Section 3.6.2.3, "AMR Results Not Consistent With or Not Addressed in the GALL Report":

- The in-scope fuse holders are in electrical boxes that protect them from external sources of moisture and chemical contamination and are in an area where there are no sources of uncontrolled chemicals near them during normal conditions.
- The applicant's walkdown confirmed that these in-scope fuse holders are clean and dry and have no evidence of moisture intrusion, chemical contamination, oxidation, or corrosion.
- The in-scope fuse holders provide power to low current control circuits where no appreciable thermal cycling or ohmic heating occurs.
- Electrical transients are mitigated by the fast action of circuit protective devices at high currents.

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.6-1, AMR item 3.6-1, 017 addresses managing increased resistance of connection due to fatigue caused by frequent fuse 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 NRC staff evaluated the applicant's claim and finds it acceptable because according to the LRA, Section 3.6.2.3:

- The fuses in the in-scope fuse holders are not subject to frequent manipulation; and
- The in-scope fuse holders are in electrical boxes that are mounted with no attached sources of vibrations.

AMR items 3.6-1, 016 and 3.6-1, 017 cite generic note I. These AMR items also cite plant-specific note 4 for in-scope fuse holders, which states:

> The potential aging effects as discussed in NUREG-1801 are not applicable to the in-scope fuse holders….

The NRC staff's evaluation of the applicant's claim regarding LRA Table 3.6.2-1 is documented in SE Section 3.6.2.3.2.

3.6.2.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL-LR Report

In LRA Section 3.6.2.2, the applicant further evaluates aging management for certain electrical and instrumentation and controls system components as recommended by the GALL-LR 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-LR Section 3.6.2.2. The following subsections document the staff's review.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

LRA Section 3.6.2.2.1 states that TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1) and that the evaluation of the TLAA for the environmental qualification of electrical equipment is addressed in LRA Section 4.4, "Environmental Qualification of Electrical Equipment." This is consistent with SRP-LR Section 3.6.2.2.1 and, therefore, is acceptable. The NRC staff's evaluation regarding the TLAA for the environmental qualification of electrical equipment is documented in SE Section 4.4.

3.6.2.2.2 Reduced Insulation Resistance Due to Presence of Any Salt Deposits and Surface Contamination, and Loss of Material Due to Mechanical Wear Caused by Wind Blowing on Transmission Conductors

LRA section 3.6.2.2.2, associated with LRA Table 3.6-1, AMR item 3.6-1, 002, addresses loss of material due to mechanical wear caused by wind blowing on transmission conductors for high-voltage insulators composed of porcelain; malleable iron; aluminum; galvanized steel; and cement exposed to air-outdoor, which will be managed by the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.6.2.2.2 and Appendix A.1, "Aging Management Review - Generic (Branch Technical Position RLSB-1)."

In its review of components associated with AMR item 3.6-1, 002, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program is acceptable because the plant-specific AMP: (1) will manage the aging effects caused by wind blowing on transmission conductors for the in-scope high-voltage insulators by performing periodic inspections, including the use of infrared thermography (as necessary), to detect age-related degradation prior to loss of component intended function with documentation of the inspections; and (2) is consistent with the guidance in SRP-LR Appendix A.1.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.6.2.2.2, item 3.6-1, 002 criterion. For those AMR items associated with LRA Section 3.6.2.2.2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

LRA Section 3.6.2.2.2, associated with LRA Table 3.6-1, AMR item 3.6-1, 003, addresses reduced insulation resistance due to presence of any salt deposits and surface contamination for high-voltage insulators composed of porcelain; malleable iron; aluminum; galvanized steel; and cement exposed to air-outdoor, which will be managed by the Transmission Conductor and

Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed the applicant’s proposal against the criteria in SRP-LR Section 3.6.2.2.2 and Appendix A.1.

In its review of components associated with AMR item 3.6-1, 003, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant’s proposal to manage the effects of aging using the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program is acceptable because the plant-specific AMP:

- will manage the aging effects due to presence of any salt deposits and surface contamination for the in-scope high-voltage insulators by performing periodic inspections, including the use of infrared thermography (as necessary), to detect age-related degradation prior to loss of component intended function with documentation of the inspections; and
- is consistent with the guidance in SRP-LR Appendix A.1.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.6.2.2.2, item 3.6-1, 003 criterion. For those AMR items associated with LRA Section 3.6.2.2.2, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

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

LRA Section 3.6.2.2.3, associated with LRA Table 3.6-1, AMR item 3.6-1, 004, addresses loss of conductor strength due to corrosion for transmission conductors composed of aluminum; and steel exposed to air-outdoor, which will be managed by the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed the applicant’s proposal against the criteria in SRP-LR Section 3.6.2.2.3 and Appendix A.1.

In its review of components associated with AMR item 3.6-1, 004, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant’s proposal to manage the effects of aging using the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program is acceptable because the plant-specific AMP: (1) will manage the aging effects due to corrosion for transmission conductors by performing periodic inspections, including the use of infrared thermography (as necessary), to detect age-related degradation prior to loss of component intended function with documentation of the inspections; and (2) is consistent with the guidance in Appendix A.1.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.6.2.2.3, item 3.6-1, 004 criterion. For those AMR items associated with LRA Section 3.6.2.2.3, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

LRA Section 3.6.2.2.3, associated with LRA Table 3.6-1, AMR item 3.6-1, 005, addresses increased resistance of connection due to oxidation or loss of pre-load for transmission connectors composed of aluminum; and steel exposed to air-outdoor, which will be managed by the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.6.2.2.3 and Appendix A.1.

In its review of components associated with AMR item 3.6-1, 005, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program is acceptable because the plant-specific AMP: (1) will manage the aging effects due to oxidation for transmission connectors by performing periodic inspections, including the use of infrared thermography (as necessary), to detect age-related degradation prior to loss of component intended function with documentation of the inspections; and (2) is consistent with the guidance in Appendix A.1.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.6.2.2.3, item 3.6-1, 005 criterion. For those AMR items associated with LRA Section 3.6.2.2.3, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

LRA Section 3.6.2.2.3, associated with LRA 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 pre-load for switchyard bus and connections composed of aluminum; copper; bronze; stainless steel; and galvanized steel exposed to air-outdoor, which will be managed by the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.6.2.2.3 and Appendix A.1.

In its review of components associated with AMR item 3.6-1, 006, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program, as modified by response to RAI 3.6 (ML25002A050), is acceptable because the plant-specific AMP:

- will manage the loss of material due to wind-induced abrasion (referred to as wear) and the increased resistance of connection due to oxidation or loss or pre-load for switchyard bus and connections by performing periodic inspections, including the use of infrared thermography (as necessary), to detect age-related degradation prior to loss of component intended function with documentation of the inspections; and
- is consistent with the guidance in Appendix A.1.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.6.2.2.3, item 3.6-1, 006 criterion. For those AMR items associated with LRA Section 3.6.2.2.3, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

LRA Section 3.6.2.2.3, associated with LRA 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; and steel exposed to air-outdoor, which will be managed by the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program. The NRC staff reviewed the applicant's proposal against the criteria in SRP-LR Section 3.6.2.2.3 and Appendix A.1.

In its review of components associated with AMR item 3.6-1, 007, the NRC staff finds that the applicant has met the further evaluation criteria and that the applicant's proposal to manage the effects of aging using the Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators program, as modified by response to RAI 3.6 (ML25002A050), is acceptable because the plant-specific AMP:

- will manage the loss of material due to wind-induced abrasion (referred to as wear) for transmission conductors by performing periodic inspections, including the use of infrared thermography (as necessary), to detect age-related degradation prior to loss of component intended function with documentation of the inspections; and
- is consistent with the guidance in Appendix A.1.

Based on its review and the program identified, the NRC staff concludes that the applicant meets SRP-LR Section 3.6.2.2.3, item 3.6-1, 007 criterion. For those AMR items associated with LRA Section 3.6.2.2.3, the staff concludes that the LRA is consistent with the GALL-LR 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 period of extended operation, as required by 10 CFR 54.21(a)(3).

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-LR Report

The following subsections document the NRC staff's review of AMR results listed in LRA Table 3.6.2-1 that are either not consistent with, or not addressed in, the GALL-LR 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 SRP-LR 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-LR Report, the NRC 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 period of extended operation. The following sections document the staff's evaluation.

3.6.2.3.1 Insulated Cable and Connections (including terminal blocks, fuse holders, etc.) Composed of Various Organic Polymers Exposed to Adverse Localized Environment Caused by Heat, Radiation, or Moisture

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.6.2-1, AMR item 3.6-1, 008, states that reduced insulation resistance; moisture intrusion and radiation-induced oxidation for various organic polymers of insulated cable and connections (including terminal blocks, fuse holders, etc.) exposed to adverse localized environment caused by heat, radiation, or moisture is not applicable and no AMP is proposed. The AMR item cites generic note I. Item 3.6-1, 008, as modified by response to RAI B.2.3.36 (ML25002A050), cites plant-specific note 3, which states, "An adverse localized environment (oil mist) was identified for in-scope cables and connections (located in the auxiliary building, elev. 115'). The DCPP Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP (B.2.3.36) will manage the aging effects by periodic inspections and cable surface cleaning until a solution to prevent or divert oil from the affected cables is implemented…."

The NRC staff reviewed the associated items in the LRA, as modified, to confirm that this aging effect is not applicable for this component, material, and environment combination. The staff finds the applicant's proposal acceptable based on its review of EPRI Report 3002010641, "Low Voltage and Instrumentation and Control Cable Aging Management Guide," Revision 1, which provides guidance for instances when low voltage and instrumentation and controls cables are unintentionally exposed to chemicals, including oil. EPRI Report 3002010641 states that cables subjected for oil or hydraulic fluid contamination should be cleaned and evaluated for any effects on longevity. The EPRI Report also notes that once the chemical, oil, or hydraulic fluid is removed from the surface of the cable, visual/tactile inspection should be performed to assess the effect of the exposure. The EPRI Report suggests a re-inspection frequency of approximately 6–12 months. If adverse effects are observed, such as swelling or softening, replacement or repair would be appropriate. According to the description, as modified, of the Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program, the applicant will perform annual visual/tactile inspections on a six-month offset with annual cable cleaning until a solution to prevent or divert oil from the affected cables is implemented prior to December 31, 2025. The applicant also committed (Commitment No. 38) to implement a solution to prevent or divert oil from the cables affected by oil residue prior to December 31, 2025. Based on its review and this information, the staff finds that the proposed AMP will provide reasonable assurance that the effects of aging will be managed so that the intended function(s) of the insulated material for electrical cables and connections not subject to 10 CFR 50.49 environmental qualification requirements within the scope of the AMP will be maintained consistent with CLB during the period of extended operation.

3.6.2.3.2 3.6.2.3.2 Metallic Clamps of Fuse Holders (Not Part of Active Equipment) Composed of Various Metals Used for Electrical Connections Exposed to Air – Indoor, Controlled or Uncontrolled

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.6.2-1, AMR item 3.6-1, 016, states that increased resistance of connection due to chemical contamination, corrosion, and oxidation (in an air-indoor controlled environment, increased resistance of connection due to chemical contamination, corrosion and oxidation do not apply); fatigue due to ohmic heating, thermal cycling, electrical transients for fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air-indoor, uncontrolled are 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 potential aging effects as discussed in NUREG-1801 are not applicable to the in-scope fuse holders….”

The NRC staff reviewed the associated items in the LRA, as modified, to confirm that these aging effects are not applicable for this component, material, and environment combination. The staff finds the applicant’s proposal acceptable because:

- The electrical boxes are located in an environment that does not subject them to environmental aging.
- The fuse holders are installed in electrical boxes that offer protection against contamination or moisture.
- Walkdowns confirmed that in-scope fuse holders are clean and dry.
- No appreciable thermal cycling or ohmic heating occurs due the fuse holder design and operation at low current.
- Electrical faults are not considered a credible aging mechanism since they are infrequent and random, and transients are typically mitigated by the fast action of the circuit protective devices at high current.

As modified by letter dated October 14, 2024 (ML24289A118), LRA Table 3.6.2-1, AMR item 3.6-1, 017, states that increased resistance of connection due to fatigue caused by frequent 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 are 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 potential aging effects as discussed in NUREG-1801 are not applicable to the in-scope fuse holders….”

The NRC staff reviewed the associated items in the LRA, as modified, to confirm that these aging effects are not applicable for this component, material, and environment combination. The staff finds the applicant’s proposal acceptable because:

- The in-scope fuse holders are not subject to frequent manipulation.
- Proceduralized good work practices are used when fuses are manipulated.
- The in-scope fuse holders are located in electrical boxes that are not mounted on moving or rotating equipment that could cause vibration.

3.7 Conclusion for Aging Management Review Results

The NRC staff reviewed LRA Section 3, “Aging Management Review Results,” and LRA Appendix B, “Aging Management Programs,” as supplemented. Based on its audit and review of the applicant’s AMR 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 function(s) consistent with the CLB for the 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 adequately describes the AMPs and activities credited for managing the effects of aging for the period of extended operation at DCPP.

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 renewed operating licenses for DCPP, 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) of the license renewal application (LRA) for the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 summarizes the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff's evaluation of Pacific Gas and Electric Company's (PG&E, the applicant) basis for identifying those plant-specific or generic analyses that need to be identified in the LRA as time-limited aging analyses (TLAAs) and PG&E's list of TLAAs. This section of the SE also summarizes the staff's evaluation of PG&E's basis for identifying those exemptions that need to be identified in the LRA as being based on TLAAs and PG&E's list of those exemptions.

The regulation at Title 10 of the *Code of Federal Regulations* (10 CFR) 54.3, "Definitions," defines TLAAs as those licensee calculations and analyses (henceforth referred to as "analysis" or "analyses") that:

(1) involve systems, structures, and components (SSCs) within the scope of license renewal, as delineated in 10 CFR 54.4(a);

(2) consider the effects of aging;

(3) involve time-limited assumptions defined by the current operating term (e.g., 40 years for an initial operating license);

(4) were determined to be relevant by the licensee in making a safety determination;

(5) involve conclusions or provide the basis for conclusions related to the capability of the SSC to perform its intended functions, as delineated in 10 CFR 54.4(b); and

(6) are contained or incorporated by reference in the current licensing basis (CLB).

The regulation at 10 CFR 54.21(c)(1) requires an LRA to contain a list of TLAAs, as defined in 10 CFR 54.3, and that the applicant demonstrate that:

(i) the analyses remain valid for the period of extended operation;

(ii) the analyses have been projected to the end of the period of extended operation; or

(iii) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

The regulation at 10 CFR 54.21(c)(2) requires an LRA to contain a list of plant-specific exemptions granted under 10 CFR 50.12, "Specific exemptions," and in effect that are based on TLAAs. For any such exemptions, the applicant must provide an evaluation that justifies the continuation of the exemptions for the period of extended operation.

4.1.1 Summary of Technical Information in the Application

LRA Section 4.1 describes the process used by the applicant to identify the TLAAs within the DCPP CLB and design-basis documentation. The applicant specified the CLB and design-basis documentation that was reviewed to identify potential TLAAs. The applicant stated that the document search was performed consistent with the guidance in NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"

(SRP-LR), dated December 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103490036), NUREG-1801, Revision 2, “Generic Aging Lessons Learned (GALL) Report” (GALL Report), dated December 2010 (ML103490041), Nuclear Energy Institute (NEI) 95-10, Revision 6, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” dated June 2005 (ML051860406), the statements of consideration for 10 CFR Part 54, and prior LRAs, NRC requests for additional information (RAIs), and NRC SEs for LRAs.

In addition, the applicant stated that it reviewed the DCPP CLB as required by 10 CFR 54.12(c)(2) to identify all plant-specific exemptions granted under 10 CFR 50.12 and in effect that are based on TLAAs. In the LRA, as supplemented by letter dated October 14, 2024 (ML24289A118), the applicant stated that the only exemption for DCPP based on a TLAA is no longer in effect and is, therefore, not required to be dispositioned by 10 CFR 54.12(c)(2).

4.1.2 Staff Evaluation

The NRC staff reviewed LRA Section 4.1 in accordance with the guidance provided in SRP-LR Section 4.1, “Identification of Time-Limited Aging Analyses.” Specifically, SRP-LR Section 4.1.1 provides the areas of review. In addition, SRP-LR Sections 4.1.2 and 4.1.3 provide the staff’s acceptance criteria and review procedures, respectively, for the identification of TLAAs and exemptions based on TLAAs. SRP-LR Table 4.1-1 provides a sample process for identifying potential TLAAs. SRP-LR Table 4.1-2 provides a list of generic TLAAs. SRP-LR Table 4.1-3 provides examples of potential plant-specific TLAAs that have been identified by license renewal applicants. The staff used the SRP-LR tables to assist in its review in determining whether the applicant identified all applicable calculations and analyses in its CLB as TLAAs in its LRA.

The LRA states that the applicant searched the CLB and design-basis documentation to identify potential TLAAs. The documentation that was searched included the following: the updated final safety analysis report (UFSAR); the technical specifications (TS) and the TS bases; the equipment control guidelines (ECGs); the facility operating licenses (FOLs), including conditions and appendices; the calculations and design reports referenced in the UFSAR, TS, TS bases, ECGs, and FOLs; the inservice inspection (ISI) program; the environmental qualification (EQ) program; the pressure-temperature limit report (PTLR); the NRC SEs regarding the FOLs; subsequent NRC SEs; PG&E and NRC docketed licensing correspondence; and other design-basis documents.

During its aging management audit (ML24311A123), the NRC staff confirmed that the applicant performed a search of its CLB and design-basis documentation to identify potential TLAAs. The staff noted that the applicant used a list of specific key words during this search to identify potential TLAAs. The staff reviewed the list of key words and found them appropriate because the key words were reasonable and tailored to focus on age-related degradation targeted toward time-dependent assessment. The staff also confirmed that each potential TLAA identified during the applicant’s search was reviewed 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 aging management audit, the NRC staff also confirmed that the applicant performed a search of docketed licensing correspondence, the FOLs, and the UFSAR to identify exemptions granted pursuant to 10 CFR 50.12 that are currently in effect. By letter dated October 14, 2024, the applicant supplemented the LRA to conclude that an exemption related to the use of

American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Case N-514 for low-temperature overpressure protection (LTOP) that was previously identified as being based on a TLAA is no longer in effect.

The NRC staff reviewed DCPP TS Section 5.6.6, “Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR),” and the DCPP PTLR and determined that pressure-temperature (P-T) limits and LTOP limits must be developed using the analytical methods described in topical reports WCAP 14040-NP-A and WCAP-15958. Thus, the exemption granted by letter dated May 3, 1999 (ML022400137), to use ASME Code Case N-514 is no longer applicable or in effect and has been superseded by the methods described in DCPP TS Section 5.6.6. Therefore, the exemption does not require evaluation per 10 CFR 54.3(a). The staff confirmed that the applicant reviewed its exemptions to determine whether any exemptions were based on a TLAA and that no exemptions 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 SEs to identify potential TLAAs. Based on this independent search, the staff did not identify TLAAs that were not already identified in the LRA. Additionally, the staff did not identify any in-effect exemptions granted pursuant to 10 CFR 50.12 and based on a TLAA as defined in 10 CFR 54.3.

4.1.3 Conclusion

Based on its review and independent search, the NRC staff concludes that the systematic approach that the applicant took to search its CLB and design-basis documentation identified the analyses that meet all the six criteria of a TLAA in accordance with 10 CFR 54.21(c)(1). In addition, based on its review and independent search, the staff concludes that the systematic approach that the applicant took to search its CLB and design-basis documentation for exemptions that were based on a TLAA was acceptable and that no exemptions were required to be identified in accordance with 10 CFR 54.21(c)(2).

4.2 Reactor Vessel Neutron Embrittlement Analysis

4.2.1 Neutron Fluence Projections

4.2.1.1 Summary of Technical Information in the Application

LRA Section 4.2.1, as supplemented, describes the applicant’s TLAA for neutron fluence projections.

The applicant dispositioned this TLAA for the reactor pressure vessel (RPV) beltline and extended beltline materials in accordance with 10 CFR 54.21(c)(1)(ii) to demonstrate that the effects of aging due to fluence on the intended functions will be adequately managed by the Reactor Vessel Surveillance Aging Management Program (AMP) for the period of extended operation.

The applicant projected the expected neutron fluence values for the RPV to 60 years.
The projected fluence values for DCPP, Units 1 and 2 are for 54 effective full-power years (EFPY) as that bounds the EFPY to date and is expected to be conservative when projecting the cumulative EFPY for the period of extended operation to 60 years.

The applicant stated that the fluence projections for 60 years of operation were performed using the three-dimensional discrete ordinates computer code RAPTOR-M3G and the BUGLE-96 cross-section library in accordance with the methodology described in WCAP-18124-NP-A, “Fluence Determination with RAPTOR-M3G and FERRET” (ML18204A010), and WCAP-18124-NP-A Supplement 1-NP-A, “Fluence Determination with RAPTOR-M3G and FERRET – Supplement for Extended Beltline Materials” (ML22153A139).

The applicant noted in the LRA that the RPV beltline neutron fluence values applicable to the 60-year period of operation were calculated for the DCPP, Units 1 and 2 RPV beltline material in WCAP-18852-NP (Enclosure 3 to Supplement 1 to the LRA) and WCAP-18853-NP (Enclosure 4 to Supplement 1 to the LRA), respectively. These calculations also evaluated cumulative fluence at 54 EFPY for the RPV materials that are not traditionally thought of as being plant limiting. These materials exposed to fluences that exceed the 1.0×10^{17} n/cm^2 (E >1.0 MeV) threshold are referred to as the extended beltline materials and must be monitored to evaluate changes in fracture toughness in accordance with 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix H, “Reactor Vessel Material Surveillance Program Requirements.”

The applicant stated that for DCPP, Unit 1, the last RPV material surveillance capsule withdrawn and tested was Capsule V at the end of cycle 11 in 2002, with an exposure equivalent to 32.25 EFPY of operation. To obtain capsule data for a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end-of-license extension (EOLE) for DCPP, Unit 1, the applicant stated that it will submit to the NRC the testing results of the capsule to be withdrawn per the withdrawal schedule that was approved by the NRC on July 20, 2023 (ML23199A312). The applicant stated that for DCPP, Unit 2, the last remaining capsule withdrawn and tested was Capsule V with an exposure equivalent to 52.51 EFPY. This exposure is within the 20-percent of the limit specified in NRC Regulatory Guide (RG) 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” dated March 2001 (ML010890301), to the projected 54 EFPY for 60 years of operation limit.

4.2.1.2 Staff Evaluation

The NRC staff reviewed the applicant’s TLAA for the RPV beltline and extended beltline 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-LR Section 4.2.2.1. Specifically, the staff reviewed whether the applicant (1) identified the neutron fluence for each beltline material at the end of the period of extended operation (PEO), (2) used the NRC staff-approved methodology to calculate the neutron fluence, and (3) applied a methodology that is consistent with the guidance in RG 1.190.

The plant-specific estimated RPV beltline and extended beltline fast neutron (E >1.0 MeV) fluences at the end of 60 years of operation are provided for the DCPP, Units 1 and 2. In addition to the RPV, the applicant estimated 60-year neutron fluence values for reactor vessel internals components calculated using a plant-specific model. The fluence projections were performed in accordance with the NRC-approved methodology described in WCAP-18124-NP-A and WCAP-18124-NP-A Supplement 1-NP-A. The NRC staff notes that the applicant based the TLAAs in LRA Section 4.2.1 on a 54 EFPY projection for the PEO. The staff finds this projection acceptable because 54 EFPY is deemed the EOLE for the PEO.

Based on its review of the plant-specific calculation performed for the RPV beltline and extended beltline fast neutron fluences documented in WCAP-18852-NP and WCAP-18853-NP for DCPP, Units 1 and 2, respectively, the NRC staff determined that the neutron fluence methodology used was essentially unbiased with an uncertainty within the 20 percent (1σ) criterion established in RG 1.190. The applicant appropriately identified beltline and extended beltline materials in the LRA along with the fluence projections for the end of the PEO. Therefore, the staff concludes that the beltline and the extended beltline materials will not become limiting during the PEO.

In its approval of WCAP-18124-NP-A, the NRC staff identified two limitations and conditions (L&C) associated with the application of RAPTOR-M3G and FERRET. L&C #1 states that applicability of WCAP-18124-NP is limited to the RPV region near the active height of the core based on the uncertainty analysis performed and the measurement data provided. It further states that additional justification should be provided via additional benchmarking, fluence sensitivity analysis to the response parameters of interest, margin assessment, or a combination thereof, for applications of the method to components including, but not limited to, the RPV upper circumferential weld and the reactor coolant system inlet and outlet nozzles and reactor vessel internal components. L&C #1 requires licensees to provide additional justification to apply WCAP-18124 to components beyond the beltline region that exceeded a threshold neutron fluence accumulation of 1×10^{17} neutrons/cm^2. This region is often referred to as the extended beltline region. The conditions necessary to meet L&C #1 are provided in WCAP-18124-NP-A Supplement 1-NP-A, which allows for the application of RAPTOR-M3G method to the RPV extended beltline region on a generic basis.

By letter dated October 24, 2024 (ML24261B949), the NRC-approved amendment to DCPP TS 5.6.6. This amendment allowed the use of WCAP-18124-NP-A and WCAP-18124-NP-A Supplement 1-NP-A for determining neutron fluence at the DCPP. The staff SE for this amendment notes that by adopting both WCAP-18124-NP-A and WCAP-18124-NP-A Supplement 1, L&C #1 has been adequately addressed for the DCPP. In addition, the applicant used both WCAP-18124-NP-A and WCAP-18124-NP-A Supplement 1 for the fluence projections for the PEO for DCPP, Units 1 and 2, thus satisfying L&C #1.

L&C #2 of WCAP-18124-NP describes when least squares adjustment is acceptable. To meet L&C #2, the applicant stated that as documented in the NRC letter dated October 24, 2024, the least squares analyses will not be used to modify the calculated surveillance capsule or RPV neutron exposure when applying the methodology. Therefore, L&C #2 is not applicable to the fluence projections at DCPP. Based on the above, the NRC staff finds that the applicant has adequately addressed the L&Cs of WCAP-18124-NP.

The applicant stated in the LRA that the 54 EFPY fluence projections will be managed for the PEO by the Reactor Vessel Surveillance AMP (as described in Section B.2.1.18 of the LRA) during the PEO. The NRC staff notes that the Reactor Vessel Surveillance AMP, as described in Section B.2.1.18 of the LRA, includes for DCPP, Unit 1 the scheduled removal and testing of the last capsule having accumulated 1 to 2 times the peak reactor vessel neutron fluence at 60 years of operation. The applicant stated that there are no capsules remaining in the DCPP, Unit 2 RPV and that the last capsule removed produced exposures comparable to the fluences expected at the end of the PEO. The NRC staff finds the use of the Reactor Vessel Surveillance AMP to be acceptable based on the removal and testing of surveillance capsules with comparable or bounding fluence exposures.

The NRC staff determined that the applicant has adequately demonstrated that the analysis for the neutron fluence for the RPV and for each beltline and extended beltline material has been projected to the end of the PEO pursuant to 10 CFR 54.21(c)(1)(ii). The staff finds that the analysis meets the acceptance criteria in SRP-LR Section 4.2.2.1 because the methods used to calculate the neutron fluence are NRC-approved methods and adhere to the guidance of RG 1.190 where applicable. Hence, the staff finds that the applicant's Neutron Fluence Projections TLAA is consistent with the acceptance criteria in SRP-LR Section 4.2.2.1 and is, therefore, acceptable in accordance with 10 CFR 54.21(c)(1)(iii).

Based on the above, the NRC staff finds the DCPP, Units 1 and 2 RPV beltline and extended beltline area component fluence projections through the PEO for the neutron embrittlement TLAA evaluations to be acceptable.

4.2.1.3 UFSAR Supplement

LRA Section A.3.1.1 provides the UFSAR supplement summarizing the neutron fluence projections. The NRC staff reviewed LRA Section A.3.1.1 consistent with the review procedures in SRP-LR Section 4.2.3.1.1. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 RPV and the vessel internals 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 effects of aging due to neutron fluence on the intended functions of the RPV beltline and extended beltline materials will be adequately managed for the PEO. 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).

4.2.2 Pressurized Thermal Shock

4.2.2.1 Summary of Technical Information in the Application

LRA Section 4.2.2 describes the applicant's TLAA for pressurized thermal shock of the RPV. The applicant dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the pressurized thermal shock analysis has been projected to the end of the PEO.

4.2.2.2 Staff Evaluation

The NRC staff reviewed the applicant's TLAA for pressurized thermal shock of the RPV and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii) consistent with the review procedures in SRP-LR Section 4.2.3.1.2.2.

By letter dated October 14, 2024, the applicant provided revisions to LRA Section 4.2.2, which were made in part pursuant to 10 CFR 54.21(b). The NRC staff noted that revisions to LRA Section 4.2.2 were generally associated downstream impacts related to:

- Updated neutron fluence calculations based on NRC-approved methodologies (i.e., WCAP-18124-NP-A and WCAP-18124-NP-A Supplement 1-NP-A). The staff's review of these neutron fluence calculations is documented in SE Section 4.2.1.

- Additional sister-plant data for DCPP, Unit 2 (i.e., a recently withdrawn and tested capsule).

Additionally, by letter dated October 14, 2024, the applicant provided WCAP-18924-NP, "Diablo Canyon Units 1 and 2 Initial License Renewal: Time-Limited Aging Analyses (TLAAs) on Reactor Vessel Integrity (RVI)" (Enclosure 5 to Supplement 1 to the LRA), which contains updated evaluations related to pressurized thermal shock based on the downstream impacts of the revisions noted above.

The updated evaluations related to pressurized thermal shock in LRA Section 4.2.2 used neutron fluence values that included a 10-percent upward bias applied to the relative power of the peripheral and reentrant corner fuel assemblies. The NRC staff noted that this bias is generally intended to account for normal cycle-to-cycle variations in the applicant's current and future core designs. As such, the staff finds it reasonable that the applicant conservatively considered increased neutron fluence exposure of the RPV for the PEO.

4.2.2.2.1 Material Property Values

During its aging management audit, the NRC staff assessed the material property values (e.g., initial reference temperature for nil-ductility transition (RT_{NDT}), weight-percent copper (%Cu), weight-percent nickel (%Ni), etc.) for the materials identified as "Reactor Vessel Beltline" and "Reactor Vessel Extended Beltline" for DCPP, Units 1 and 2 contained in the LRA Tables (Unit 1 – Table 4.2.2-1; Unit 2 – Table 4.2.2-2) to confirm that (1) these values were consistent with the CLB, (2) revisions to the CLB values are justified and appropriate, or (3) values not previously addressed are justified and appropriate. Through its review of the applicant's CLB documents (i.e., UFSAR, PTLR, and "Evaluation of Diablo Canyon Power Plant Reactor Vessel Materials by the NRC Pressurized Thermal Shock Screening Criteria" (ML16341D574)), the staff confirmed that the material property values for those RPV materials identified as "Reactor Vessel Beltline" and "Reactor Vessel Extended Beltline" in LRA Table 4.2.2-1 and LRA Table 4.2.2-2 (except for the %Cu and %Ni values for the DCPP, Unit 2 upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008)) are consistent with the applicant's CLB and, therefore, appropriate for use in determining reference temperature - pressurized thermal shock (RT_{PTS}) values for the end of the PEO.

For the DCPP, Unit 2 upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008), RG 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," dated May 1988 (ML003740284), explains that the best-estimate values for a material will normally be the mean of the measured values for a plate or forging or for weld samples made with the weld wire heat number that matches the critical vessel weld. The NRC staff reviewed Table 4-3 in WCAP-15423, "Analysis of Capsule V from Pacific Gas and Electric Company Diablo Canyon Unit 2 Reactor Vessel Radiation Surveillance Program" (ML010180432), and confirmed that the %Cu and %Ni values of 0.22 and 0.87, respectively, were based on the mean of best-estimate chemical compositions from relevant (i.e., heat-to-heat match of the RPV material) publicly available material data. Thus, the staff finds that the %Cu and %Ni values for the upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008) in LRA Table 4.2.2-2 are acceptable because they were determined consistent with RG 1.99, Revision 2 and, therefore, are appropriate for use in determining RT_{PTS} values for the end of the PEO.

Additionally, based on its review and verification described above, the NRC staff finds that the appropriate margin values consistent with RG 1.99, Revision 2 were applied for each RPV material for the purposes of addressing pressurized thermal shock.

4.2.2.2.2 Surveillance Data

The NRC staff noted that the applicant assessed relevant surveillance data to determine its credibility per the criteria in 10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events," and RG 1.99, Revision 2 and considered whether it is appropriate to use the surveillance data when calculating RT_{PTS} values. Specifically, the applicant indicated that RT_{PTS} values for the following RPV materials in LRA Tables 4.2.2-1 and 4.2.2-2 were determined based on credible surveillance data, as defined in 10 CFR 50.61(c)(2)(i):

- DCPP, Unit 1
  - intermediate shell longitudinal welds 2-442A, B, and C (Heat No. 27204)
  - lower shell longitudinal welds 3-442A, B, and C (Heat No. 27204)
- DCPP, Unit 2
  - intermediate shell plate B5454-1 (Heat No. C5161-1)
  - intermediate shell longitudinal welds 2-201A, B, and C (Heat No. 21935/12008)
  - lower shell longitudinal welds 3-201A (Heat No. 33A277)
  - upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008)

The NRC staff reviewed Section 3, "Material Property Input," Appendix A, "Credibility Evaluation of the Diablo Canyon Unit 1 Surveillance Program," and Appendix B, "Credibility Evaluation of the Diablo Canyon Unit 2 Surveillance Program," of WCAP-18924-NP and noted that it provides the applicant's assessment of surveillance data. The staff's assessment for each unit is summarized below.

Surveillance Data for DCPP, Unit 1

When considering only plant-specific surveillance data for intermediate shell plate B4106-3 (Heat No. C2793-1) and Heat No. 27204, the applicant determined that the surveillance data was non-credible in accordance with 10 CFR 50.61 and RG 1.99, Revision 2. Based on its review of the credibility of plant-specific surveillance data, the NRC staff confirmed that one of the three surveillance data points for the respective RPV material falls outside the ±1σ scatter band for surveillance base (i.e., 17 degrees Fahrenheit (°F)) and weld (i.e., 28°F) materials as specified in 10 CFR 50.61 and RG 1.99, Revision 2. Thus, when considering only plant-specific surveillance data, the staff determined that the surveillance data for Heat No. C2793-1 and Heat No. 27204 are deemed non-credible per the third criterion for credibility in 10 CFR 50.61 and RG 1.99, Revision 2.

LRA Section 4.2.2 identifies the consideration of non-credible surveillance data for intermediate shell plate B4106-3 (Heat No. C2793-1). The NRC staff noted that the applicant provided its assessment of the non-credible surveillance data for completeness and not for demonstration that pressurized thermal shock is addressed in accordance with 10 CFR 50.61 through the PEO. Additionally, since the non-credible surveillance data does not impact whether the RT_{PTS} value for intermediate shell plate B4106-3 is less than the screening criteria in 10 CFR 50.61

nor is this the limiting material with respect to the pressurized thermal shock for DCPP, Unit 1, this non-credible data was not considered relevant to the staff's evaluation of pressurized thermal shock and compliance with 10 CFR 50.61 through the PEO. The NRC staff noted that surveillance data from a sister-plant (i.e., material with a heat-to-heat match) is available for Heat No. 13253 and Heat No. 27204. In accordance with 10 CFR 50.61(c)(2) licensees shall consider plant-specific information that could affect the level of embrittlement. This information includes but is not limited to the reactor vessel operating temperature and any related surveillance program results. Surveillance program results mean any data that demonstrates the embrittlement trends for the limiting beltline material, including but not limited to data from test reactors or from surveillance programs at other plants with or without surveillance program integrated per 10 CFR Part 50, Appendix H.

Regarding the upper shell to intermediate shell circumferential weld 8-442 (Heat No. 13253), the NRC staff reviewed publicly available surveillance data for Heat No. 13253 contained in WCAP-10492 (ML18092A231), WCAP-11554 (ML12242A156), WCAP-13366 (ML18096B076), and WCAP-15692 (ML012910321) to determine the impacts of this information on the applicant's assessment for pressurized thermal shock. Based on its audit and review, the staff determined that when considering this information, the RT_{PTS} value for this material (i.e., 38.3°F) is significantly less when compared to the RT_{PTS} value of limiting RPV material for Unit 1 (i.e., 215°F) and the screening criterion in 10 CFR 50.61 (300 °F for circumferential weld materials); thus, the staff finds that the applicant's conclusions related to pressurized thermal shock are not impacted by this surveillance data for Heat No. 13253.

The applicant's assessment of available surveillance data (i.e., plant-specific and sister-plant) for Heat No. 27204 is documented in Appendix A of WCAP-18924-NP. The NRC staff noted that the operating temperature and chemical composition of the sister-plant data for Heat No. 27204 needed assessment to appropriately consider it in the evaluation of pressurized thermal shock. Regarding adjustments due to chemical composition, RG 1.99, Revision 2 indicates that an adjustment is made to the measured values of ΔRT_{NDT} by multiplying the ratio of the chemistry factor for the vessel weld to that for the surveillance weld. Based on its review, the staff finds that the applicant took into consideration the difference in the copper or nickel content of the vessel weld and the surveillance weld when considering the available surveillance data (i.e., plant-specific and sister-plant) for Heat No. 27204 consistent with RG 1.99, Revision 2.

Regarding adjustments due to operating temperatures, the NRC staff noted that lower nominal irradiation temperatures are considered to produce greater embrittlement, whereas higher nominal irradiation temperatures are considered to produce less embrittlement, which is consistent with the guidance in RG 1.99, Revision 2. Thus, when considering sister-plant data, the staff noted that it is necessary to account for differences in the operating temperature of the reactor vessels that the surveillance specimens being assessed were irradiated in. The staff noted that at the irradiation temperatures discussed in RG 1.99, Revision 2, it is generally expected that a 1°F decrease in irradiation temperature will result in approximately a 1°F increase ΔRT_{NDT}. Based on its review, the staff finds that the applicant appropriately took into consideration the different operating temperatures of the reactor vessels that the surveillance specimens being assessed were irradiated in when considering the available surveillance data (i.e., plant-specific and sister-plant) for Heat No. 27204.

Based on its review of the credibility of available surveillance data for Heat No. 27204, the NRC staff confirmed that all surveillance data points were within the +/- 1σ scatter band for surveillance weld materials (i.e., 28°F). Thus, when considering all available surveillance data for Heat No. 27204, the staff finds that the applicant's credibility evaluation meets the third criterion for credibility in 10 CFR 50.61 and RG 1.99, Revision 2. Additionally, based on its audit and review, the staff verified that the applicant's credibility assessment of surveillance data and use of credible surveillance data for Heat No. 27204 in the evaluation of pressurized thermal shock and RT_{PTS} values is appropriate and consistent with 10 CFR 50.61 and RG 1.99, Revision 2. Finally, the staff finds that the applicant complied with 10 CFR 50.61(c)(2) by taking into consideration available sister-plant data for Heat No. 13253 and Heat No. 27204.

Surveillance Data for DCPP, Unit 2

When considering only plant-specific surveillance data for intermediate shell plate B5454-1 (Heat No. C5161-1) and Heat No. 21935/12008, the applicant determined that the surveillance data was credible in accordance with 10 CFR 50.61 and RG 1.99, Revision 2. Based on its review of the credibility of plant-specific surveillance data, the NRC staff confirmed that (1) all eight surveillance data points for Heat No. C5161-1 fall within the ±1σ scatter band for surveillance base materials (i.e., 17°F) and (2) an adequate number of surveillance data points (i.e., greater than or equal to 68%) for Heat No. 21935/12008 fall within the ±1σ scatter band for surveillance weld materials (i.e., 28°F). Thus, when considering only plant-specific surveillance data, the staff determined that the surveillance data is deemed credible per the third criterion for credibility in 10 CFR 50.61 and RG 1.99, Revision 2.

The NRC staff noted that surveillance data from sister-plants (material with a heat-to-heat match) is available for Heat No. 33A277. The applicant's assessment of available sister-plant surveillance data for Heat No. 33A277 is documented in Section 3 and Appendix B of WCAP-18924-NP with additional supporting detail in WCAP-18624-NP, "Analysis of Capsule 83° from the Calvert Cliffs Unit 1 Reactor Vessel Radiation Surveillance Program" (ML21210A325). The staff noted that the operating temperature and chemical composition of the sister-plant data needed assessment to appropriately consider it for Heat No. 33A277. The basis for these adjustments for sister-plant data is discussed above in the staff's evaluation of the DCPP, Unit 1 surveillance data.

Based on its review, the NRC staff finds that the applicant took into consideration the difference in the copper or nickel content of the vessel weld and the surveillance weld when considering the available surveillance data for Heat No. 33A277 consistent with RG 1.99, Revision 2. Based on its review, the staff also finds that the applicant appropriately took into consideration the different operating temperatures of the reactor vessels that the surveillance specimens being assessed were irradiated in when considering the available surveillance data (i.e., plant-specific and sister-plant) for Heat No. 33A277.

Based on its review of the credibility of available surveillance data for Heat No. 33A277, the NRC staff confirmed that all surveillance data points were within the ±1σ scatter band for surveillance weld materials (i.e., 28°F). Thus, when considering available sister-plant surveillance data for Heat No. 33A277, the staff finds that the applicant's credibility evaluation meets the third criterion for credibility in 10 CFR 50.61 and RG 1.99, Revision 2. Additionally, based on its audit and review, the staff verified that the applicant's credibility assessment of surveillance data and use of credible surveillance data for intermediate shell plate B5454-1 (Heat No. C5161-1), Heat No. 21935/12008, and Heat No. 33A277 in the evaluation of pressurized thermal shock and RT_{PTS} values is appropriate and consistent with 10 CFR 50.61 and RG 1.99, Revision 2. Finally, the staff finds that the applicant complied with 10 CFR 50.61(c)(2) by taking into consideration available sister-plant data for Heat No. 33A277.

Assessment of RT_{PTS} for DCPP, Units 1 and 2

As revised by letter dated October 14, 2024, the applicant stated that the limiting RT_{PTS} values at 54 EFPY for each unit are as follows:

- DCPP, Unit 1
  - limiting base metal or axial weld material
    - 245.5°F for lower shell longitudinal welds 3-442A, B, and C
  - limiting circumferentially oriented weld material
    - 216.3°F for the intermediate to lower shell circumferential weld 9-442
- DCPP, Unit 2
  - limiting base metal or axial weld material
    - 224.6°F for intermediate shell plate B5454-2
  - limiting circumferentially oriented weld material
    - 54.4°F for upper shell to intermediate shell circumferential weld 8-201

Based on its review, as described above related to material property information and surveillance data, the NRC staff verified that the projected RT_{PTS} values, as revised by letter dated October 14, 2024, were calculated in accordance with 10 CFR 50.61; as such, the staff finds that the limiting materials for pressurized thermal shock identified by the applicant for (1) base metal or axial weld material and (2) circumferentially oriented weld material are appropriate and that the associated RT_{PTS} values are less than the screening criteria specified in 10 CFR 50.61.

Based on the above, the NRC staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii), that the analyses for pressurized thermal shock of the RPV materials, as revised by letter dated October 14, 2024, have been projected to the end of the PEO. Additionally, the TLAA meets the acceptance criteria in SRP-LR Section 4.2.2.1.2.2 because the pressurized thermal shock analyses were reevaluated consistent with 10 CFR 50.61 when considering the neutron fluence values for 60 years (54 EFPY), and the applicant has demonstrated that the pressurized thermal shock screening criteria were not exceeded through the PEO.

4.2.2.3 UFSAR Supplement

LRA Section A.3.1.2 provides the UFSAR supplement summarizing pressurized thermal shock of the RPV. The NRC staff reviewed LRA Section A.3.1.2 consistent with the review procedures in SRP-LR Section 4.2.3.2. Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-LR 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 pressurized thermal shock of the RPV, 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 analysis for pressurized thermal shock of the RPV, as revised by letter dated October 14, 2024, has been projected to the end of the PEO. 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).

4.2.3 Upper-Shelf Energy

4.2.3.1 Summary of Technical Information in the Application

LRA Section 4.2.3 describes the applicant's TLAA for upper-shelf energy of RPV shell materials. The applicant dispositioned the TLAA for the decrease in upper-shelf energy of the RPV in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analysis has been projected to the end of the PEO.

4.2.3.2 Staff Evaluation

The NRC staff reviewed the applicant's TLAA for the decrease in upper-shelf energy of the RPV and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii) consistent with the review procedures in SRP-LR Section 4.2.3.1.1.2.

By letter dated October 14, 2024, the applicant provided revisions to LRA Section 4.2.2, which were made in part pursuant to 10 CFR 54.21(b). The NRC staff noted that revisions to LRA Section 4.2.2 were generally associated downstream impacts related to:

- Updated neutron fluence calculations based on NRC-approved methodologies (i.e., WCAP-18124-NP-A and WCAP-18124-NP-A Supplement 1-NP-A). The staff's review of these neutron fluence calculations is documented in SER Section 4.2.1.
- Additional sister-plant data for DCPP, Unit 2 (i.e., a recently withdrawn and tested capsule).

The updated evaluations related to upper-shelf energy in LRA Section 4.2.3 used neutron fluence values that included a 10-percent upward bias applied to the relative power of the peripheral and reentrant corner fuel assemblies. The NRC staff noted that this bias generally is intended to account for normal cycle-to-cycle variations in the applicant's current and future core designs. As such, the staff finds it reasonable the applicant conservatively considered increased neutron fluence exposure of the RPV for the PEO.

4.2.3.2.1 Material Property Values

During its aging management audit, the NRC staff assessed the material property values (e.g., initial upper-shelf energy and %Cu) for the materials identified as "Reactor Vessel Beltline" and "Reactor Vessel Extended Beltline" for DCPP, Units 1 and 2 contained in the LRA Tables (Unit 1 – Table 4.2.3-1; Unit 2 - Table 4.2.3-2) to confirm that (1) these values were consistent with the CLB, (2) revisions to the CLB values are justified and appropriate, or (3) values not previously addressed are justified and appropriate. Through its review of the applicant's CLB documents (i.e., UFSAR and PTLR), the staff confirmed that the material property values for those RPV materials identified as "Reactor Vessel Beltline" and "Reactor Vessel Extended Beltline" in LRA Table 4.2.3-1 and LRA Table 4.2.3-2 (except for the %Cu value for the Unit 2 upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008)) are consistent with the applicant's CLB and, therefore, appropriate for use in determining upper- shelf energy values for the end of the PEO.

For the DCPP, Unit 2 upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008), the NRC staff determined in SE Section 4.2.2.2 that the %Cu value for the upper shell longitudinal weld 1-201A, B, and C (Heat No. 21935/12008) is acceptable because it was determined consistent with RG 1.99, Revision 2.

4.2.3.2.2 Surveillance Data

The NRC staff noted that the applicant assessed relevant surveillance data to determine its credibility per the criteria in RG 1.99, Revision 2 and considered whether it is appropriate to use the surveillance data when calculating upper-shelf energy values. Specifically, the applicant indicated that upper-shelf energy values for the following RPV materials in LRA Tables 4.2.3-1 and 4.2.3-2, for DCPP, Units 1 and 2, respectively, were determined based on surveillance data:

- DCPP, Unit 1
  - Intermediate shell plate B4106-3 (Heat No. C2793-1)
  - Heat No. 27204
    - intermediate shell longitudinal welds 2-442A, B, and C
    - lower shell longitudinal welds 3-442A, B, and C
- DCPP, Unit 2
  - Intermediate shell plate B5454-1 (Heat No. C5161-1)
  - Heat No. 21935/12008
    - intermediate shell longitudinal welds 2-201A, B, and C
    - upper shell longitudinal welds 1-201A, B, and C

Section 3, “Material Property Input,” Appendix A, “Credibility Evaluation of the Diablo Canyon Unit 1 Surveillance Program,” and Appendix B, “Credibility Evaluation of the Diablo Canyon Unit 2 Surveillance Program,” of WCAP-18924-NP provides the applicant’s assessment of surveillance data. RG 1.99, Revision 2 indicates, in part, that if data do not meet the third criterion for credibility for the use in adjusted reference temperature shift calculations, it may still be credible for determining decrease in upper-shelf energy if the upper-shelf can be clearly determined. Additionally, Position 2.2 of RG 1.99, Revision 2 states that the decrease in upper-shelf energy may be obtained by plotting the reduced plant surveillance data on Figure 2 of this guide and fitting the data with a line drawn parallel to the existing lines as the upper bound of all the data, and that this line should be used in preference to the existing graph.

Based on its review, the NRC staff determined that the plant-specific surveillance data assessment was acceptable and consistent with RG 1.99, Revision 2. Furthermore, the staff finds that the surveillance data for Heat No. 27204, Heat No. C5161-1, Heat No. 21935/12008, and Heat No. C2793-1 is applicable for use (i.e., per Position 2.2 of RG 1.99, Revision 2) in the applicant’s evaluation for upper-shelf energy values for the RPV materials identified above.

4.2.3.2.3 Projected 54-EFPY Upper-Shelf Energy Values

Based on its review, as described above related to the RPV material property and surveillance data, the NRC staff also verified that the projected upper-shelf energy values, including those that took into consideration surveillance data (i.e., per Position 2.2), were calculated in accordance with RG 1.99, Revision 2; as such, the staff finds that the projected upper-shelf energy values for the RPV materials identified in LRA Tables 4.2.3-1 and 4.2.3-2, as revised by letter dated October 14, 2024, are appropriate and are greater than the screening criterion of 50 foot-pounds per Appendix G, “Fracture Toughness Requirements,” of 10 CFR Part 50.

The NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(ii) that the analyses for upper-shelf energy of the RPV, as revised by letter dated October 14, 2024, has been projected to the end of the PEO. Additionally, the TLAA meets the acceptance criteria in SRP-LR Section 4.2.2.1.1.2 because the upper-shelf energy analyses were reevaluated consistent with RG 1.99, Revision 2 when considering the neutron fluence values for 60 years (54-EFPY) and the applicant demonstrated that the screening criterion of 50 foot-pounds per Appendix G of 10 CFR Part 50 was met for its RPV materials.

4.2.3.3 UFSAR Supplement

LRA Section A.3.1.3 provides the UFSAR supplement summarizing the TLAA for decrease in upper-shelf energy of the RPV. The NRC staff reviewed LRA Section A.3.1.3 consistent with the review procedures in SRP-LR Section 4.2.3.2. Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-LR 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 decrease in upper-shelf energy of the RPV, as required by 10 CFR 54.21(d).

4.2.3.4 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 analysis for upper-shelf energy of the RPV materials, as revised by letter dated October 14, 2024, has been projected to the end of the PEO. 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 Pressure-Temperature Limits

4.2.4.1 Summary of Technical Information in the Application

LRA Section 4.2.4 describes the applicant’s TLAA for pressure-temperature limits and LTOP related to the RPV. The applicant dispositioned the TLAA for the pressure-temperature limits and LTOP related to the RPV in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of neutron embrittlement on the intended functions of the RPV will be adequately managed by the Administrative Controls Process for the PTLR described in TS Section 5.6.6 for the PEO.

4.2.4.2 Staff Evaluation

The NRC staff reviewed the applicant’s TLAA for the pressure-temperature limits and LTOP related to the RPV and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.2.3.1.3.3. SRP-LR Section 4.2.2.1.3.3 specifies that the 10 CFR 50.90 process for P-T limits located in the limiting conditions for operation or the Administrative Controls Process for P-T limits that are administratively amended through a PTLR process can be considered adequate aging management programs within the scope of 10 CFR 54.21(c)(1)(iii), such that P-T limits will be maintained through the PEO.

The current P-T limits for DCPP, Units 1 and 2 are contained in “PTLR for Diablo Canyon,” Revision 16A (ML23298A107), which has a period of applicability through 35 EFPY. The NRC staff noted that the NRC had previously approved the applicant’s request to relocate the P-T limits and LTOP limit setpoints from the TS limiting conditions for operation into a plant-specific PTLR that will be administratively controlled by TS Section 5.6.6 by Amendment Nos. 170 and 171 for Unit1 and 2, respectively, by letter dated May 13, 2004 (ML041400243).

The applicant explained that LTOP is provided by the cold over-pressurization mitigation system and that any changes to RCS P-T limit curves also require an evaluation of the LTOP enable temperature setpoint and the power operated relief valve pressure setpoint and supporting safety analyses. Based on its review, the NRC staff noted that the Administrative Controls Process for the PTLR, as described in the applicant's TS Section 5.6.6, requires that the analytical methods used to determine the RCS pressure and temperature and LTOP limits shall be those previously reviewed and approved by the NRC, which are explicitly identified in TS 5.6.6, and that any revisions or updates to the P-T limits, including LTOP analysis, will be submitted to the NRC for prior review.

The NRC staff finds the applicant has demonstrated 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 for the PEO. Additionally, the TLAA meets the acceptance criteria in SRP-LR Section 4.2.2.1.3.3 because, as discussed above, the P-T limits including LTOP analysis will be updated and submitted to the NRC in accordance with the Administrative Controls Process for the PTLR described in TS Section 5.6.6 prior to the expiration of the period of applicability for the P-T limits.

4.2.4.3 *UFSAR Supplement*

LRA Section A.3.1.4 provides the UFSAR supplement summarizing the TLAA for P-T limits and LTOP related to the RPV. The NRC staff reviewed LRA Section A.3.1.4 consistent with the review procedures in SRP-LR Section 4.2.3.2. Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-LR 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 neutron embrittlement of the RPV and its impact to the P-T limits and LTOP setpoints, as required by 10 CFR 54.21(d).

4.2.4.4 *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)(iii), that the effects of neutron embrittlement and its impact to the P-T limits and LTOP setpoints on the intended functions of the RPV will be adequately managed by the Administrative Controls Process for the PTLR described in TS Section 5.6.6 for the PEO. 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 <u>Metal Fatigue</u>

4.3.1 DCPP Transient Monitoring and Projections

4.3.1.1 Summary of Technical Information in the Application

LRA Section 4.3.1, as supplemented by RAI response dated October 3, 2024 (ML24277A067), and by letter dated October 14, 2024, describes the applicant's transient monitoring and cycle projections for 60 years of operation. The applicant dispositioned the TLAA on transient monitoring and projections in accordance with 10 CFR 54.21(c)(1)(iii) to demonstrate that the effects of aging due to fatigue on the intended functions of the RCS will be adequately managed for the PEO by using the Fatigue Monitoring AMP (LRA Section B.2.2.1). The Fatigue Monitoring AMP will monitor the transient cycles to ensure that the actual transient cycles remain bounded by the fatigue design assumptions and calculations or that appropriate reevaluation or other corrective actions (e.g., repair/replacement activities) are initiated before the fatigue design limit is exceeded.

4.3.1.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAA on the transient monitoring and cycle projections for the RCS and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The NRC staff noted that LRA Section 4.3.1 addresses the overall approach for the transient monitoring and projections for 60 years of operation. The specific fatigue TLAAs, which use these transient cycle projections as an input, are separately addressed in LRA Sections 4.3.2 (Class A fatigue analyses), 4.3.3 (fatigue analyses of RPV internals), 4.3.4 (environmentally assisted fatigue analysis), 4.3.5 (allowable stress analyses for American National Standards Institute (ANSI) B31.1 piping), and 4.3.6 (fatigue analysis of Class 1E electrical raceway support angle fittings).

LRA Table 4.3-1 describes the 60-year projected cycles of the design transients. The applicant explained that the projected cycles were calculated using a dual linear projection of the historical cycle data. For each transient, the following two cycle accumulation rates were determined: (1) a long-term rate of accumulation based on the entire history (i.e., the number of cycles since the start of plant operation) and (2) a short-term rate of accumulation (i.e., the incremental cycles for the most recent 10 years up to March 31, 2022 and October 21, 2022, for DCPP, Units 1 and 2, respectively). These two cycle accumulation rates were combined using a weighted average. The average cycle projection rate is determined as (LTW x (long-term rate) + STW x (short-term rate)) / (LTW + STW), where LTW is the long-term weighting factor and STW is the short-term weighting factor. The applicant also explained that, for the weighting factors, an LTW value of 1 and a STW value of 3 are used at the DCPP to reflect the most likely future cycles.

The NRC staff noted that the cycle projection approach of the applicant is reasonable because (1) the cycle projections are based on the actual transient cycles that were accumulated since the start of plant operation including the most recent 10-year cycle data and (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), consistent with the acceptable determination that the more recent cycle data better represent the future cycle projections.

In addition, the NRC staff finds that the applicant’s evaluation regarding the “loss of charging with prompt return to service (loop 4/3)” transient cycles, as supplemented by the response to RAI 4.3.1-1 and letters dated October 3, 2024, and October 14, 2024, is acceptable because the applicant clarified the following:

(1) The “loss of charging with prompt return to service (loop 4/3)” transient is the only design transient in LRA Table 4.3-1 for which the number of 60-year projected cycles is not bounded by the limiting (lowest) analyzed cycles of transients evaluated in LRA Section 4.3 for metal fatigue TLAAs.

(2) The only fatigue analysis, which may be affected by the 60-year projected cycles not bounded by the limiting analyzed cycles, is the charging nozzle environmentally assisted fatigue (EAF) analysis in LRA Section 4.3.4.

(3) The limiting analyzed cycles (25 cycles) of the “loss of charging with prompt return to service (loop 4/3)” transient result in a contribution of less than 10^{-5} to the cumulative usage factor (CUF) of 0.0641 for the charging nozzle that is described in LRA Table 4.3.4-1.

(4) The increase in the analyzed cycles of the transient by a factor of 10 to 250 cycles, which significantly exceed the 60-year projected cycles, would result in a negligible contribution to CUF and environmentally adjusted CUF (CUF_{en}).

(5) Accordingly, there is reasonable assurance that the existing fatigue analyses including the EAF analysis continue to be valid (e.g., meeting the CUF and CUF_{en} criterion of 1.0).

Regarding the transient cycle monitoring, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the input to the fatigue analyses, by taking corrective actions as needed (e.g., reevaluation of the fatigue analyses and repair/replacement of components). The staff finds that the applicant’s use of the Fatigue Monitoring AMP is adequate to monitor the transient cycles because the Fatigue Monitoring AMP ensures that the actual transient cycles remain bounded by the fatigue design assumptions and calculations or that appropriate reevaluation or other corrective actions (e.g., repair/replacement activities) are initiated before the fatigue design limit (e.g., CUF_{en} of 1.0) is exceeded.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the TLAA on transient monitoring and projections for the RCS will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

4.3.1.3 UFSAR Supplement

LRA Section A.3.2 provides the UFSAR supplement summarizing the transient cycle monitoring and projections for 60 years of operation. The NRC staff reviewed LRA Section A.3.2 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its action to address the transient cycle monitoring and projections for 60 years of operation, as required by 10 CFR 54.21(d).

4.3.1.4 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)(iii), that the TLAA on transient monitoring and projections for the RCS will be adequately managed by the Fatigue Monitoring AMP for the PEO. 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).

4.3.2 ASME Section III, Class A Fatigue Analyses

4.3.2.1 Reactor Pressure Vessel, Nozzles, and Studs

4.3.2.1.1 Summary of Technical Information in the Application

LRA Section 4.3.2.1 describes the fatigue TLAAs for the RPV, nozzles, and studs. The applicant dispositioned the fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions of the RPV components will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.2.1.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the RPV, nozzles, and studs and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The applicant indicated that the existing fatigue analyses for the RPV, nozzles, and studs are based on the design transients described in LRA Table 4.3-1. The applicant also explained that the Fatigue Monitoring AMP (LRA Section B.2.2.1) will monitor the transient cycles and will take corrective actions if the actual cycles approach their analyzed numbers to ensure that the CUF values continue to meet the fatigue design limit (1.0). The Fatigue Monitoring AMP includes corrective actions such as repair and replacement of components and reevaluation of CUF values.

Regarding aging management for the RPV, nozzles, and studs, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the CUF analysis, such that the CUF values will not exceed the design limit of 1.0 (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue analyses to ensure that the fatigue design limit for CUF is met for the PEO. The staff finds that the applicant’s use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue because the program monitors the transient cycles and performs corrective actions as needed, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue on the intended functions of the RPV, nozzles, and studs will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3

4.3.2.1.3 UFSAR Supplement

LRA Section A.3.2.1.1 provides the UFSAR supplement summarizing the fatigue TLAAs for the RPV, nozzles, and studs. The NRC staff reviewed LRA Section A.3.2.1.1 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 TLAAs, as required by 10 CFR 54.21(d).

4.3.2.1.4 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)(iii), that the effects of fatigue on the intended functions of the RPV, nozzles, and studs will be adequately managed by the Fatigue Monitoring AMP for the PEO. 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).

4.3.2.2 Reactor Vessel Closure Heads and Associated Components

4.3.2.2.1 Summary of Technical Information in the Application

LRA Section 4.3.2.2, as supplemented by letter dated October 14, 2024, describes the fatigue TLAAs for the reactor vessel closure heads and associated components. For the replacement reactor vessel closure heads (RRVCHs), control rod drive mechanism (CRDM) pressure housings, core exit thermocouple nozzle assemblies (CETNAs), and thermocouple nozzles, the applicant dispositioned the fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the PEO. For the reactor vessel thermocouple columns, the applicant dispositioned the fatigue TLAA in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the analysis has been projected to the end of the PEO.

4.3.2.2.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the RRVCHs, CRDM pressure housings, CETNAs, and thermocouple nozzles and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(i) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.1. The staff also reviewed the fatigue TLAA for the reactor vessel thermocouple columns and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.2.

The applicant explained that the CRDM pressure housings, CETNAs, and thermocouple nozzles were replaced when the reactor vessel closure head was replaced in 2010 for Unit 1 and 2009 for Unit 2. The applicant also indicated that the existing fatigue analyses for these components are based on 50-year design life and, therefore, the fatigue analyses are valid until 2060 for Unit 1 and until 2059 for Unit 2. The NRC staff noted that the design life of the RRVCHs and these associated replacement components significantly exceeds the PEO for each unit (i.e., 2044 and 2045 for Units 1 and 2, respectively).

The NRC staff finds that the applicant’s TLAA disposition for the RRVCHs, CRDM pressure housings, CETNAs, and thermocouple nozzles per 10 CFR 54.21(c)(1)(i) is acceptable because (1) the existing fatigue analyses, which meet the design limit of CUF (1.0), are based on conservative 50-year design cycles and (2) the 50-year design life after the component replacements significantly exceeds the end of the PEO for each unit.

In addition, the applicant dispositioned the fatigue TLAA for the reactor vessel thermocouple columns in accordance with 10 CFR 54.21(c)(1)(ii) by demonstrating that the fatigue analysis has been projected to the end of the PEO. The applicant explained that these components were not replaced during the reactor vessel head replacements that occurred in 2010 for Unit 1 and in 2009 for Unit 2. The applicant also indicated that the existing fatigue analysis for the reactor vessel thermocouple columns is based on the 50-year design transient cycles and the CUF value based on the design cycles is 0.0122. Therefore, the 60-year projected CUF value is estimated to be 0.015 (i.e., (0.0122 × 60 years) ÷ 50 years), which is significantly less than the fatigue design limit (1.0).

The NRC staff finds that the applicant's TLAA disposition for the reactor vessel thermocouple columns per 10 CFR 54.21(c)(1)(ii) is acceptable because:

(1) The applicant determined the existing CUF based on the 50-year design transient cycles.

(2) The applicant appropriately projected the 50-year CUF to estimate the 60-year CUF.

(3) The 60-year CUF is less than 0.1 and, therefore, meets the fatigue design limit (1.0) with a significantly margin.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the fatigue analyses for the RRVCHs, CRDM pressure housings, CETNAs, and thermocouple nozzles remain valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.1 because the applicant demonstrated that the 50-year design life for the replacement components is bounding for operation since the replacement through the period of the extended operation.

As discussed above, the NRC staff also finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(ii) that the fatigue analysis for the reactor vessel thermocouple columns has been projected to the end of the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.2 because the applicant demonstrated that the 60-year projected CUF is less than the fatigue design limit (1.0).

4.3.2.2.3 UFSAR Supplement

LRA Section A.3.2.1.2 provides the UFSAR supplement summarizing the fatigue TLAAs for the RRVCHs, CRDM pressure housings, CETNAs, thermocouple nozzles, and thermocouple columns. The NRC staff reviewed LRA Section A.3.2.1.2 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 TLAAs, as required by 10 CFR 54.21(d).

4.3.2.2.4 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)(i), that the fatigue TLAAs for RRVCHs, CRDM pressure housings, CETNAs, and thermocouple nozzles remain valid for the PEO. The staff also concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the fatigue TLAA for the reactor vessel thermocouple nozzles has been projected to the end of the PEO. The staff further concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.3.2.3 Reactor Coolant Pump Pressure Boundary Components

4.3.2.3.1 Summary of Technical Information in the Application

LRA Section 4.3.2.3, as supplemented by letter dated October 14, 2024, describes the fatigue TLAAs for the reactor coolant pump (RCP) pressure boundary components. There are four Westinghouse Model 93A RCPs for each reactor (one pump per coolant loop). The applicant dispositioned the fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions of the RCP pressure boundary components will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.2.3.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the RCP pressure boundary components and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The applicant explained that the RCP components, which form the reactor coolant pressure boundary, are subject to the fatigue TLAAs. The NRC staff also noted that the fatigue TLAA for the RCP flywheel is separately addressed in LRA Section 4.7.4. The staff's evaluation of the fatigue TLAA for the RCP flywheel is documented in SE Section 4.7.4. The applicant also indicated that the existing CLB fatigue analyses for the RCP pressure boundary components rely on the fatigue waiver provisions in accordance with ASME Code Section III, N-415.1 or meet the fatigue design limit for CUF (1.0).

Regarding the fatigue waiver analysis, the applicant explained that the transients used in the fatigue waiver analysis are consistent with a subset of the design transients identified in UFSAR Table 5.2-4, except for using a lower number of (1) "plant heat-up and cool-down" transient cycles and (2) "primary side leak test" transient cycles. The applicant also explained that given the lower number of the transient cycles in the fatigue waiver analysis than the design cycles, the Fatigue Monitoring AMP incorporates the lower, more conservative number of transients to determine an action limit for fatigue monitoring and potential corrective action.

The NRC staff finds that the applicant's aging management approach for the RCP pressure boundary components (e.g., upper seal housing and upper seal housing bolts) subject to the fatigue waiver analysis is acceptable because:

(1) Even though the analyzed cycles in the fatigue waiver analysis are less than the 50-year design cycles, the analyzed cycles are greater than the 60-year projected cycles, as clarified by letter dated October 14, 2024 (ML24289A118), so that there is reasonable assurance that the fatigue waiver analysis continues to be valid for the PEO.

(2) The Fatigue Monitoring AMP will monitor the transient cycles, which are used as the input to the fatigue waiver analysis, to ensure that the fatigue waiver analysis continues to be valid for the PEO.

In addition, the applicant explained that the Fatigue Monitoring AMP will monitor the transient cycles and will take corrective actions if the actual cycles approach their analyzed numbers to ensure that the CUF values of the RCP pressure boundary components (e.g., pump casing and primary suction/discharge nozzles), which are not subject to the fatigue waiver analysis, continue to meet the fatigue design limit (1.0). The Fatigue Monitoring AMP includes corrective actions such as repair and replacement of components and reevaluation of CUF calculations.

Regarding aging management for the RCP pressure boundary components that are not subject to the fatigue waiver analysis, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the fatigue waiver analysis or CUF analysis, such that the fatigue waiver analysis continues to be valid and the CUF values do not exceed the design limit of 1.0 (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue analysis to ensure that the fatigue waiver analysis continues to be valid and the fatigue design limit for CUF is met for the PEO. The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue because the program monitors the transient cycles and performs corrective actions as needed, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue on the intended functions of the RCP pressure boundary components and fatigue analyses will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

4.3.2.3.3 UFSAR Supplement

LRA Section A.3.2.1.3 provides the UFSAR supplement summarizing the TLAAs for the RCP pressure boundary components. The NRC staff reviewed LRA Section A.3.2.1.3 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 TLAAs, as required by 10 CFR 54.21(d).

4.3.2.3.4 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)(iii), that the effects of fatigue on the intended functions of the RCP pressure boundary components and fatigue analyses will be adequately managed by the Fatigue Monitoring AMP for the PEO. 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).

4.3.2.4 Pressurizer and Pressurizer Nozzles

4.3.2.4.1 Summary of Technical Information in the Application

LRA Section 4.3.2.4, as supplemented by the RAI response dated October 3, 2024, and by letter dated October 14, 2024, describes the fatigue TLAAs for the pressurizer. These fatigue analyses also include the pressurizer components such as pressurizer nozzles, closures, heaters, and integral support skirts. For the DCPP, Unit 2 relief valve support bracket fillet weld, the applicant dispositioned the fatigue TLAA in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analysis remains valid for the PEO. For the other pressurizer components, the applicant dispositioned the fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions of the components will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.2.4.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAA for the Unit 2 relief valve support bracket fillet 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 4.3.3.1.1.1. The staff reviewed the fatigue TLAAs for the other pressurizer 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-LR Section 4.3.3.1.1.3.

The applicant stated that the pressure-retaining and support components of the pressurizer are subject to fatigue analyses in accordance with the ASME Code Section III design requirements. Accordingly, the existing fatigue analyses include the pressurizer components such as pressurizer nozzles, closures, heaters, and integral support skirts.

In LRA Section 4.3.2.4, the applicant addressed a specific fatigue analysis for the Unit 2 relief valve support bracket fillet weld. The applicant stated that the Unit 1 pressurizer does not have such a relief valve support bracket. The applicant explained that the fatigue analysis for the Unit 2 relief valve support bracket fillet weld evaluated the partial usage factors due to the loads required by the design specification and the loads imposed by relief valve operation. The applicant also clarified that the partial usage factor due to the loads required by the design specification is less than 0.1 and accordingly maintaining the CUF for the weld within the fatigue design limit (1.0) is controlled by the permitted number of relief valve operation cycles.

The applicant further explained that the limit on the valve operation cycles is 9,000 cycles to meet the fatigue design limit. In comparison, the Unit 2 pressurizer relief valve is operated less than 10 times per year so that the 60-year projected number of valve operation cycles is 600 cycles (i.e., 10 cycles/year × 60 years), which involves a significant margin below the cycle limit of 9,000 cycles.

The NRC staff finds that the fatigue analysis for the Unit 2 relief valve support bracket fillet weld is acceptable because the number of the 60-year projected cycles based on the actual operation data is significantly less than the cycle limit of 9,000 such that the existing fatigue analysis remains valid for the PEO.

The applicant also indicated that the transients used in the fatigue analyses for the pressurizer components are consistent with the design transients listed in UFSAR Table 5.2-4. The applicant explained that the 50-year design transient cycles are more conservative (higher) than the 60-year projected cycles and that based on the conservative 50-year design cycles, all the pressurizer components meet the fatigue design limit (CUF less than 1.0) except for the Unit 1 pressurizer lower head penetrations. For the Unit 1 pressurizer lower head penetrations, the applicant further stated that the CUF based on the 60-year projected transient cycles meet the design limit (1.0).

The NRC staff finds that the fatigue analyses for the pressurizer components discussed above are acceptable because (1) the fatigue analyses are based on the 60-year projected cycles or design cycles that are more conservative than the 60-year projected cycles and (2) the 60-year projected CUF values meet the design limit of CUF (1.0).

Regarding aging management for the pressurizer components other than the Unit 2 relief valve support bracket fillet weld, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the fatigue analyses for the pressurizer components, such that the CUF values continue to meet the design limit of 1.0 (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue analyses to ensure that the fatigue design limit for CUF is met for the PEO. The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue because the program monitors the actual transient cycles and performs corrective actions as needed, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

As discussed above, for the Unit 2 relief valve support bracket fillet weld, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the fatigue analysis for the weld remains valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.1 because the number of projected transient cycles does not exceed the cycle limit for the weld.

As discussed above, for the pressurizer components other than the Unit 2 relief valve support bracket fillet weld, the NRC staff finds the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue on the intended functions of these components will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue by monitoring the transient cycles, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3

4.3.2.4.3 UFSAR Supplement

LRA Section A.3.2.1.4 provides the UFSAR supplement summarizing the fatigue TLAAs for the pressurizer components. The NRC staff reviewed LRA Section A.3.2.1.4 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR Section 4.3.2.2 and is, therefore, acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its action to address the fatigue TLAAs, as required by 10 CFR 54.21(d).

4.3.2.4.4 Conclusion

Based on its review, the NRC staff concludes the following:

(1) For the Unit 2 relief valve support bracket fillet weld, the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i), that the fatigue TLAA remains valid for the PEO.

(2) For the other pressurizer components, the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of fatigue on the intended functions of the components will be adequately managed by the Fatigue Monitoring AMP for the PEO.

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).

4.3.2.5 Steam Generator ASME Code Section III Class 1, Class 2 Secondary Side, and Feedwater Nozzle Fatigue Analyses and Fatigue Qualification Tests

4.3.2.5.1 Summary of Technical Information in the Application

LRA Section 4.3.2.5, as supplemented by RAI response dated October 3, 2024, and by letter dated October 14, 2024, describes the fatigue TLAAs for the replacement steam generator (RSG) components. The fatigue analyses and fatigue qualification tests for the RSG components are based on the design transient cycles that are bounding for the 60-year projected cycles. These fatigue analyses include the primary side and secondary side components of the RSGs. The applicant dispositioned the fatigue TLAAs and fatigue qualification tests in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the PEO.

4.3.2.5.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the RSG components in accordance with 10 CFR 54.21(c)(1)(i) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.1.

The applicant explained that the RSGs were designed and fabricated in accordance with the requirements of ASME Code Section III, 1998 Edition. Specifically, the design specification classifies the primary side of each RSG as ASME Code Class 1 and the secondary side of each RSG as ASME Code Class 2. The applicant also explained that the pressure boundary components of the RSGs were designed and constructed in accordance with ASME Code Section III, Class 1 requirements. Accordingly, the applicant performed fatigue analyses involving CUF for the RSG components.

The applicant explained that the CUF analyses are based on the design cycles in UFSAR 5.2-4, which are bounding for the 60-year projected cycles as shown in LRA Table 4.3-1. The applicant also stated that the RSGs were installed in 2008 for Unit 2 and in 2009 for Unit 1. The applicant further stated that the design life of the RSGs is a minimum of 50 years, ending in 2058 and 2059 for Units 1 and 2, respectively. In comparison, the end of the PEO is 2044 and 2045 for Units 1 and 2, respectively. Therefore, the NRC staff noted that, for each unit, the 50-year design life since installation of the RSGs significantly exceeds the end of the PEO.

Based on the above, the NRC staff finds that the fatigue TLAA evaluation for the RSG components is acceptable because:

(1) The 50-year design life of the RSGs is significantly beyond the end of the PEO.

(2) The conservative design cycles of the RSGs are also greater than the 60-year projected cycles.

(3) Accordingly, there is reasonable assurance that the CUF values for the RSG components continue to meet the design limit (1.0) for the PEO.

The applicant also addressed the fatigue qualification tests for the following RSG components:

(1) primary man-way drain hole

(2) primary man-way studs

(3) 6-inch hand-hole studs

(4) 2.5-inch inspection port gasket seal bolts

(5) diaphragm seal bolts

The applicant explained that these components were qualified by fatigue tests in accordance with ASME Code Section III, Appendix II for the number of cycles required by the design specification that are bounding for the 60-year projected cycles.

In addition, the applicant explained that visual examination of steam generator closure (i.e., man-way, hand-hole, inspection port) fasteners is periodically performed following closure cover removal during the outages per ASME Code examination category B-G-2 and that the inspection results revealed no observations of cracking or mechanical damage of any steam generator closure studs or bolts.

The NRC staff finds that the applicant's TLAA evaluation regarding the fatigue qualification tests is acceptable because:

(1) The design transient cycles evaluated in the fatigue qualification tests exceed the 60-year projected cycles for the RSG components.

(2) The operating experience, including the inspection results for the components subject to the fatigue qualification tests, also supports that there is no effect of fatigue on the structural integrity of the RSG components.

(3) Accordingly, there is reasonable assurance that the fatigue qualification tests remain valid for the PEO.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the fatigue analyses and fatigue qualification tests for the RSG components remain valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.1 because the projected transient cycles do not exceed the design cycles evaluated in the fatigue analyses and fatigue qualification tests.

4.3.2.5.3 UFSAR Supplement

LRA Section A.3.2.1.5 provides the UFSAR supplement summarizing the fatigue analyses and fatigue qualification tests for the RSG components. The NRC staff reviewed LRA Section A.3.2.1.5 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 TLAAs, as required by 10 CFR 54.21(d).

4.3.2.5.4 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)(i), that the fatigue analyses and fatigue qualification tests for the RSG components remain valid for the PEO. 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).

4.3.2.6 Absence of a TLAA for Reactor Coolant System Boundary Valves

4.3.2.6.1 Summary of Technical Information in the Application

LRA Section 4.3.2.6 describes the absence of a TLAA for the RCS boundary valves. Because the CLB for the RCS boundary valves does not include a time-dependent design method or criteria, the applicant determined that there are no TLAAs associated with these valves.

4.3.2.6.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the RCS boundary valves in accordance with 10 CFR 54.3(a) that describes the criteria for a TLAA.

The applicant explained that the DCPP fluid systems and components were designed in accordance with the codes and standards that were in effect during its design and construction. The applicant also indicated that UFSAR Table 5.2-9 provides a comprehensive list of the existing RCS boundary valves (also called reactor coolant pressure boundary (RCPB) valves). The applicant further explained that the RCS boundary valves were designed in accordance with the following codes and standards:

(1) USAS (ANSI) B16.5 for relief valves

(2) ASME Code Section III, Article 9 for safety valves

(3) For the remainder of the valves, ANSI B16.5, MSS SP-66, and 1968 Draft ASME Code for Pumps and Valves

In addition, the applicant clarified that the USAS B16.5 code and MSS SP-66 design standard include the provision for pressure-temperature ratings, marking, testing, tolerances, and methods of designating openings for pipe flanges and flanged fittings. The applicant also stated that these design codes and standards for the RCS boundary valves do not require a fatigue analysis, implicit fatigue analysis, or a maximum allowable stress range reduction analysis.

The applicant further explained that all the valves designed in accordance with the 1968 Draft ASME Code for Pumps and Valves are 4 inches or less and, therefore, there is no requirement for a time-dependent fatigue analysis for these valves such as explicit fatigue analysis, implicit fatigue analysis, and maximum allowable stress range reduction analysis.

The NRC staff noted that the design codes and standards for the RCS boundary valves do not require a time-limited analysis such as time-dependent fatigue analysis. The staff also reviewed UFSAR Chapter 5.0, which addresses the RCS and its components including the RCS boundary valves. The staff's review also included UFSAR Section 5.2.2.1.13, which discusses the compliance of RCPB components with design code requirements. In its review, the staff did not identify an analysis involving time-limited assumptions related to the RCS boundary valves.

As discussed above, the NRC staff finds that the applicant's determination regarding the absence of a TLAA for the RCS boundary valves is acceptable because:

(1) There is no time-dependent analysis for the RCS boundary valves in the CLB.

(2) The design codes and standards for these valves do not require an analysis involving time-limited assumptions such as time-dependent fatigue analysis limited by the current license term.

The NRC staff also finds that the applicant's determination is consistent with the criteria for the identification of a TLAA in 10 CFR 54.3(a) because:

(1) The TLAA criterion in 10 CFR 54.3(a)(3) states that a TLAA involves time-limited assumptions defined by the current operating term.
(2) The RCS boundary valves are not subject to such an analysis that meet the TLAA criterion involving time-limited assumptions.

4.3.2.6.3 UFSAR Supplement

The NRC staff concludes that a UFSAR supplement is not required in relation to the RCS boundary valves because there is no TLAA for the RCS boundary valves.

4.3.2.6.4 Conclusion

Based on its review, the NRC staff concludes that there is no TLAA for the RCS boundary valves.

4.3.2.7 Reactor Coolant Pressure Boundary Piping

4.3.2.7.1 Summary of Technical Information in the Application

LRA Section 4.3.2.7 describes the TLAAs for the RCPB piping. The RCPB piping was designed originally in accordance with the design requirements of ANSI B31.1. The design requirements do not include a fatigue analysis involving explicit CUF calculations for the RCPB piping. Instead, the design requirements include an implicit fatigue analysis involving stress range reduction factors based on transient cycles for the RCPB and the implicit fatigue analysis is addressed in LRA Section 4.3.5.

In addition, full structural weld overlays were installed on the DCPP, Unit 1 residual heat removal (RHR) suction pipe-to-elbow weld (WIB-228) in 2019 and on the DCPP, Unit 2 RHR suction pipe-to-elbow weld (WIB-245) in 2018. The weld overlays were designed in accordance with ASME Code Case N-740-2 and were supported by a fatigue analysis involving CUF calculation and a crack growth analysis. The applicant dispositioned these fatigue and crack growth analyses for the RHR weld overlays in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue and crack growth on the intended functions of the RHR weld overlays will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.2.7.2 Staff Evaluation

The NRC staff reviewed the fatigue and crack growth analyses for the RHR suction pipe-to-elbow weld overlays and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The applicant explained that the RCPB piping is the DCPP Design Class I and Quality Class I piping and was originally designed in accordance with the design requirements of ANSI B31.1.

The applicant also explained that the design requirements for the RCPB piping do not include a fatigue analysis involving explicit CUF calculations. The applicant further indicated that in place of the explicit fatigue analysis (i.e., CUF analysis), the design requirements include an implicit fatigue analysis involving stress range reduction factors based on transient cycles and that the implicit fatigue TLAA is addressed in LRA Section 4.3.5.

The NRC staff finds that the applicant's determination regarding the applicability of explicit and implicit fatigue analyses to the RCPB piping is acceptable because:

(1) The design requirements for the RCPB piping do not include an explicit fatigue analysis (i.e., CUF analysis) so there is no explicit fatigue TLAA for the RCPB.

(2) The design requirements for the RCPB piping include an implicit fatigue analysis involving the stress range reduction factor.

(3) The implicit fatigue TLAA for the RCPB piping is addressed in LRA Section 4.3.5. The staff's evaluation of the implicit fatigue analysis is documented in SE Section 4.3.5.

In addition, the applicant stated that full structural weld overlays were installed on the DCPP, Unit 1 RHR suction pipe-to-elbow weld in 2019 and on the DCPP, Unit 2 RHR suction pipe-to-elbow weld in 2018. The applicant indicated that these weld overlays were designed in accordance with ASME Code Case N-740-2 and supported by a fatigue analysis involving CUF calculation and a crack growth analysis.

The applicant further explained that the fatigue and crack growth analyses used the design transient cycles and that the design transient cycles are bounding for the 60-year project transient cycles as shown in LRA Table 4.3-1. Based on the bounding nature of the design transient cycles evaluated in the fatigue and crack growth analyses compared to the 60-year projected cycles, the NRC staff finds that there is reasonable assurance that the fatigue and crack growth analyses continue to be valid for the PEO.

The installation of the RHR weld overlays was previously approved by the NRC, as documented in the SE dated January 2, 2018 (ML17338A131), in accordance with 10 CFR 50.55a, "Codes and standards." The continued use of the RHR weld overlays for the fifth 10-year ISI interval (ending on May 6, 2035, for Unit 1 and on March 12, 2036, for Unit 2) also has been approved by the NRC, as documented in the SE dated October 9, 2024 (ML24270A166). The applicant's request dated June 24, 2024, for the use of the RHR weld overlays for the fifth ISI interval states that the service life of the RHR weld overlays is greater than 60 years (ML24180A205). The staff finds that the applicant's TLAA evaluation for the RHR weld overlays is consistent with the CLB of DCPP, Units 1 and 2 because the CLB includes the NRC approvals for the implementation and continued use of the RHR weld overlays.

Regarding aging management for the RHR weld overlays, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the fatigue and crack growth analyses for the RHR weld overlays, such that the fatigue and crack growth analyses continue to be valid (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue and crack growth analyses to ensure that the fatigue design limit (1.0) for CUF is met and that the crack growth analysis continues to be valid for the PEO. The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue and crack growth because the program monitors the transient cycles and performs corrective actions as needed, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue and crack growth on the intended functions of the RHR weld overlays will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue and crack growth, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

4.3.2.7.3 UFSAR Supplement

LRA Section A.3.2.1.6, as supplemented by letter dated October 14, 2024, provides the UFSAR supplement summarizing the fatigue and crack growth TLAAs for the RHR suction pipe-to-elbow structural weld overlays. The NRC staff reviewed LRA Section A.3.2.1.6 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 and crack growth TLAAs, as required by 10 CFR 54.21(d).

4.3.2.7.4 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)(iii), that the effects of fatigue and crack growth on the intended functions of the RHR suction pipe-to-elbow weld overlays will be adequately managed by the Fatigue Monitoring AMP. 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).

4.3.2.8 Absence of Supplemental Fatigue Analysis TLAAs in Response to Bulletin 88-08 for Intermittent Thermal Cycles due to Thermal-Cycle-Driven Interface Valve Leaks and Similar Cyclic Phenomena

4.3.2.8.1 Summary of Technical Information in the Application

LRA Section 4.3.2.8, as supplemented by letter dated October 14, 2024, describes that there is no fatigue TLAA in response to NRC Bulletin 88-08, “Thermal Stresses in Piping Connected to the Reactor Coolant Systems.” Therefore, no time-dependent analyses have been performed. Accordingly, the applicant determined that no TLAA exists for the phenomena described in Bulletin 88-08 in accordance with 10 CFR 54.3(a)(3).

4.3.2.8.2 Staff Evaluation

The NRC staff reviewed the applicant’s determination regarding the absence of a TLAA related to Bulletin 88-08 in accordance with 10 CFR 54.3(a) that describes the criteria for a TLAA.

The applicant explained that in response to Bulletin 88-08, the applicant reviewed the systems connected to the RCS to determine whether unisolable sections of piping connected to the RCS can be subjected to stresses from temperature stratification or oscillations that could be induced by leaking valves. The applicant identified that only four Boron Injection Tank (BIT) cold leg safety injection lines of each unit can be subject to the thermal stresses resulting from leaking valves in relation to the concern discussed in Bulletin 88-08. To ensure that the unisolable section of BIT injection piping connected to the RCS would not be subjected to cyclic thermal stresses, the applicant installed an isolation valve and a pressure indicator in the BIT bypass line that is upstream of the unisolable section of the safety injection piping.

The applicant explained that although the BITs were removed from the safety injection piping systems of DCPP, Units 1 and 2 in 1990, the concerns discussed in Bulletin 88-08 still apply because the safety injection piping lines and valves still exist and are connected to the charging header. The applicant also clarified that the installed pressure indicators monitor the pressure of the remaining piping to ensure that the pressure is less than the RCS pressure so that a potentially leaking valve does not cause cyclic thermal stresses in the unisolable section of the piping connected to the RCS. In addition, the applicant stated that no time-dependent analyses have been performed in response to Bulletin 88-08 and that, therefore, no TLAA is identified in relation to the effect of fatigue due to cyclic thermal cycles described in Bulletin 88-08.

The NRC staff finds that the applicant’s determination that there is no TLAA in relation to Bulletin 88-08 is acceptable because:

(1) The applicant’s response to Bulletin 88-08 involved piping modifications and the installation of pressure indicators but did not include a time-dependent analysis regarding cyclic thermal stresses.

(2) The applicant’s response to Bulletin 88-08 does not meet the TLAA criterion in 10 CFR 54.3(a)(3), which states that a TLAA involves time-limited assumptions defined by the current operating term.

(3) Accordingly, there is no TLAA associated with the applicant’s response to Bulletin 88-08.

4.3.2.8.3 UFSAR Supplement

The NRC staff concludes that a UFSAR supplement is not required because there is no TLAA associated with the applicant’s response to Bulletin 88-08.

4.3.2.8.4 Conclusion

Based on its review, the NRC staff concludes that there is no TLAA associated with the applicant’s response to Bulletin 88-08.

4.3.2.9 Bulletin 88-11 Revised Fatigue Analysis of the Pressurizer Surge Line for Thermal Cycling and Stratification

4.3.2.9.1 Summary of Technical Information in the Application

LRA Section 4.3.2.9 describes the fatigue TLAA for the pressurizer surge line piping. NRC Bulletin 88-11, “Pressurizer Surge Line Thermal Stratification,” addressed the effect of thermal cycling and stratification on the integrity of the pressurizer surge line piping. In response to Bulletin 88-11, Westinghouse Electric Corporation performed a plant-specific fatigue analysis for the pressurizer surge line piping. The fatigue analysis determined that the maximum CUF for the pressurizer surge line is 0.97 and the transient cycles evaluated in the fatigue analysis are bounding for the 60-year projected cycles. The applicant dispositioned the fatigue TLAA in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions of the pressurizer surge line piping will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.2.9.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAA for the pressurizer surge line piping and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The applicant explained that the fatigue analysis, which was performed in response to Bulletin 88-11, determined that the maximum CUF for the pressurizer surge line piping is 0.97 at the reactor coolant loop (RCL) hot-leg surge nozzle safe-end. The applicant also explained that the transient cycles used in the fatigue analysis are bounding for the 60-year projected cycles so that there is reasonable assurance that the CUF analysis continues to meet the fatigue design limit (1.0) for the PEO.

Regarding aging management for the pressurizer surge line piping, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the fatigue analysis for the pressurizer surge line piping and the CUF values continue to meet the fatigue design limit of 1.0 (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue analysis to ensure that the fatigue design limit for CUF is met for the PEO. The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue because the program monitors the transient cycles and performs corrective actions as needed, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue on the intended functions of the pressurizer surge line piping will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

4.3.2.9.3 UFSAR Supplement

LRA Section A.3.2.1.7 provides the UFSAR supplement summarizing the fatigue TLAA for the pressurizer surge line piping. The NRC staff reviewed LRA Section A.3.2.1.7 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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, as required by 10 CFR 54.21(d).

4.3.2.9.4 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)(iii), that the effects of fatigue on the intended functions of the pressurizer surge line piping will be adequately managed by the Fatigue Monitoring AMP. 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).

4.3.2.10 Cast Austenitic Stainless Steel Reactor Coolant Pumps

4.3.2.10.1 Summary of Technical Information in the Application

LRA Section 4.3.2.10, as supplemented by letter dated October 14, 2024, describes the TLAAs for the cast austenitic stainless steel (CASS) RCPs. The RCPs are Westinghouse Model 93A and the pump casings are fabricated from SA351 CF8 materials, which has a low ferrite content that has minimal susceptibility to thermal aging degradation. Fracture mechanics analyses for the flaw tolerance evaluation of the pump casings use saturated (fully aged) fracture toughness properties. Therefore, the analyses do not involve time-dependency and there is no TLAA associated with the flaw tolerance evaluation.

In addition, the existing fatigue crack growth analysis for the RCPs ensures that reasonably sized flaws and their fatigue crack growth would not affect the structural integrity of the RCPs. The applicant dispositioned the fatigue crack growth TLAA for the RCPs in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions of the RCPs will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.2.10.2 Staff Evaluation

The NRC staff reviewed the absence of a TLAA related to thermal aging effects on the pump casings in accordance with 10 CRF 54.3(a), which addresses the criteria for a TLAA. The staff also reviewed the fatigue crack growth TLAA regarding the RCPs and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The applicant explained that the RCPs are Westinghouse Model 93A and that the pump casings are fabricated from SA351 CF8 CASS, which has a 304 stainless-steel chemistry. The applicant also indicated that even though the low ferrite content of the pump casings causes minimal susceptibility to thermal aging degradation, fracture toughness analyses were performed to ensure adequate flaw tolerance and structural integrity of the pump casings in accordance with ASME Code Coase N-481, “Alternate Examination Requirements for Cast Austenitic Pump Casings.”

The NRC staff noted that the applicant’s fracture mechanics analysis included the evaluation of the saturated fracture toughness values for the pump casings in accordance NUREG/CR-4513, Revision 2, “Estimation of Fracture Toughness of Cast Stainless Steels during Thermal Aging in LWR [Light-Water Reactor] Systems,” dated May 2016 (ML16145A082). The staff also noted that the applicant’s analysis ensures that the evaluated fracture toughness values represent the saturated condition, after which further exposure to high temperatures does not affect the material fracture toughness properties (see WCAP-13895-NP, “A Demonstration of Applicability of ASME Code Case N-481 to the Primary Loop Pump Casings of Diablo Canyon Units 1 and 2 for the 60-year Initial License Renewal (ILR) Program,” Revision 1 (Enclosure 6 to Supplement 1 to the LRA)).

Because of the absence of any time-dependency based on the use of the saturated fracture toughness values, the NRC staff finds that the fracture toughness analysis does not meet the TLAA criterion in 10 CFR 54.3(a)(3), which states that a TLAA involves time-limited assumptions defined by the current operating term. Therefore, the staff finds that there is no TLAA associated with the fracture toughness analysis regarding the thermal aging effects on the pump casings based on the TLAA criterion in 10 CFR 54.3(a)(3).

In addition, the applicant performed a fatigue crack growth analysis to ensure that postulated flaws and their fatigue crack growth would not affect the structural integrity of the RCPs. The applicant explained that the initial depths of the postulated flaws were equal to or greater than those acceptable in accordance with the acceptance criteria for detected flaws specified in ASME Code Section XI. The applicant also explained that due to the postulated initial crack depth being equal to or greater than the ASME Code acceptance criteria, the postulated crack depths are reasonably large for the fatigue crack growth analysis.

The applicant identified this fatigue crack growth analysis as a TLAA due to the cycle-dependency of the analysis. The applicant proposed to manage the effects of fatigue crack growth for the RCPs by using the Fatigue Monitoring AMP (LRA Section B.2.2.1).

Regarding aging management for the RCPs and their potential susceptibility to fatigue crack growth, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the fatigue growth analysis for the RCPs such that the fatigue crack growth analysis continues to be valid (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue crack growth analysis to ensure the fatigue crack growth analysis continues to be valid for the PEO. The staff finds that the applicant’s use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue because the program monitors the transient cycles and performs corrective actions as needed, consistent with SRP-LR Section 4.3.2.1.1.3.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue on the intended functions of the RCPs will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

4.3.2.10.3 UFSAR Supplement

LRA Section A.3.2.1.8, as supplemented by letter dated October 14, 2024, provides the UFSAR supplement summarizing the fatigue crack growth TLAA for the RCPs. The NRC staff reviewed LRA Section A.3.2.1.8 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 crack growth TLAA, as required by 10 CFR 54.21(d).

4.3.2.10.4 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)(iii), that the effects of fatigue on the intended functions of the RCPs will be adequately managed by the Fatigue Monitoring AMP. 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).

4.3.2.11 Absence of a Cumulative Fatigue TLAA to Determine High-Energy Line Break Locations

4.3.2.11.1 Summary of Technical Information in the Application

LRA Section 4.3.2.11, as supplemented by letter dated October 14, 2024, describes the TLAA on the high-energy line break (HELB) location postulation. The applicant addressed this TLAA by (1) referring to LRA Section 4.3.5 for the evaluation of ANSI B31.1 piping and (2) demonstrating that RCL breaks are not subject to this TLAA.

The piping systems at DCPP, Units 1 and 2 were originally designed in accordance with ANSI B31.1, which does not require an explicit fatigue analysis involving CUF calculations. However, ANSI B31.1 does require an implicit fatigue analysis involving the stress range reduction factor and allowable stress for thermal expansion stress, as addressed in LRA Section 4.3.5. The TLAAs for the ANSI B31.1 piping also include a TLAA on HELB location postulation because the cycle-dependency of the stress range reduction factor and allowable stress range can affect the criteria for HELB location postulation. The applicant's evaluation of the HELB location TLAA associated with the implicit fatigue analysis is described in LRA Section 4.3.5.

In addition, the application of a leak-before-break (LBB) analysis eliminated the dynamic effects (e.g., jet and pipe whip loads) of the RCL breaks from the design and licensing basis of DCPP, Units 1 and 2. Therefore, the RCL is not subject to HELB location postulation.

4.3.2.11.2 Staff Evaluation

The NRC staff reviewed the CLB of DCPP, Units 1 and 2 related to the application of the LBB analysis. The staff noted that the dynamic effects (e.g., jet and pipe whip loads) of RCL breaks were eliminated from the CLB in accordance with General Design Criterion 4 specified in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, as approved by the staff's SE dated March 2, 1993 (ML16342A006). Accordingly, the staff noted that the CLB does not include HELB location postulation for the RCL piping as a result of the NRC-approved LBB analysis.

The TLAA criterion in 10 CFR 54.3(a)(4) indicates that a TLAA should be relevant in making a safety determination. As discussed above, there is no time-limited analysis relevant in making a safety determination for the RCL due to the application of the LBB analysis. Therefore, the NRC staff finds that there is no TLAA related to HELB location postulation for the RCL in accordance with 10 CFR 54.3(a)(4). The TLAA on the LBB analysis is separately addressed in LRA Section 4.3.2.12. The staff's evaluation of the TLAA on the LBB analysis is documented in SE Section 4.3.2.12.

The applicant also explained that the implicit fatigue analysis for the ANSI B31.1 piping, including the related HELB location analysis, is addressed in LRA Section 4.3.5. The NRC staff's evaluation of the HELB location analysis is documented in SE Section 4.3.5.

4.3.2.11.3 UFSAR Supplement

The NRC staff finds that no UFSAR supplement is required in relation to a TLAA to postulate HELB locations for the RCL due to the application of the LBB analysis. In addition, the UFSAR supplement regarding the HELB location TLAA for the ANSI B31.1 piping is addressed in LRA

Section A.3.2.4. The staff's evaluation of the UFSAR supplement regarding the HELB location TLAA for the ANSI B31.1 piping is documented in SE Section 4.3.5.3.

4.3.2.11.4 Conclusion

Based on its review, the NRC staff concludes that there is no TLAA regarding the HELB location TLAA for the RCL due to the application of the LBB analysis. The staff's conclusion regarding the evaluation of the HELB location TLAA for the ANSI B31.1 piping is documented in SE Section 4.3.5.4.

4.3.2.12 Fatigue Crack Growth Assessments and Fracture Mechanics Stability Analyses for Leak-Before-Break Elimination of Dynamic Effects of Primary Loop Piping Failures

4.3.2.12.1 Summary of Technical Information in the Application

LRA Section 4.3.2.12, as supplemented by letter dated January 2, 2025 (ML25002A050), describes the fatigue crack growth TLAA for the primary loop piping (i.e., the RCL) in relation to the LBB analysis. The fatigue crack growth analysis was performed to determine the sensitivity of the primary loop piping to postulated cracks in terms of structural integrity. The applicant dispositioned the fatigue crack growth analysis for the primary loop piping in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the potential effects of fatigue crack growth on the intended functions of the primary loop piping will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

In addition, the applicant's fracture mechanics analysis associated with the LBB analysis considers the effects of thermal aging on the fracture toughness of CASS piping fittings (i.e., elbows). The applicant dispositioned the fracture mechanics analysis, which involves the time-dependency of CASS 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 PEO.

4.3.2.12.2 Staff Evaluation

The NRC staff reviewed the fatigue crack growth analysis for the primary loop piping and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3. The staff reviewed the fracture mechanics analysis for the CASS elbows and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(ii) consistent with the review procedures in SRP-LR Section 4.7.3.1.2.

The applicant explained that in relation to the LBB analysis a fatigue crack growth analysis was performed to evaluate the potential effects of a postulated initial crack and subsequent fatigue crack growth on the structural integrity of the primary loop piping. The applicant also explained that the fatigue crack growth analysis determined that the effects of 60-year fatigue crack growth on the primary loop piping are negligible, as discussed in WCAP-13039, Revision 2, "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the Diablo Canyon Units 1 and 2 Nuclear Power Plants."

The NRC staff noted that as described in Section 8.0 of WCAP-13039, Revision 2, fatigue crack growth is insignificant (e.g., the crack depth increase for a postulated initial crack depth of 0.292 inch is less than 0.02 inch). Therefore, the staff finds that the fatigue crack growth analysis supports the applicant's determination that fatigue crack growth does not affect the structural integrity of the primary loop piping.

Regarding aging management, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles that are evaluated in the fatigue crack growth analysis for the primary loop piping such that the fatigue crack growth analysis continues to be valid (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue crack growth analysis to ensure that the fatigue crack growth analysis continues to be valid for the PEO. Therefore, the staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue crack growth because the program monitors the transient cycles to ensure that the fatigue crack growth analysis for the primary loop piping continues to be valid.

In addition, LRA Section 4.3.2.12, as supplemented by letter dated on January 2, 2025, addresses the fracture mechanics analysis for the CASS elbows as part of the LBB analysis. The applicant considered the time-dependency of the fracture toughness properties of the CASS elbows due to the thermal aging effect during plant operation. In the fracture mechanics analysis, the applicant used the saturated fracture toughness values for the limiting (bounding) locations in accordance with the guidance in NUREG/CR-4513, Revision 2. The applicant also confirmed that the fracture toughness values for the limiting locations estimated in accordance with NUREG/CR-4513, Revision 2 are more limiting than those estimated in accordance with NUREG/CR-4513, Revision 1.

The NRC staff finds that the fracture toughness analysis for the CASS elbows is acceptable because: (1) the applicant adequately considered the effects of thermal aging embrittlement on the fracture toughness of the CASS elbows in accordance with NUREG/CR-4513, Revision 2 and (2) the fracture mechanics analysis demonstrates that the critical flaw size based on the saturated fracture toughness has a margin of at least 2, in comparison with the leakage flaw size, consistent with the acceptance criteria in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 3.6.3, Revision 1, "Leak-Before-Break Evaluation Procedures," dated March 2007 (ML063600396).

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the effects of fatigue crack growth on the intended functions of the primary loop piping will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of fatigue crack growth, consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

As discussed above, the NRC staff also finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(ii) that the fracture toughness analysis associated with the LBB analysis for the CASS elbows has been projected to the end of the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant demonstrated that the fracture mechanics analysis continues to be valid for the PEO by using the saturated fracture toughness values, consistent with the guidance in SRP-LR Section 4.7.2.1.

4.3.2.12.3 UFSAR Supplement

LRA Section A.3.2.1.9, as supplemented by letter dated January 2, 2025, provides the UFSAR supplement summarizing the fatigue crack growth TLAA for the primary loop piping and the fracture mechanics TLAA for the CASS elbows. The NRC staff reviewed LRA Section A.3.2.1.9 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 crack growth and fracture mechanics TLAAs, as required by 10 CFR 54.21(d).

4.3.2.12.4 Conclusion

Based on its review, the NRC staff concludes the following:

(1) The applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of fatigue crack growth on the intended functions of the primary loop piping will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1)

(2) The applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(ii), that the fracture mechanics analysis for the CASS elbows has been projected to the end of the PEO.

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 Fatigue Analyses of the Reactor Pressure Vessel Internals

4.3.3.1 Summary of Technical Information in the Application

LRA Section 4.3.3 describes the fatigue TLAAs for the RPV internals (also called reactor vessel internals). The applicant dispositioned the fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of fatigue on the intended functions of the reactor vessel internals will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.3.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the reactor vessel internals and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.1.3.

The applicant explained that the existing fatigue analyses for the reactor vessel internals involved the time-limited assumption associated with the current license term (i.e., 40-years of operation); therefore, these fatigue analyses were identified as TLAAs. The applicant also explained that the fatigue analyses include the CUF calculations for reactor vessel lower internals (e.g., lower core support plate, lower support column, and core barrel flange) and reactor vessel upper internals (e.g., upper core support assembly, upper support plate flange, and upper core plate). In addition, the applicant indicated that the transients identified in LRA Table 4.3-1 include the transients that were evaluated in the existing fatigue analyses for the reactor vessel internals.

The applicant proposed to use the Fatigue Monitoring AMP (LRA Section B.2.2.1) and PWR Vessel Internals AMP (LRA Section B.2.3.7) to manage the effects of fatigue on the intended functions of the reactor vessel internals in accordance with 10 CFR 54.21(c)(1)(iii).

Regarding aging management for the reactor vessel internals, the NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the CUF analysis for the reactor vessel internals, such that the CUF values will not exceed the design limit of 1.0 (SE Section 3.0.3.2.1). The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and refinement of fatigue analysis to ensure that the fatigue design limit for CUF is met for the PEO. The staff finds that the applicant's use of the Fatigue Monitoring AMP is adequate to manage the effects of fatigue because the program monitors the transient cycles to ensure that the CUF values continue to meet the design limit (1.0), consistent with the guidance in SRP-LR Section 4.3.2.1.1.3.

In addition, the NRC staff noted that the PWR Vessel Internals AMP includes periodic examinations to inspect and monitor the cracking due to fatigue for the reactor vessel internals. The PWR Vessel Interns AMP also performs corrective actions to address any adverse conditions such as the presence of flaws and component failures. The staff finds that the applicant's use of the PWR Vessel Internals AMP is acceptable because the PWR Vessel Internals AMP periodically inspects the reactor vessel internals to ensure that the effects of fatigue are detected in a timely manner and that the structural integrity of the reactor vessel internals is adequately maintained by using corrective actions such as engineering evaluations, supplementary examinations, or repair and replacement activities (SE Section 3.0.3.1.6).

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue on the intended functions of the reactor vessel internals will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.1.3 because the applicant proposed to use the Fatigue Monitoring AMP along with the PWR Vessel Internals AMP to manage the effects of fatigue, consistent with guidance in SRP-LR Section 4.3.2.1.1.3.

4.3.3.3 UFSAR Supplement

LRA Section A.3.2.2 provides the UFSAR supplement summarizing the fatigue TLAAs for the reactor vessel internals. The NRC staff reviewed LRA Section A.3.2.2 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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, as required by 10 CFR 54.21(d).

4.3.3.4 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)(iii), that the effects of fatigue on the intended functions of the reactor vessel internals will be adequately managed by the Fatigue Monitoring AMP and PWR Vessel Internals AMP for the PEO. 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 Environmentally Assisted Fatigue

4.3.4.1 Summary of Technical Information in the Application

LRA Section 4.3.4, as supplemented by letter dated October 14, 2024, describes the applicant's TLAA on EAF. The EAF analysis includes the EAF locations described in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," dated February 1995 (ML031480219). The EAF analysis also includes additional plant-specific component locations in the RCPB if they may be more limiting than the EAF locations considered in NUREG/CR-6260. In the analysis, the CUF_{en} value is calculated by applying the environmental fatigue correction factor (F_{en}) for the component material in accordance with NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," dated March 1998 (ML031480391), for carbon and low-alloy steels, NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," dated April 1999 (ML031480394), for stainless steels, and NUREG/CR-6909, "Effect of LWR Coolant Environments on the Fatigue Life of Reactor Materials," dated February 2007 (ML070660620), for nickel alloys, consistent with the guidance in SRP-LR Section 4.3.2.1.3.

The applicant dispositioned the EAF TLAA in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the effects of EAF on the intended functions of the RCPB components and piping will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1).

4.3.4.2 Staff Evaluation

The NRC staff reviewed the EAF TLAA and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.3.3.1.3.

The applicant performed the EAF analysis on the RCPB components and piping. The NRC staff noted that the EAF analysis includes the following NUREG/CR-6260 locations applicable to DCPP:

(1) reactor vessel shell and lower head

(2) reactor vessel inlet and outlet nozzles

(3) pressurizer surge line

(4) charging system nozzle

(5) safety injection system nozzle

(6) RHR system piping

The staff finds that the inclusion of the applicable NUREG/CR-6260 locations in the EAF analysis is acceptable because it is consistent with the guidance in SRP-LR Section 4.3.2.1.3.

The EAF analysis also includes additional plant-specific component locations in the RCPB that may be more limiting than those considered in NUREG/CR-6260. These limiting locations (also called sentinel locations) are identified through an EAF screening evaluation. These limiting EAF locations, including the NUREG/CR-6260 locations and additional plant-specific locations, are described in LRA Table 4.3.4-1, as provided by letter dated October 14, 2024.

The applicant explained the screening evaluation to identify the EAF locations that may be more limiting than the NUREG/CR-6260 locations as follows:

(1) determination of thermal zones based on the common plant transients during plant operation

(2) calculation of conservative F_{en} per NUREG/CR-6583 for carbon and low alloy steels, per NUREG/CR-5704 for stainless steels, and per NUREG/CR-6909 for nickel alloys by using conservative input parameters from these NUREGs (i.e., bounding service temperature, lowest strain rate, and highest sulfur content of steels)

(3) determination of limiting EAF locations for each material type

(4) identification of the most limiting location within each thermal zone

(5) inclusion of the second limiting location with a CUF_{en} value greater than 75 percent of the maximum CUF_{en} value in each thermal zone

The NRC staff finds that the applicant's approach for EAF screening to determine the limiting EAF locations is acceptable because:

(1) The approach uses a thermal zone, which experiences the same transients so that the EAF locations of each thermal zone can be compared in a consistent and comprehensive manner for the determination of the limiting EAF locations.

(2) The F_{en} values are calculated in accordance with the guidance in SRP-LR Section 4.3.2.1.3.

(3) The F_{en} values are calculated by using the conservative service temperature, strain rate, and sulfur content of steels in the screening evaluation.

In addition, the applicant refined the screening CUF_{en} values as needed after the screening evaluation. The NRC staff finds that the applicant's approach for refining the screening CUF_{en} values after the screening evaluation is acceptable because:

(1) In place of very conservative design cycles, the 60-year projected cycles are used in the refined CUF_{en} calculations to represent actual plant operation and transient cycles.

(2) Instead of very conservative bounding service temperature, component-specific transient temperature is used in the refined Cui_{fen} calculations to evaluate the detailed conditions of each transient.

Regarding aging management for EAF, the applicant indicated that the aging effects of EAF on the intended functions of the RCPB components and piping will be managed by the Fatigue Monitoring Program (SE Section 3.0.3.2.1). The NRC staff noted that the Fatigue Monitoring AMP monitors the actual transient cycles to ensure that the actual cycles do not exceed the transient cycles, which are used as the inputs to the EAF analysis, such that the CUF_{en} values will not exceed the design limit of 1.0. The Fatigue Monitoring AMP also includes corrective actions such as repair and replacement of components and reevaluation of fatigue analysis to ensure that the fatigue design limit for CUF_{en} is met for the PEO. 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 and performs corrective actions as needed, consistent with the guidance in SRP-LR Section 4.3.2.1.3.

As discussed above, the NRC staff finds the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of EAF on the intended functions of the RCPB components and piping will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.3 because the applicant proposed to use the Fatigue Monitoring AMP to manage the effects of EAF, consistent with the guidance in SRP-LR Section 4.3.2.1.3.

4.3.4.3 UFSAR Supplement

LRA Section A.3.2.3 provides the UFSAR supplement summarizing the EAF analysis. The NRC staff reviewed LRA Section A.3.2.3 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR Section 4.3.2.2 and, therefore, is acceptable. Additionally, the staff finds that the applicant provided an adequate summary description of its actions to address the EAF TLAA, as required by 10 CFR 54.21(d).

4.3.4.4 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)(iii), that the effects of EAF on the intended functions of the RCPB components and piping will be adequately managed by the Fatigue Monitoring AMP for the PEO. 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 Assumed Thermal Cycle Count for Allowable Secondary Stress Range Reduction Factor in ANSI B31.1 Piping

4.3.5.1 Summary of Technical Information in the Application

LRA Section 4.3.5, as supplemented by letter dated October 14, 2024, describes the applicant’s TLAAs for the ANSI B31.1 piping. 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 is required in the stress analysis regarding thermal expansion stress. The TLAAs also include the analysis for HELB location postulation that involves the cycle-dependency of the stress range reduction factor. The applicant dispositioned the allowable stress and HELB location TLAAs for the ANSI B31.1 piping in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the PEO.

4.3.5.2 Staff Evaluation

The NRC staff reviewed the fatigue TLAAs for the ANSI B31.1 piping and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(i) consistent with the review procedures in SRP-LR Section 4.3.3.1.2.1.

The applicant indicated that the piping in the scope of license renewal that is designed to ANSI B31.1 requires the application of a stress range reduction factor for thermal cycling. If the total number of the full-range temperature cycles (also called thermal cycles) is 7,000 or less, a stress range reduction factor of 1.0 is applied to the calculation of the allowable stress range for thermal expansion, which means the allowable stress range does not need to be reduced because of cyclic loading and, therefore, the existing stress analysis for the piping will remain valid for 60 years of operation. If the total number of the thermal cycles is greater than 7,000, a stress range reduction factor less than 1.0 is applied to the allowable stress range depending on the cycles.

Regarding the applicant's approach for thermal cycle estimation for 60 years of operation, the applicant indicated that the thermal cycles for the piping lines were determined by using a combination of piping design information, operating procedures, specific system-level knowledge, and UFSAR information.

The applicant explained that the RCS transients, which can produce full-range thermal cycles in the balance-of-plant B31.1 piping, are the 250 heat-up, 250 cool-down, and 500 reactor trip design cycles, as described in UFSAR Table 5.2-4. The applicant also indicated that other events may contribute a few full-range or part-range cycles and that the total count of all 50-year design-basis events in UFSAR Table 5.2-4 is estimated to be 4,665 cycles. Using this conservative estimate of thermal cycles, the applicant estimated the total cycle number to be 5598 cycles for 60 years of operation (i.e., (4,665 cycles × 60 years) ÷ 50 years), which is less than the 7,000-cycle threshold discussed above.

The NRC staff noted that the cycle number for the RCS transients, which the applicant estimated above, is very conservative because the total number of the 60-year projected cycles in LRA Table 4.3-1 is less than 1,500 cycles, which is significantly less than 7,000 cycles. Therefore, the staff finds that the applicant's evaluation of the total thermal cycles for the balance-of-plant piping lines affected by the RCS transients is reasonable because:

(1) The applicant used the conservative 50-year design cycles and projected the conservative design cycles to confirm that the total number of thermal cycles for 60 years of operation is less than 7,000 cycles such that the existing stress range reduction factor (1.0) does not need to be reduced.

(2) The total number of thermal cycles based on 60-year projected cycles in LRA Table 4.3-1 is significantly less than the applicant's cycle estimation based on the conservative design transient cycles.

Regarding the piping lines that are not affected by the RCS transients, the applicant indicated that the thermal cycles for the piping lines are not more than two cycles per week (i.e., not exceeding 2 cycles/week × 52 weeks × 60 years, which is 6,240 cycles) so the total cycle number is less than 7,000 cycles for 60 years of operation. The NRC staff finds that the applicant's evaluation based on the weekly cycles is acceptable because:

(1) The 60-year cycles for these piping systems were estimated based on the relevant information such as piping design information, operating procedures, specific system-level knowledge, and UFSAR information.

(2) The estimated cycles are less than 7,000 cycles such that the existing stress range reduction factor (1.0) does not need to be reduced.

In addition, the applicant discussed the 60-year thermal cycles of the reactor coolant and pressurizer liquid space sample lines. The applicant indicated that the use of the hot-leg sample lines is estimated to be 20 times per year, which amounts to 1,200 times for 60 years, and that the pressurizer liquid space is sampled once per week, which amounts to 3,120 times for 60 years. The NRC staff finds that the applicant's cycle evaluation is acceptable because the cycle estimations are based on the actual operating characteristics and procedures and the estimated cycles for 60 years of operation are significantly less than the 7,000-cycle threshold for a reduction to the stress range reduction factor less than 1.0.

As discussed above, the NRC staff finds that the applicant's TLAA evaluation regarding the allowable stress for thermal expansion is acceptable because:

(1) The applicant demonstrated that the number of 60-year projected thermal cycles does not exceed 7,000 cycles.

(2) There is no need to reduce the existing stress range reduction factor (1.0).

(3) Accordingly, the allowable stress analysis remains valid for the PEO.

The applicant also indicated that the HELB location postulation is based on the ANSI B31.1 piping analyses that involve the cycle-dependent stress range reduction factor and allowable stress range for thermal expansion to account for thermal cycling. Accordingly, the applicant identified that the analysis for the HELB location postulation is a TLAA associated with the time-dependency of the stress range reduction factor and associated criterion for HELB location postulation. Based on the 60-year cycle estimation discussed above, the applicant dispositioned the TLAA on HELB location postulation in accordance with 10 CFR 54.21(c)(1)(i) because the estimated thermal cycles for 60 years of operation do not exceed 7,000 cycles and there is no need to change the stress range reduction factor and associated criterion for HELB location postulation.

The NRC staff finds that the applicant's TLAA evaluation regarding HELB location postulation is acceptable because:

(1) The applicant demonstrated that the number of thermal cycles estimated for 60 years of operation does not exceed 7,000 cycles.

(2) There is no need to reduce the existing stress range reduction factor (1.0).

(3) Accordingly, the HELB location postulation remains valid for the PEO.

As discussed above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the TLAAs on the allowable stress and HELB location postulation for the ANSI B31.1 piping remain valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.3.2.1.2.1 because the applicant demonstrated that the existing analyses on the allowable stress and HELB location postulation remain valid for the PEO based on an adequate cycle estimation.

4.3.5.3 UFSAR Supplement

LRA Section A.3.2.4 provides the UFSAR supplement summarizing the allowable stress and HELB location analyses for the ANSI B31.1 piping. The NRC staff reviewed LRA Section A.3.2.4 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 TLAAs for the ANSI B31.1 piping lines, as required by 10 CFR 54.21(d).

4.3.5.4 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)(i), that the allowable stress and HELB location TLAAs for the ANSI B31.1 piping remain valid for the PEO. 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 Fatigue Design and Analysis of Class 1E Electrical Raceway Support Angle Fittings for Seismic Events

4.3.6.1 Summary of Technical Information in the Application

LRA Section 4.3.6 addresses the applicant's TLAA on seismic fatigue qualification for the Class 1E electrical raceway support angle fittings subject to seismic events. As described in UFSAR Section 3.10.3.12, the Class 1E electrical raceway systems (safety-related) consist of conduits, cable trays, pull boxes, and supports. In accordance with IEEE 344-1975, "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," and the DCPP-specific licensing basis (UFSAR Section 3.10.3.12), the existing fatigue analysis assumes five design earthquakes (DEs) and one double design earthquake (DDE) or Hosgri earthquake (HE) for the life of the plant.

The applicant dispositioned the fatigue TLAA for the Class 1E electrical raceway support angle fittings in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the fatigue analysis remains valid for the PEO.

4.3.6.2 Staff Evaluation

The NRC staff reviewed the applicant's fatigue TLAA for the Class 1E electrical raceway support angle fittings and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(i) consistent with the CLB regarding the seismic fatigue qualification and the review procedures in SRP-LR Section 4.7.3.1.1.

The applicant indicated that the existing fatigue analysis in accordance with IEEE 344-1975 assumes 5 DEs and one DDE or HE for the life of the plant, as described in UFSAR sections 3.10.3.12 and 3.2.2.4.1. The applicant also explained that there have been no occurrences of a DE, DDE, or HE event at DCPP during the first 38 plus years of operation. The applicant further stated that, therefore, the original design-basis numbers of DE, DDE, and HE events (i.e., five DEs and one DDE or HE) are sufficient to ensure that the fatigue analysis remains valid for 60 years of operation.

Regarding the numbers of seismic events for the fatigue analysis, the applicant clarified that although UFSAR Table 5.2-4 identifies 20 DE events for the RCPB components, the Class 1E raceway supports are not RCPB components and, therefore, they are not within the scope of the 20 DE event limit in UFSAR Table 5.2-4. As discussed above, the applicant explained that UFSAR Section 3.10.3.12 indicates that five DE events are evaluated as part of the CLB fatigue analysis for the Class 1E electrical raceway support angle fittings.

The NRC staff finds that the applicant's evaluation is acceptable because the seismic events assumed in the fatigue analysis for the Class 1E electrical raceway supports have not occurred and the absence of these seismic events supports that the numbers of the seismic events used in the existing fatigue analysis are sufficient to be bounding for 60 years of operation, consistent with the acceptance criteria in SRP-LR Section 4.7.2.1. Therefore, the staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the fatigue TLAA for the Class 1E electrical raceway support angle fittings is still valid for the PEO based on the original design-basis numbers of seismic events being bounding for the seismic events estimated for 60 years of operation.

4.3.6.3 UFSAR Supplement

LRA Section A.3.2.5 provides the UFSAR supplement summarizing the fatigue TLAA for the Class 1E electrical raceway support angle fittings for seismic events. The NRC staff reviewed LRA Section A.3.2.5 consistent with the review procedures in SRP-LR Section 4.3.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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, as required by 10 CFR 54.21(d).

4.3.6.4 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)(i), that the fatigue analysis for the Class 1E electrical raceway support angle fittings is still valid for the PEO. 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

LRA Section 4.4 describes the applicant’s TLAA for evaluation of EQ of electric equipment for the PEO. Thermal, radiation, and cyclical aging analyses of plant electrical and instrumentation components located in harsh environments, developed to meet 10 CFR 50.49, “Environmental qualification of electric equipment important to safety for nuclear power plants,” requirements, have been identified as TLAAs. 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 the EQ of electric equipment on the intended functions will be adequately managed by the EQ of Electric Components AMP for the PEO.

4.4.2 Staff Evaluation

The NRC 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-LR 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. Electric components in the applicant’s EQ program identified as having a qualified life equal to, or greater than, the current operating term (i.e., 40 years) are considered a TLAA for license renewal.

The NRC staff reviewed LRA 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 PEO. The staff reviewed the applicant's EQ program, including the management of aging effects, to confirm that electric equipment requiring EQ will continue to operate consistent with the CLB during the PEO.

The NRC staff also conducted an audit of the information provided in LRA Section B.2.2.2, the program basis document, and other program documents provided to the staff during the audit. Based on the staff review of LRA Section B.2.2.2 and the results of the audit, the staff concludes that the applicant's EQ program elements are consistent with the GALL Report AMP X.E1. The staff's evaluation of the applicant's EQ of Electric Components AMP is documented in SE Section 3.0.3.1.1.

The NRC staff also reviewed the applicant's EQ program reanalysis attributes evaluation and concludes that it is consistent with SRP-LR Section 4.4.3.1.3 and SRP-LR Table 4.4-1. Reanalysis of an aging evaluation addresses attributes of analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (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 NRC staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of thermal, radiation, and cyclical aging of plant electrical and instrumentation components located in harsh environments, qualified to meet the 10 CFR 50.49 requirements on the intended functions of the EQ electric equipment, will be adequately managed for the PEO. 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.

Additionally, it meets the acceptance criteria in SRP-LR Section 4.4.2.1.3 because the EQ program is capable of programmatically managing the qualified life of components within the scope of the program for license renewal and the continued implementation of the EQ program provides assurance that the aging effects will be managed and that EQ electric components will continue to perform their intended functions for the PEO consistent with the requirements of 10 CFR 54.21(c)(1)(iii).

4.4.3 UFSAR Supplement

LRA Section A.3.3 provides the UFSAR supplement summarizing the EQ of electric equipment. The NRC staff reviewed LRA Section A.3.3 consistent with the review procedures in SRP-LR Section 4.4.3.2. The staff noted that the applicant has committed (Commitment No. 2) to continue the existing DCPP EQ of Electric Components AMP by November 2, 2024, for Unit 1 and by August 26, 2025, for Unit 2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP-LR 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 NRC 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 environmentally qualified electric equipment will be adequately managed by the EQ of Electric Components AMP for the PEO. 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 Analyses

LRA Section 4.5 states that the topic of concrete containment tendon prestress analyses is not applicable to the LRA because DCPP does not have prestressed tendons. Based on its review, the NRC staff confirmed that DCPP does not have prestressed tendons. Therefore, the staff concludes that the topic of concrete containment tendon prestress analyses does not apply to this review.

4.6 Containment Concrete, Liner, and Penetrations Analyses

4.6.1 Absence of a TLAA for Containment Concrete and Liner Plate

4.6.1.1 Summary of Technical Information in the Application

LRA Section 4.6.1 summarizes the evaluation of the absence of a TLAA for containment concrete, liner plate, and liner attachments for the PEO. For the containment concrete, the applicant stated that since the reinforced concrete containment vessel is designed to American Concrete Institute Standard 318-63, which does not require a fatigue analysis, the design of the containment does not include a TLAA, in accordance with 10 CFR 54.3(a)(2) and (3). Further, the LRA states that because neither the licensing bases nor the code editions invoked by them (Part UW of ASME Code Section VIII, 1968 Edition with Addenda through Summer 1968 for liner and AISC Specification “Structural Steel for Buildings” for liner attachments) impose an analysis for cyclic loading, design of the containment liner plate and its attachments are not supported by a TLAA.

4.6.1.2 Staff Evaluation

The NRC staff reviewed LRA Section 4.6.1 and compared it to the corresponding Section 4.6.1 in the original 2009 LRA submittal (ML093340086) and found the information and supporting bases in the two submittals to be essentially identical. Based on these consistencies, this section incorporates by reference Section 4.6.1.2 of the staff’s SER dated June 2010 (ML11153A103).

4.6.1.3 UFSAR Supplement

The NRC staff concludes that a UFSAR supplement is not required because a TLAA is not required and does not exist in the CLB for the DCPP containment concrete, liner plate, and liner attachments.

4.6.1.4 Conclusion

Based on its review, and as incorporated by reference from its 2010 SER, the NRC staff concludes that in accordance with the definition of TLAA in 10 CFR 54.3(a), a TLAA is not contained in the CLB of DCPP for containment concrete, liner plate, and liner attachments.

4.6.2 Design Cycles for Containment Penetrations

4.6.2.1 Summary of Technical Information in the Application

LRA Section 4.6.2 describes the applicant's TLAA for fatigue cycle evaluation of the ASME Code Class MC carbon steel steam generator blowdown lines flued heads, containment airlocks, hatches, penetration sleeves, end plates, and flued head (not including the steam generator blowdown lines flued heads). To address fatigue in containment penetrations (namely personnel and emergency airlocks, equipment hatches, containment penetration sleeves, and end plates) during the PEO, fatigue waivers were completed to demonstrate that the requirements of Subparagraph N-415.1, "Vessels Not Requiring Analysis for Cyclic Operation," and Figure N-415(A) of the ASME Code Section III, 1968 Edition (the design code of record) were met. The applicant stated that it performed the analysis using transients (250 heat-up cycles and 250 cool-down cycles for a total of 500 cycles) consistent with the current design basis and that the number of transients will be monitored by the Fatigue Monitoring AMP (LRA Section B.2.2.1). The applicant thus dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the fatigue analyses for the containment airlocks, equipment hatches, penetration sleeves, and end plates will be adequately managed during the PEO.

The LRA states that the flued heads were evaluated to the Class MC requirements of the 1971 Edition of ASME Code Section III, Subsection NE. The result of this evaluation was that the CUF for the flued heads would be less than 1.0. The applicant stated that it expects the flued heads to experience fewer cycles during 60 years of operation than was originally used in the design of the flued heads and that the number of transients will be monitored by the Fatigue Monitoring AMP (LRA Section B.2.2.1). The applicant thus dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating that the fatigue analyses for the flued heads will be adequately managed during the PEO.

For the steam generator blowdown lines flued heads, the LRA states that the 14,000 thermal cycles and 1,000 seismic cycles (for a total of 15,000 fatigue cycles) uniquely specified in the design specification was used in the original fatigue analysis. The LRA further states that the projected cycles in LRA Table 4.3-1 for 60 years of operation is less than 90 each for heat-up/cool-down cycles and 20 seismic cycles. The applicant thus dispositioned the TLAA for steam generator blowdown lines flued heads in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the fatigue analysis for the steam generator blowdown lines flued heads remains valid for the PEO.

4.6.2.2 Staff Evaluation

The NRC staff reviewed the applicant's fatigue TLAA for the containment airlocks, equipment hatches, penetration sleeves, end plates, and flued heads (excluding steam generator blowdown lines flued heads) and the corresponding disposition of the TLAA in accordance with 10 CFR 54.21(c)(1)(iii) consistent with the review procedures in SRP-LR Section 4.6.3.1.1.3.

The staff reviewed the applicant's fatigue TLAA for the steam generator blowdown lines flued heads 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 4.6.3.1.1.1.

The NRC staff noted from the LRA that as a conservative measure for the PEO, the applicant evaluated the ASME Code Section III, 1968 Edition, including up to the Summer 1968 Addenda, design code to determine if the requirements of a fatigue waiver per Subparagraph N-415.1 and Figure N-415(A) were met for the carbon steel containment airlocks, equipment hatches, containment penetration sleeves, and end plates. The staff also noted that the total number of transients used to make this determination was 500 cycles (250 heat-ups and 250 cool-downs). The staff verified from UFSAR Table 5.2-4 that the number of heat-up and cool-down transients for the design of the RCS was 250 each. The staff also noted that flued heads (except the steam generator blowdown lines flued heads) were evaluated using the MC requirements of ASME Code Section III, Subsection NE, 1971 Edition. The evaluation found that the maximum allowable stress intensity ($3S_m$) was less than the stress range derived from ASME Code Section III, 1968 Edition, Figure I-9.0 (S_a) for the design number of cycles. Since the computed stress intensity must be less than S_m for normal operations, the flued head automatically satisfies the fatigue requirements.

The NRC staff reviewed ASME Code Section III, Subparagraph N-415 and Figure N-415(A) and verified that for 500 cycles, the airlocks, equipment hatches, containment penetration sleeves, flued heads, and end plates meet the requirements of a fatigue waiver. According to Figure N-415(A), the S_a for 500 cycles is 100,000 psi. Therefore, the S_m for material to satisfy a waiver is 33,333 psi (⅓ of 100,000). According to UFSAR Section 3.8.2.1.6.4, the airlocks, equipment hatches, containment penetration sleeves, flued heads, and end plates are made of ASME SA 516, ASTM A 333, and A106 carbon steel material. According to ASME Code Appendix I, none of these carbon steel materials have S_m greater than 33,333 psi. Therefore, the staff has determined that the applicant's analysis of airlocks, equipment hatches, containment penetration sleeves, flued heads and end plates meets the requirements for a fatigue waiver per ASME Code Section III, Subparagraph N-415.1. The applicant will monitor the number of transients by the Fatigue Monitoring AMP (LRA B.2.2.1) to ensure that the actual transients will not exceed the 500 cycles for which the waiver was evaluated.

The NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(iii) that the aging effects of fatigue cycles on the intended functions of the carbon steel containment airlocks, equipment hatches, penetration sleeves, end plates, and flued heads (except the steam generator blowdown lines flued heads) will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.6.2.1.1.3 because consistent with the TLAA acceptance criterion in 10 CFR 54.21(c)(1)(iii), the applicant proposed to use the Fatigue Monitoring AMP (LRA B.2.2.1) to manage the effects of fatigue cycles on the intended functions of the containment airlocks, equipment hatches, penetration sleeves, end plates, and flued heads (excluding the steam generator blowdown lines flued heads) during the PEO.

The NRC staff reviewed LRA Table 4.3-1 and noted that the SG blowdown lines flued heads are projected to experience a total of less than 200 fatigue cycles (including less than 90 each of heat-up and cool-down cycles and 20 seismic cycles) in 60 years of operation. The original fatigue analysis used 15,000 cycles. The staff thus finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the existing fatigue analysis for the steam generator blowdown lines flued heads is still valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.6.2.1.1.1 because the number of assumed total fatigue cycles (i.e., 15,000) considered in the existing fatigue analysis will not be exceeded during the PEO.

4.6.2.3 UFSAR Supplement

LRA Section A.3.4 provides the UFSAR supplement summarizing the TLAA evaluation of design cycles for containment carbon steel penetrations fatigue analysis. The NRC staff reviewed LRA Section A.3.4 consistent with the review procedures in SRP-LR Section 4.6.3.2. Based on its review of the UFSAR supplement, the staff finds that its summary description of the evaluation of design cycles for containment airlocks, equipment hatches, penetration sleeves, end plates, and flued heads (including those for steam generator blowdown lines) penetrations meets the acceptance criteria in SRP-LR 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 the design cycles for containment airlocks, equipment hatches, penetration sleeves, end plates, and flued heads penetrations fatigue analysis, as required by 10 CFR 54.21(d).

4.6.2.4 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)(iii), that the effects of aging due to fatigue on the intended functions of the containment airlocks, equipment hatches, penetration sleeves, end plates, and flued heads (excluding the steam generator blowdown lines flued heads) will be adequately managed for the PEO. The staff also concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(i), that the steam generator blowdown lines flued heads fatigue analysis remains valid for the PEO. Finally, the staff concludes that the UFSAR supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

4.7 <u>Other Plant-Specific TLAAs</u>

4.7.1 Crane Load Cycle Limits

4.7.1.1 Summary of Technical Information in the Application

LRA Section 4.7.1 identifies seven cranes within the scope of license renewal. Four of these cranes carry heavy loads (exceeding 1,972 pounds), as defined by NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36,” dated July 1980 (ML070250180). The applicant stated that the remaining three cranes are outside the scope of NUREG-0612 because their loads are less than the defined threshold for heavy loads (1,972 pounds).

The applicant also stated in the LRA that for the design of cranes that carry heavy loads, NUREG-0612 recommends compliance with crane design criteria stated in Chapter 2 of ANSI B30.2-1976, “Overhead and Gantry Cranes,” and Crane Manufacturers Association of America Specification Number 70 (CMAA-70), “Specifications for Electric Overhead Traveling Cranes.” Under CMAA-70, crane design is based on the estimated number of load cycles (crane lifts) over the service life of the component. The four cranes at DCPP, which are designed to carry heavy loads, were originally designed before the publication of these design specifications. However, the applicant demonstrated, in its response to NUREG-0612, that their designs meet the intent of ANSI B30.2-1976 and CMAA-70 specifications and are, therefore, TLAAs. These cranes are listed below:

- containment polar crane (one for each unit)

- fuel handling area crane
- turbine building crane (one for each unit)
- intake structure crane

The applicant further stated that three other cranes that are in the scope of license renewal were designed to different specifications and that only the containment dome service crane requires a TLAA. According to the applicant, the remaining two cranes—the reactor cavity manipulator crane and the spent fuel pool bridge crane—do not require TLAAs because their original design did not include any load cycle limit.

According to the LRA, the containment polar crane, the fuel handling area crane, the turbine building crane, and the intake structure crane were built in accordance with Association of Iron and Steel Engineers Standard No. 6 and were designed for more than 2 million load cycles. The applicant based its analysis of these cranes subject to a TLAA on load cycles of the spent fuel pool bridge crane, the most used crane within the scope of license renewal. The applicant estimated that the spent fuel pool bridge crane will have performed approximately 159,000 lifts by the end of the PEO, only about 3.3 percent of the 2 million design cycles.

The LRA also states that the containment dome service crane is designed to CMAA 70, Service Class A, requirements. Service Class A cranes are designed for 20,000–100,000 maximum rated lifts (load cycles). The applicant assumed that it would have 120 refueling outages in 60 years, that it would require 166 lifts each refueling outage to reach 20,000 lifts, and that the crane typically performs less than 10 lifts per outage.

The LRA states that the reactor cavity manipulator cranes were designed to the requirements of Class C, Moderate Service, of Electric Overhead Crane Institute Design Specification No. 61, which does not provide a limiting number of load cycles, rather it limits the stress due to loads to less than 20 percent of the ultimate strength of the material. Because the design specification does not consider the effects of aging and, thus, would not be dependent on the 40 years of operation, the applicant claimed that the design of this crane is not a TLAA. Similarly, the Westinghouse design specification for the spent fuel pool bridge crane also does not give a limiting number of load cycles and limits maximum stress due to loads to 20 percent of the ultimate strength.

The applicant dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the crane load cycle analyses remain valid for the PEO.

4.7.1.2 Staff Evaluation

The NRC staff reviewed LRA Section 4.7.1 to verify, pursuant to 10 CFR 54.21(c)(1)(i), that the analyses remain valid for the PEO for the seven cranes in the scope of license renewal and to verify that two cranes, the reactor cavity manipulator crane and the spent fuel pool bridge crane, do not require TLAAs.

4.7.1.2.1 Containment Polar Crane, Fuel Handling Area Crane, Turbine Building Crane, and Intake Structure Crane

LRA Section 4.7.1 and UFSAR Section 9.1.4 state that the containment polar crane, fuel handling area crane, turbine building crane, and intake structure crane are designed as Category 1, Class F cranes in accordance with the Specification for Electrical Overhead Traveling Cranes for Steel Mill Service, Association of Iron and Steel Engineers Standard 6.

Therefore, these four cranes are designed for a minimum of 2 million load cycles. This is far more than the number of lifts that these cranes are expected to make in 60 years of operation. The applicant used a conservative estimate of 159,000 lifts over 60 years for these cranes, which is significantly less than the design limit of 2 million cycles. Therefore, the staff finds that the containment polar crane, fuel handling area crane, turbine building crane, and intake structure crane can continue to operate and that their existing fatigue analysis will remain valid during the PEO.

4.7.1.2.2 Containment Dome Service Crane

The containment dome service crane was designed in accordance with CMAA-70, which is recommended for crane design in NUREG-0612. It was designed to perform 20,000–100,000 load cycles, which corresponds to the criteria for CMAA-70 Service Class A. According to the applicant, this crane typically performs less than 10 lifts per refueling outage. The applicant assumed 1,200 lifts for the crane, which is a conservative estimate. The projected number of lifts is also significantly less than the 20,000 load cycles for which the crane has been designed. Therefore, the staff finds that the containment dome service crane can continue to operate and that its existing fatigue analysis will remain valid during the PEO.

4.7.1.2.3 Reactor Cavity Manipulator Crane

The reactor cavity manipulator crane was designed in accordance with Specification No. 61 of the Electric Overhead Crane Institute and is not designed for a specific number of lifts. The crane design for fatigue is controlled by limiting the allowable stress in the components to not more than 20 percent of the ultimate strength of the material. Therefore, the design of this crane is not subject to a TLAA.

4.7.1.2.4 Spent Fuel Pool Bridge Crane

The NRC staff reviewed information in the LRA and UFSAR and determined that the spent fuel pool bridge crane was procured in accordance with Westinghouse Equipment Specification No. 676470 and is not required to be designed for a specific number of lifts. The crane design for fatigue is controlled by limiting the allowable stress in the components to not more than 20 percent of the ultimate strength of the material. Therefore, the design of this crane is not subject to a TLAA.

Based on its review, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the analyses for the cranes within the scope of license renewal remain valid during the PEO because either no limiting number of load cycles exists or the cranes are designed for more cycles than the maximum expected cycles during 60 years.

4.7.1.3 UFSAR Supplement

LRA Section A.3.5.1 provides the UFSAR supplement summarizing the TLAA evaluation of load cycle limits of cranes within the scope of license renewal in. All cranes within the scope of license renewal either have no limiting number of loading cycles, in which case no TLAA exists, or are designed for more than the maximum number of load cycles for the PEO. Based on its review of the UFSAR supplement, the NRC staff concludes that the applicant provided an adequate summary description of its actions to address the crane load cycle limits, as required by 10 CFR 54.21(d).

4.7.1.4 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)(i), that the analyses for load cycle limits of the containment polar crane, fuel handling area crane, turbine building crane, intake structure crane, and containment dome service crane remain valid for the PEO. The other in-scope cranes (i.e., the reactor cavity manipulator crane and spent fuel pool bridge crane) do not require a TLAA in accordance with 10 CFR 54.3(a). 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 TLAAs Supporting Repair of Alloy 600 Materials

4.7.2.1 Summary of Technical Information in the Application

LRA Section 4.7.2 describes the applicant's TLAA for its repair of Alloy 600 materials. The LRA states that both Alloy 600 base material and Alloy 82/182 weld material have exhibited susceptibility to primary water stress corrosion cracking (PWSCC). Evaluations of these effects, or analyses in support of repairs to affected locations, can be TLAAs. Westinghouse performed an assessment of PWSCC susceptibility for Alloy 600 components and Alloy 82/182 welds at the DCPP. This assessment provided guidance for inspection of these materials. The applicant evaluated the Alloy 600 material in the pressurizer, RPV, and steam generators. Weld overlay repairs have been implemented only on the DCPP, Unit 2 pressurizer nozzles. The applicant also discussed the comprehensive Alloy 600 control program and other locations. The applicant noted that any repairs made to Alloy 600 locations, including mechanical stress improvement process, mechanical nozzle seal assemblies, half nozzle or weld overlay repairs, would be implemented in accordance with the Alloy 600 control program.

The only TLAA identified by the applicant in LRA Section 4.7.2 is for the weld overlay repairs that were analyzed for 38 years after installation for the Unit 2 pressurizer safe-end welds. The applicant dispositioned the fatigue crack growth analysis in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the PEO.

4.7.2.2 Staff Evaluation

The NRC staff reviewed LRA Section 4.7.2 to verify, pursuant to 10 CFR 54.21(c)(1)(i), that the TLAA of the nickel-based Alloy 600 base material and the nickel-based Alloy 82/182 weld material remains valid during the PEO, consistent with the review procedures in SRP-LR Section 4.7.3.1.1.

4.7.2.2.1 Absence of TLAA for Alloy 600 Materials for Unit 1 Pressurizer, Steam Generators, and Reactor Vessel Internals

<u>Pressurizer</u>. LRA Section 4.7.2 states that the Unit 1 pressurizer and associated nozzles and safe-ends contain no Alloy 600 or Alloy 82/182 weld material. Unit 2 pressurizer nozzles do contain Alloy 82/182 welds and their TLAA is discussed in SE Section 4.7.2.2.2.

<u>Steam Generators</u>. LRA Section 4.7.2 states that the Unit 1 steam generators were replaced in the spring of 2009 and that the Unit 2 steam generators were replaced in the spring of 2008. The applicant stated that the replacement steam generators contain no Alloy 600 or Alloy 82/182 welds.

Reactor Vessel. The applicant replaced the Unit 2 RPV head in October 2009 and the Unit 1 RPV head in October 2010. All components penetrating the new RPV closure heads and welded to the inner surfaces of the RPV closure heads have been replaced with Alloy 690 material, which includes Alloy 52/152 weld material. The NRC staff noted that Alloy 690/52/152 material is less susceptible to PWSCC than Alloy 600 material and has been accepted by the industry and the staff for replacing Alloy 600 material.

LRA Section 4.7.2 states that the Mechanical Stress Improvement Process, the Mechanical Nozzle Seal Assembly, half nozzle, or weld overlay repairs have not been applied to RPV Alloy 600 nozzle locations. The applicant has not detected any reportable indications in the RPV nozzles that require flaw evaluations. The NRC staff noted that TLAAs apply to flaw evaluations because flaw evaluations are time-dependent as they predict the acceptability of the final flaw size at a certain time in the future. The applicant has not detected flaws in the RPV nozzles that require flaw evaluations; therefore, TLAAs do not apply to the RPV nozzles.

Based on the above information, the NRC staff finds that TLAAs of Alloy 600 materials do not apply to the Units 1 and 2 RPV nozzles and vessel head; the replacement steam generators; and the Unit 1 pressurizers.

4.7.2.2.2 Unit 2 Pressurizer Nozzles

The Unit 2 pressurizer contains Alloy 600 material in the form of Alloy 82/182 welds attaching the surge, spray, and relief valve nozzles to the safe-ends. The applicant installed Alloy 690 (Alloy 52 weld material) structural weld overlays (SWOLs) on all of these locations during the Unit 2 14th refueling outage (i.e., spring of 2008) to mitigate the effects of PWSCC in the original Alloy 82/182 welds. As part of the weld overlay design, the applicant performed fatigue crack growth analyses of overlaid Alloy 82/182 welds. These fatigue crack growth analyses are considered TLAAs and were projected to the end of the PEO.

By letter dated October 14, 2014, the NRC authorized the use of proposed alternative, RR SWOL-REP-1 U2, at DCPP, Unit 2 for the expected life of the overlays, which is August 26, 2045 (ML14255A232). This authorization covers the PEO. As part of its review, the NRC staff verified that the applicant has considered appropriate transients in its fatigue crack growth calculation of the overlaid Alloy 82/182 welds associated with the Unit 2 pressurizer; therefore, the transients used are acceptable. The staff finds that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(i), that the analysis for the SWOL fatigue crack growth is valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis

4.7.2.3 UFSAR Supplement

LRA Section A.3.5.2 provides the UFSAR supplement summarizing the fatigue crack growth analyses of the SWOLs. The NRC staff reviewed LRA Section A.3.5.2 consistent with the review procedures in SRP Section 4.7.3.2. The applicant stated that the Unit 2 pressurizer nozzle weld overlays were supported by fatigue crack growth analyses as part of TLAAs supporting repair of Alloy 600 materials. These fatigue crack growth analyses were projected to the end of the PEO and are, therefore, valid for the PEO in accordance with 10 CFR 54.21(c)(1)(i). Based on its review, the staff finds that the UFSAR supplement meets the acceptance criteria in SRP-LR 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 TLAA for the Unit 2 pressurizer nozzle weld overlays, as required by 10 CFR 54.21(d).

4.7.2.4 Conclusion

Based on its review, the NRC staff concludes that, pursuant to 10 CFR 54.21(c)(1)(i), the applicant has demonstrated that the fatigue crack growth calculation for the SWOL design of Alloy 82/182 dissimilar butt welds at Unit 2 pressurizer nozzles remains valid for the PEO. The staff also concludes that TLAAs of Alloy 600 materials are not applicable to the Units 1 and 2 RPV nozzles and head; the Units 1 and 2 replacement steam generators; and the Unit 1 pressurizer. Finally, the staff concludes that the UFSAR supplement contains an adequate summary of the TLAA evaluation of the mitigation of Alloy 82/182 dissimilar butt welds at the Unit 2 pressurizer nozzles, as required by 10 CFR 54.21(d).

4.7.3 **Absence of a TLAA for Reactor Vessel Underclad Cracking Analyses**

4.7.3.1 Summary of Technical Information in the Application

LRA Section 4.7.3 states that since no underclad cracks have been identified in the RPV flange welds or nozzles, the applicant does not credit WCAP-7733 or WCAP-15338-A in the CLB. Therefore, these analyses are not TLAAs for the DCPP under 10 CFR 54.3(a)(6).

4.7.3.2 Staff Evaluation

The NRC staff noted that the applicant’s basis for claiming that the reactor vessel underclad cracking analysis is not a TLAA is based on the applicant’s CLB not crediting the generic analyses in WCAP-7733 or WCAP-15338-A. The staff reviewed the applicant’s claim in accordance with the definition of a TLAA in 10 CFR 54.3(a) and the review procedures in SRP-LR Section 4.1.

The applicant stated that it credits the ASME Code Section XI, ISI, Subsection IWB, IWC, and IWD program for examining applicable RPV components susceptible to underclad cracking (i.e., the RPV flange and inlet and outlet nozzles fabricated from SA-508, Class 2 forgings per UFSAR Tables 5.2-11, 5.2-12, 5.2-17, 5.2-18A, and 5.2-18B). However, because no underclad cracks have been identified in the RPV flange welds or nozzles, the applicant does not credit WCAP-7733 or WCAP-15338-A in the DCPP CLB. Furthermore, if underclad cracking is identified in the future and the generic analysis in WCAP-15338-A is credited, then the applicant explained that the assumed numbers of WCAP-15338-A design transients would be evaluated on a plant-specific basis as discussed in the SE for WCAP-15338-A.

Additionally, 10 CFR 54.37(b) states:

> After the renewed license is issued, the FSAR update required by 10 CFR 50.71(e) must include any systems, structures, and components newly identified that would have been subject to an aging management review or evaluation of time-limited aging analyses in accordance with [10 CFR] 54.21. This FSAR update must describe how the effects of aging will be managed such that the intended function(s) in [10 CFR] 54.4(b) will be effectively maintained during the period of extended operation.

Based on this review, the NRC staff finds that an analysis related to underclad cracking of the reactor vessel does not exist within the CLB for DCPP, Units 1 and 2 and thus a TLAA does not need to be identified in accordance with 10 CFR 54.21(c)(1). Additionally, the staff finds it appropriate that the applicant's ASME Code Section XI, ISI, Subsection IWB, IWC, and IWD program (LRA B.2.3.1) will manage the reactor vessel to ensure the timely detection of underclad cracks during the PEO and that 10 CFR 54.37(b) ensures that the applicant will address the potential of WCAP-15338-A being credited in the future if underclad cracks in the reactor vessel are identified.

4.7.3.3 UFSAR Supplement

The NRC staff concludes that a UFSAR supplement is not required because there is no TLAA for reactor vessel underclad cracking analyses.

4.7.3.4 Conclusion

Based on its review, the NRC staff concludes that a TLAA related to underclad cracks does not exist at DCPP, Units 1 and 2.

4.7.4 Reactor Coolant Pump Flywheel Fatigue Crack Growth Analysis

4.7.4.1 Summary of Technical Information in the Application

LRA Section 4.7.4 describes the applicant's TLAA for the RCP flywheel fatigue crack growth analysis at DCPP. LRA Section 4.7.4 states that the RCP flywheel fatigue crack growth analysis conforms to the definition of a TLAA in an evaluation of the probability of failure over a PEO for all operating Westinghouse plants as shown in NRC-approved WCAP-15666-A, Revision 1, "Extension of Reactor Coolant Pump Motor Flywheel Examination," (ML18303A413). The applicant stated that based on the WCAP-15666-A evaluation, the DCPP RCP flywheel has a high structural reliability with a high flaw tolerance and negligible flaw crack growth over a 60-year service life. The applicant stated that the fatigue crack growth analysis is valid for the PEO in accordance with 10 CFR 54.21(c)(1)(i).

4.7.4.2 Staff Evaluation

The NRC staff reviewed the applicant's TLAA for the DCPP RCP flywheel fatigue crack growth analysis 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 4.7.3.1.1.

The NRC staff noted that SRP-LR Table 4.1-3 identifies fatigue analysis of the RCP flywheel as a potential plant-specific TLAA. The staff noted that during normal operation, the RCP flywheel possesses sufficient kinetic energy to potentially produce high-energy missiles inside containment and could also damage pump seals or other pressure boundary components in the unlikely event of failure. Conditions that may result in overspeed of the RCP flywheel increase both the potential for failure and the kinetic energy. The aging effect of concern is fatigue crack initiation and growth in the flywheel bore keyway as stated in RG 1.14, Revision 1, "Reactor Coolant Pump Flywheel Integrity," dated August 1975 (ML003739936).

The NRC safety evaluation report regarding the DCPP, Units 1 and 2 operating license application, NUREG-0675, states that the RCP motor flywheel is designed to meet the guidelines of RG 1.14. The DCPP flywheel design and its compliance with RG 1.14 is described in UFSAR Section 5.2.3.21. The associated inspection recommendations are incorporated into the DCPP ISI Program and are required by TS Section 5.5.7. To reduce the inspection frequency and scope, the applicant amended DCPP's initial compliance with RG 1.14 by implementing WCAP-15666-A, Revision 1, which supports relaxation of the inspection recommended by RG 1.14 Position C.4.b(1) and (2). The NRC staff has reviewed and accepted WCAP-15666-A for use in license renewal applications. By letter dated September 5, 2013 (ML13178A005), the NRC approved the relaxation of RCP flywheel inspection at DCPP. Subsequently, the applicant incorporated the revised RCP flywheel inspection into the DCPP ISI Program and TS.

The NRC staff noted that LRA Table 4.3-1 specifies 250 cycles for heat-up, 250 cycles for cool-down, and 500 cycles for reactor trip as the design-basis transients that would affect the operation of the RCP flywheels. These design-basis transients are taken from UFSAR Table 5.2-4.

The NRC staff also noted that LRA Table 4.3-1 also provides projected cycles for heat-up, cool-down, and reactor trip for 60 years of operation. The 60-year projection for heat-up is 78 cycles. The 60-year projection for cool-down is 80 cycles. The 60-year projection for reactor trip is 74 cycles. The staff noted that these projection cycles are taken based on the higher number of either Unit 1 or Unit 2 in LRA Table 4.3-1. The staff finds that the projected cycles in LRA Table 4.3-1 are reasonable because the projection is based on the applicant's plant-specific operating experience and cumulative transient cycles from the beginning of the operating licenses.

Finally, the NRC staff noted that WCAP-15666-A assumes 6,000 cycles of RCP starts and stops to calculate the fatigue crack growth of the RCP flywheel being addressed in this TLAA. The staff noted that the 6,000 cycles used in the fatigue crack growth analysis are significantly higher than either the design-basis transient cycles or projected cycles, indicating that there are margins in the fatigue crack growth calculations.

The NRC staff verified that WCAP-15666-A includes all of the analyses recommended in NRC RG 1.14, including the RCP rotor critical speed analysis for non-ductile flywheel deformations, which involved a fatigue flaw growth assessment of a postulated flaw in the limiting RCP flywheel disc under an assumed number of RCP flywheel start and stop cycles.

The staff confirmed that the crack flaw growth analysis is the relevant time-dependent analysis in the report.

The staff noted that although WCAP-15666-A evaluates the impact of the flywheel examination extension on the probability of failure over a 60-year life, the evaluation does include crack growth calculations due to fatigue covering all RCP flywheels in operating Westinghouse plants, including DCPP. The staff noted that the fatigue flaw growth analysis in WCAP15666-A assumed the occurrence of an initial radial crack in the limiting flywheel disc that extended 10 percent through the radial flywheel disc, initiating at a corner of the disc keyway and extending toward the disc outer circumference. The analysis demonstrates that the growth of the postulated initial crack is negligible over 60 years as compared to the total distance from the keyway to the outer diameter of the flywheel that the crack would have to grow to cause the failure. The analysis also demonstrates that the RCP flywheel disc will remain stable for a 60-year design life. The staff finds that the fatigue analysis in WCAP-15666-A demonstrates that the flywheel design has a high structural reliability with a high flaw tolerance through the PEO.

Based on the above, the NRC staff finds that the applicant has demonstrated pursuant to 10 CFR 54.21(c)(1)(i) that the TLAA for the RCP flywheel remains valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1.1 because the projected number of RCP start and stop cycles through 60 years of operation is significantly less than the number of RCP start and stop cycles assumed in the RCP flywheel analysis of WCAP15666-A.

4.7.4.3 UFSAR Supplement

LRA Section A.3.5.3 provides the UFSAR supplement summarizing the RCP flywheel fatigue crack growth analysis. The NRC staff reviewed LRA Section A.3.5.3 consistent with the review procedures in SRP Section 4.7.3.2. Based on its review of the UFSAR supplement, the staff finds that it meets the acceptance criteria in SRP 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 RCP flywheel fatigue crack growth analysis, as required by 10 CFR 54.21(d).

4.7.4.4 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)(i), that the fatigue crack growth analyses associated with the aging effect of fatigue for the RCP flywheel remain valid for the PEO. 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 Inservice Flaw Growth Analyses that Demonstrate Structural Stability for 40 Years

4.7.5.1 Summary of Technical Information in the Application

LRA Section 4.7.5 describes the applicant’s TLAA for its inservice flaw growth analyses. The LRA states that according to the ISI procedure at DCPP, a fracture mechanics analysis in accordance with ASME Code Section XI, Subsection IWB-3600 must be completed if a detected flaw is not able to satisfy the acceptance criteria in the corresponding test procedure. These fracture mechanics analyses depend on a specified number of operating years and thus may be TLAAs.

The applicant dispositioned the TLAA for the Unit 2 RHR piping weld RB-119-11, the Unit 2 pressurizer safety and spray nozzle welds, the Unit 2 auxiliary feedwater piping line 567, the Unit 1 pressurizer spray line pipe weld WIB-378, the Unit 1 RHR piping weld WIC-95, and the Units 1 and 2 safety injection pumps vent and drain socket welds in accordance with 10 CFR 54.21(c)(1)(i) by demonstrating that the analyses remain valid for the PEO.

The applicant dispositioned the TLAA for the Unit 2 charging pump discharge line welds WIC-45A and RB-46-7 in accordance with 10 CFR 54.221(c)(1)(iii) by demonstrating that the effects of flaw growth on the intended functions will be adequately managed by the Fatigue Monitoring AMP (LRA Section B.2.2.1) for the PEO.

4.7.5.2 Staff Evaluation

The NRC staff reviewed the applicant’s TLAAs for inservice flaw growth and the corresponding disposition of the TLAAs in accordance with 10 CFR 54.21(c)(1)(i) or 10 CFR 54.21(c)(1)(iii), as appropriate, consistent with the review procedures in SRP-LR Sections 4.7.3.1.1 and 4.7.3.1.3, respectively.

4.7.5.2.1 Unit 2 RHR piping weld RB-119-11

During a routine ISI prior to the Unit 2 13th refueling outage in 2006, the applicant identified a circumferential flaw in Weld RB-119-11 of the RHR system. The applicant reported that the flaw did not meet the acceptance standards of Table IWB-3514-2 of ASME Code Section XI. To disposition the flaw, the applicant evaluated the indication in accordance with ASME Code Section XI, IWB-3640. Subsequently, the applicant submitted the flaw evaluation in PG&E Letter DCL-06-069, "Residual Heat Removal Weld RB-119-11–Flaw Analytical Evaluation Results," dated June 6, 2006 (ML061720081). No mitigation measures were applied.

In LRA Section 4.7.5, the applicant stated that the service life for Weld RB-119-11 is based on operating for 40 years from the date that the flaw was identified (i.e., until 2046) during which the flaw is assumed to experience 500 startup-shutdown cycles. Further, the applicant stated that the cycle assumptions used in the analysis are conservative compared to the DCPP design cycles listed in LRA Table 4.3-1, which shows that the DCPP licensing basis assumes 250 heat-ups and 250 cool-downs for a 60-year plant life. The NRC staff concurs with this assessment. The staff also finds that the necessary loadings have been included in the flaw growth analysis and that, therefore, it is acceptable.

As described in LRA Section 4.3.1, the applicant will monitor transient cycles using the Fatigue Monitoring AMP (LRA B.2.2.1) and ensure that corrective actions are taken if any of the actual cycles approach their analyzed numbers in LRA Table 4.3-1. The NRC staff finds that this AMP will provide additional assurance that transient cycles used in the flaw evaluation are not exceeded by the actual operating cycles. The staff finds that the transient cycles in the applicant's flaw evaluation bound the predicted cycles at the end of 60 years. The staff further reviewed the applicant's inspections under ASME Code requirements and finds that the subject weld will be examined in the future to provide additional assurance of its structural integrity.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(i), that the flaw evaluation for this weld remains valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis.

4.7.5.2.2 Unit 2 Pressurizer Safety and Spray Nozzle Welds

During the Unit 2 14th refueling outage in 2008, Alloy 690 SWOLs were completed on Alloy 82/182 welds attaching the surge, spray, and relief valve nozzles to the safe-ends and the safe-ends to the connecting piping. During the Unit 2 17th refueling outage in 2013, the applicant identified fabrication weld flaw indications located at the Unit 2 SWOLs for pressurizer safety nozzles A and B and the pressurizer spray nozzle. The applicant submitted fatigue crack growth evaluations as part of a revision to the original relief request for the SWOLs in PG&E Letter DCL-14-028 (ML14101A246). By letter dated October 14, 2014, the NRC authorized the use of the proposed alternative, replacement reactor SWOL-REP-1 U2, at DCPP, Unit 2 for the expected life of the overlays, which is August 26, 2045 (ML14255A232). This analysis of the flaw depth covers the PEO for DCPP, Unit 2.

As described in LRA Section 4.3.1, the applicant will monitor transient cycles using the Fatigue Monitoring AMP (LRA B.2.2.1) and ensure that corrective actions are taken if any of the actual cycles approach their analyzed numbers in LRA Table 4.3-1. The NRC staff finds that this AMP will provide additional assurance that transient cycles used in the flaw evaluation are not exceeded by the actual operating cycles.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(i), that the flaw evaluations for these welds remain valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis.

4.7.5.2.3 Unit 2 Auxiliary Feedwater Piping Line 567

During the Unit 2 8th refueling outage, while performing a non-routine surface examination before maintenance, the applicant detected an indication in Unit 2 carbon steel auxiliary feedwater piping line 567. Subsequently, the applicant performed and submitted a flaw evaluation for the auxiliary feedwater piping line 567 in PG&E Letter DCL-99-136, dated October 22, 1999 (ML993060021). The flaw evaluation for auxiliary feedwater piping line 567 assumed 250 cycles of future seismic and thermal loading.

LRA Section 4.7.5 states that the assumed transients are consistent with or bounded by the 50-year design-basis described in UFSAR Table 5.2-4. In the applicant's previous response dated September 24, 2010 (ML102780501), the applicant clarified that the flaw evaluation considered 250 Hosgri seismic loads (five seismic events with 50 cycles per event). This is more conservative than the licensing basis described in UFSAR Table 5.2-4 because it is based on five Hosgri events whereas the licensing basis only anticipates one event. The NRC staff finds that the applicant used conservative seismic cycles to analyze the Unit 2 auxiliary feedwater piping line 567; therefore, the seismic cycle input is acceptable. The staff finds that the transient cycles in the applicant's flaw evaluation bound the predicted cycles at the end of 60 years. The staff further reviewed the applicant's inspections under ASME Code requirements and finds that the subject weld will be examined in the future to provide additional assurance of its structural integrity.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(i), that the flaw evaluation for this line remains valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis.

4.7.5.2.4 Unit 1 Pressurizer Spray Line Pipe Weld WIB-378

During the Unit 1 19th refueling outage in 2015, the applicant identified a weld flaw indication located in the ASME Code Class 1 pressurizer spray line pipe weld WIB-378. The flaw was accepted by analysis in accordance with ASME Code Section XI, IWB-3600 and was submitted to the NRC (ML15307A752). Consistent with the ASME Code Section XI, IWB-2420 for successive inspections, weld WIB-378 is required to be re-examined for three ISI periods with two examinations already having been completed satisfactorily with the flaw size unchanged. The NRC staff notes that these examinations support the licensee's conclusions and flaw analysis. The applicant has committed to performing the third period examination in Commitment 3 of LRA Table A-3.

As described in LRA Section 4.7.5 and confirmed by the NRC staff review of the applicant's submitted flaw analysis, the fatigue crack growth evaluation used transient cycles consistent with or more conservative than the applicant's 50-year design basis described in UFSAR Table 5.2.4. As described in LRA Section 4.3.2, the applicant will monitor transient cycles using the Fatigue Monitoring AMP (LRA B.2.2.1) and ensure that corrective actions are taken if any of the actual cycles approach their analyzed numbers in LRA Table 4.3-1. The staff finds that this

AMP will provide additional assurance that transient cycles used in the flaw evaluation are not exceeded by the actual operating cycles.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(i), that the flaw evaluations for this weld remain valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis.

4.7.5.2.5 Unit 1 RHR Piping Weld WIC-95

During the Unit 1 9th refueling outage, while performing an ISI examination, the applicant identified an indication in weld WIC-95 of an ASME Code Class 2 portion of the RHR injection line 985 to hot legs 1 and 2. The indication exceeded the acceptance standards of ASME Code Section XI, Table IWC-3410-1. To disposition this indication, the applicant performed a flaw evaluation per ASME Code Section XI, IWB-3600. The applicant submitted the flaw evaluation in PG&E Letter DCL-97-086, dated May 7, 1997 (ML16342D627). Further clarifications on the flaw analysis were submitted by the applicant in PG&E Letter DCL-10-120, dated September 24, 2010 (ML102780501). In that submittal, the applicant explained that the successive examination requirements for Class 2 piping, such as the subject RHR piping, are specified in ASME Code Section XI, IWC-2420. The applicant stated that the required ultrasonic examination showed no apparent changes in the indication size and that the results were satisfactory. Additional details were provided by the applicant in PG&E Letters DCL-10-155, dated December 6, 2010 (ML103410091), and DCL-11-003, dated February 1, 2011 (ML110330309).

The applicant stated that the 400 seismic cycles used in the flaw evaluation are adequate for the PEO. The applicant projected seismic cycles to 60 years of operation by using the actual plant seismic history and projecting it to 60 years. As shown in LRA Table 4.3-1, the projected number of DEs (and thus the number of seismic cycles) is less than the 400 cycles used in the flaw evaluation. The NRC staff finds that because the seismic loading plus pressure and deadweight loads bound the thermal stress due to heat-up and cool-down, the exclusion of heat-up and cool-down cycles is acceptable. The staff finds that the structural integrity of weld WIC-95 will be monitored during the PEO in accordance with the ASME Code Section XI, including leak detection walkdowns; therefore, these monitoring methods will provide additional assurance of its structural integrity.

As described in LRA Section 4.3.1, the applicant will monitor transient cycles using the Fatigue Monitoring AMP (LRA B.2.2.1) and ensure that corrective actions are taken if any of the actual cycles approach their analyzed numbers in LRA Table 4.3-1. The NRC staff finds that this AMP will provide additional assurance that transient cycles used in the flaw evaluation are not exceeded by the actual operating cycles.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(i), that the flaw evaluation for this weld remains valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis.

4.7.5.2.6 Units 1 and 2 Safety Injection Pumps Vent and Drain Socket Welds

On July 21, 2014, the applicant submitted PG&E Letter DCL-14-060, which requested an alternative, REP-SI, for repair/replacement activities for certain safety injection pump welded attachments (ML14202A614). The socket welds are DCPP, Unit 1, ASME Code Class 2 safety injection Pumps 1-1 and 1-2 nominal pipe size ¾-inch vent and drain connection socket weld attachments (four attachment welds per pump); and DCPP, Unit 2, ASME Code Class 2 safety injection Pump 2-1 nominal pipe size ¾-inch vent and drain connection socket weld attachments (four attachment welds).

As part of the technical basis to support the alternative, the applicant submitted a stress and fracture mechanics evaluation including a fatigue flaw analysis for both outside diameter and inside diameter initiating flaws. By letter dated July 15, 2015, the NRC-authorized REP-SI for the remaining service life of safety injection Pumps 1-1, 1-2, and 2-1, including the duration of the current operating licenses plus a contemplated license extension period of 20 years (ML15187A035). This authorization would be applicable through the PEO. The NRC staff concluded in the authorization that the applicant's stress and fracture mechanics analyses demonstrate reasonable assurance that should an outside diameter or inside diameter flaw exist, the flaw would not grow rapidly to cause catastrophic failures and that it would not grow to the allowable flaw size for the remaining life of the safety injection pumps.

As described in LRA Section 4.7.5, the applicant verified that for the postulated crack analysis, 7,000 thermal transient cycles (pump starts), 400 DE cycles (20 events with 20 cycles per event), and 20 HE cycles (1 event with 20 cycles) were assumed. The applicant noted that using a projection of 1,400 safety injection pump start cycles for a 60-year plant life, the 7,000 thermal transient cycles assumed in the postulated crack analysis during 60 years of operation is conservative. The number of seismic cycles used in the analysis is consistent with the DCPP 50-year design basis described in UFSAR Table 5.2-4. The applicant further clarified that there have been no occurrences of a DE or Hosgri seismic event at DCPP during the first 38-plus years of operation.

As confirmed by the NRC staff review of the applicant's submitted flaw analysis, the fatigue crack growth evaluation used transient cycles that are conservative for the duration of the NRC-authorized alternative and the PEO. As described in LRA Section 4.3.2, the applicant will monitor transient cycles using the Fatigue Monitoring AMP (LRA B.2.2.1) and ensure that corrective actions are taken if any of the actual cycles approach their analyzed numbers in LRA Table 4.3-1. The staff finds that this AMP will provide additional assurance that transient cycles used in the flaw evaluation are not exceeded by the actual operating cycles.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(i), that the flaw evaluations for these welds remain valid for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.1 because the applicant appropriately evaluated the transient cycles and demonstrated that they are bounded by the values used in the original analysis.

4.7.5.2.7 Unit 2 Charging Pump Discharge Line Welds WIC-45A and RB-46-7

During the Unit 2 20th refueling outage in 2018, the applicant identified weld flaw indications in ASME Code Class 2 charging pump discharge line pipe welds WIC-45A and RB-46-7 (one indication in each weld). The applicant accepted the flaws for continued operation by analysis in accordance with ASME Code Section XI, IWB-3600, and the flaw evaluation was submitted to the NRC in PG&E Letter DCL-18-058, dated August 8, 2018 (ML18220B396). The applicant has chosen to perform successive inspections for the welds in accordance with the ASME Code Class 1 of IWB-2420 versus the allowance of ASME Code Class 2 successive inspection requirements. The NRC staff find this change to be conservative as the applicant confirms that these welds will be re-examined for three ISI periods rather than just one examination under the ASME Code Class 2 rules.

The NRC staff reviewed the applicant's flaw analysis to verify that the transient cycles used were bounding for the PEO. The applicant's analysis calculated further growth based on the higher of transient cycles for 60-year projections or design cycles, which the staff found to be conservative. The staff found that the additional 40 years of operation through 2058 bound the PEO for Unit 2.

As confirmed by the NRC staff review of the applicant's submitted flaw analysis, the fatigue crack growth evaluation used transient cycles that are conservative for the duration of the NRC-authorized alternative and the PEO. As described in LRA Section 4.3.2, the applicant will monitor transient cycles using the Fatigue Monitoring AMP (LRA B.2.2.1) and ensure that corrective actions are taken if any of the actual cycles approach their analyzed numbers in LRA Table 4.3-1. The staff finds that this AMP will ensure that transient cycles used in the flaw evaluation are not exceeded by the actual operating cycles.

Based on its review, the NRC staff finds, pursuant to 10 CFR 54.21(c)(1)(iii), that the effects of fatigue on the intended functions of the charging pump discharge line pipe welds WIC-45A and RB-46-7, as evaluated in the fatigue crack growth analysis, will be adequately managed for the PEO. Additionally, it meets the acceptance criteria in SRP-LR Section 4.7.2.3 because the applicant demonstrated that the Fatigue Monitoring AMP is capable of identifying when the analyzed cycles may be exceeded, providing for timely corrective actions.

4.7.5.3 UFSAR Supplement

LRA Section A.3.5.4 provides the UFSAR supplement summarizing the inservice flaw growth analyses. The NRC staff reviewed LRA Section A.3.5.4 consistent with the review procedures in SRP-LR Section 4.7.3.2. The applicant stated that the ISI procedure states that a fracture mechanics analysis, in accordance with ASME Code Section XI, Subsection IWB-3600, must be completed if flaw acceptance criterion is not met as outlined in the corresponding test procedure. These analyses depend on a specified number of operating years and thus are TLAAs. The applicant will perform any supplemental inspections in accordance with the LRA and ASME Code requirements. Based on its review, the NRC staff finds that the UFSAR supplement meets the acceptance criteria in SRP-LR 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 TLAA of the flaw growth analyses of the subject piping and welds, as required by 10 CFR 54.21(d).

4.7.5.4 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)(i), that the flaw growth analysis for the Unit 2 RHR piping weld RB-119-11, the Unit 2 pressurizer safety and spray nozzle welds, the Unit 2 auxiliary feedwater piping line 567, the Unit 1 Pressurizer Spray Line Pipe Weld WIB-378, the Unit 1 RHR piping weld WIC-95, and the Units 1 and 2 safety injection pumps vent and drain socket welds will remain valid for the PEO. Additionally, the staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(iii), that the flaw growth analysis for the Unit 2 charging pump discharge line welds WIC-45A and RB-46-7 will be adequately managed for the PEO. Finally, the staff concludes that the UFSAR supplement contains an adequate summary description of the TLAAs of the flaw growth analyses, as required by 10 CFR 54.21(d).

4.8 TLAAs Supporting 10 CFR 50.12 Exemptions

With respect to the DCPP, there are no in-effect exemptions granted pursuant to 10 CFR 50.12 and based on a TLAA; therefore, there are no TLAAs supporting 10 CFR 50.12 exemptions.

4.9 Conclusion for Time-Limited Aging Analyses

The NRC staff reviewed LRA Section 4, “Time-Limited Aging Analyses.” Based on its review, the staff concludes that the applicant provided a sufficient list of TLAAs, as defined in 10 CFR 54.3. In addition, the staff concludes that the applicant demonstrated that (1) the TLAAs remain valid for the period of extended operation, as required by 10 CFR 54.21(c)(1)(i); (2) the TLAAs have been projected to the end of the period of extended operation, as required by 10 CFR 54.21(c)(1)(ii); or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation, as required by 10 CFR 54.21(c)(1)(iii). The staff also reviewed the UFSAR supplements for the TLAAs and finds that they contain summary descriptions of the TLAAs for the period of extended operation sufficient to satisfy the requirements of 10 CFR 54.21(d). In addition, the staff concludes, as required by 10 CFR 54.21(c)(2), that no plant-specific TLAA-based exemptions are in effect.

With regard to these matters, the NRC staff concludes that there is reasonable assurance that the activities authorized by the renewed licenses will continue to be conducted in accordance with the CLB, and that any changes made to the CLB in order to comply with 10 CFR 54.29(a) are in accordance with the Atomic Energy Act of 1954, as amended, and the NRC’s regulations.

SECTION 5 REVIEW BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

In accordance with Title 10 of the *Code of Federal Regulations* Section 54.25, “Report of the Advisory Committee on Reactor Safeguards,” the license renewal application (LRA) for the Diablo Canyon Nuclear Power Plant, Units 1 and 2 will be referred to the Advisory Committee on Reactor Safeguards (ACRS) for a review and report. The U.S. Nuclear Regulatory Commission (NRC) staff’s safety evaluation (SE) of the LRA will also be provided to the ACRS. The applicant and the NRC staff will meet with the ACRS, as required, to discuss issues associated with the LRA and the SE. Any ACRS report will be made part of the record of the LRA and made available to the public, except to the extent that security classification prevents disclosure.

SECTION 6 CONCLUSION

The U.S. Nuclear Regulatory Commission (NRC, the Commission) staff performed a safety review of the license renewal application (LRA) for the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 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.” The staff reviewed the application using guidance in NUREG-1800, Revision 2, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” (SRP-LR), dated December 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103490036), and NUREG 1801, Revision 2, “Generic Aging Lessons Learned (GALL) Report” (GALL Report), dated December 2010 (ML103490041). Section 54.29, “Standards for issuance of a renewed license,” of 10 CFR sets forth the standards for issuance of renewed licenses, which include that the Commission may issue a renewed license if it finds 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 current licensing basis, 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,” have been satisfied.

Based on its review of the DCPP LRA and all the related information submitted through March 6, 2025, the NRC staff determined that the applicant has met the requirements of 10 CFR 54.29(a). Specifically, actions have been identified and have been or will be taken with respect to (1) managing the effects of aging during the 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 of the DCPP LRA is documented separately from this safety evaluation.

APPENDIX A

LICENSE RENEWAL COMMITMENTS

A. License Renewal Commitments

During the review of the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 license renewal application (LRA) by the staff of the U.S. Nuclear Regulatory Commission (NRC), Pacific Gas and Electric Company (PG&E) made commitments related to the aging management programs (AMPs) or activities used to manage the effects of aging for structures and components within the scope of license renewal and subject to an aging management review (AMR). Table A-1, below, repeats verbatim from the identified sources each PG&E commitment, along with the name of the AMP or activity, the corresponding section, if any, of NUREG-1801, Revision 2, “Generic Aging Lessons Learned (GALL) Report,” dated December 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103490041), the implementation schedule, and the source(s) (i.e., LRA, Appendix A, Table A-3 (ML25069A508); LRA Supplement 1 (ML24289A118); Request for Additional Information (RAI) Set 2 (ML25002A050); and/or RAI Set 3 (ML25056A500)) for each PG&E commitment. The source(s) for each commitment are publicly available online in the ADAMS Public Documents collection at https://www.nrc.gov/reading-rm/adams.html at the Accession No. provided. The period of extended operation (PEO) for DCPP began on November 2, 2024, for Unit 1, and begins on August 26, 2025, for Unit 2.

Table A-1 DCPP License Renewal Commitments

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
1	Fatigue Monitoring (A.2.1.1)	X.M1	Continue the existing DCPP Fatigue Monitoring AMP, including enhancements to: (a) The AMP will be modified to include additional analyses and critical thermal and pressure transients for components that have been identified to have a fatigue TLAA [time-limited aging analysis], which are not covered by the current Fatigue Monitoring Program. Additional locations will also include EAF [environmentally assisted fatigue] analyses for the set of sample components from NUREG/CR-6260, Revision 0, and those components evaluated and determined to be more limiting than the components specified in NUREG/CR-6260 based on the methodology in EPRI [Electric Power Research Institute] Report 3002018262, “Environmentally Assisted Fatigue Screening Methods.” (b) The AMP will be modified to include acceptance criteria for transient definitions, cycle count action limits, and CUF/CUF_{en} action limits, which will invoke appropriate corrective actions if a component reaches a cycle count action limit or a CUF/CUF_{en} action limit. Action limits permit completion of corrective actions before the design limits are exceeded. (c) The procedures governing the DCPP Fatigue Monitoring AMP will be modified to specify the frequency of periodic reviews of the monitored cycle count and cumulative usage factor data at least once per fuel cycle. This review will determine whether fatigue analyses updates are needed if (a) an allowable cycle limit is approached, (b) where a transient definition has been changed, (c) unanticipated new thermal events are discovered, or (d) the geometry of components has been modified. (d) The procedures governing the DCPP Fatigue Monitoring AMP will be revised to include appropriate corrective actions if a component reaches a cycle count action limit or a fatigue usage action limit. The corrective action options for a component that has reached action limits include a revised fatigue analysis or repair or replacement of the component. Corrective actions for approaching fatigue	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			crack growth analysis action limits include re-analyzing the fatigue crack growth analysis consistent with or reconciled to the originally submitted analysis. The reanalysis will receive the same level of regulatory review as the original analysis.		
2	Environmental Qualification of Electric Components (A.2.1.2)	X.E1	Continue the existing DCPP Environmental Qualification of Electric Components AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
3	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (A.2.2.1)	XI.M1	Continue the existing DCPP ASME Section XI, Subsection IWB, IWC, and IWD AMP, including an enhancement to: (a) Re-examine the Unit 1 Pressurizer Spray Line Pipe Weld WIB-378 for three ISI [inservice inspection] periods since identification of the weld flaw in 2015 in accordance with ASME Code, paragraph IWB-2420 for Successive Inspections as described in PG&E Letter DCL-16-043, response to NRC question 5. The first two exams showed the flaw as unchanged in size. If during the third successive exam the flaw has reached 50 percent through wall depth, PG&E will reanalyze the current acceptability and projected flaw growth rate for the remainder of the PEO and continue monitoring it on a periodic basis. (b) Augment the program scope to include a plant specific small-bore piping outside diameter inspection of 10 percent of the susceptible ASME Code Class 1 socket weld population greater than or equal to NPS [nominal pipe size] 1 inch and less than NPS 4 inches with a maximum of 25 welds per unit using visual and penetrant examinations in each ISI interval in the PEO.	Except for item (b), enhancements are implemented by 11/02/2024*(Complete)* Enhancement (b) is implemented by 08/26/2025	LRA, Appendix A, Table A (ML25069A508)
4	Water Chemistry (A.2.2.2)	XI.M2	Continue the existing DCPP Water Chemistry AMP.	Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
5	Reactor Head Closure Stud Bolting (A.2.2.3)	XI.M3	Continue the existing DCPP Reactor Head Closure Stud Bolting AMP, including an enhancement to: (a) Ensure the actual measured yield strength of replacement reactor head closure stud material purchased in the future is limited to <150ksi.	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
6	Boric Acid Corrosion (A.2.2.4)	XI.M10	Continue the existing DCPP Boric Acid Corrosion AMP.	Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
7	Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components AMP (A.2.2.5)	XI.M11B	Continue the existing Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
8	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (A.2.2.6)	XI.M12	Implement the new DCPP Thermal Aging Embrittlement of Cast Austenitic Stainless-Steel AMP.	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
9	PWR Vessel Internals (A.2.2.7)	XI.M16A	Implement the new DCPP PWR Vessel Internals AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
10	Flow-Accelerated Corrosion (A.2.2.8)	XI.M17	Continue the existing DCPP Flow-Accelerated Corrosion AMP, including enhancements to: (a) Include piping, piping components, and piping elements that are susceptible to erosion wall-thinning mechanisms such as cavitation, flashing, droplet impingement, or solid particle impingement and include erosion as an aging mechanism for all components that are susceptible. This will include guidelines for measuring wall thickness due to erosion during the PEO. (b) Ensure that identification of locations susceptible to erosion is based on the extent of condition reviews from corrective actions in response to plant-specific and	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			industry OE [operating experience]. Components may be treated in a manner similar to "susceptible-not-modeled" lines discussed in NSAC-202L. Additionally, include guidance from EPRI 1011231 for identifying potential damage locations and EPRI TR-112657 and/or NUREG/CR-6031 (April 1993) guidance for cavitation erosion. (c) Include trending of wall thickness measurements at locations susceptible to erosion mechanisms to adjust the monitoring frequency and to predict the remaining service life of the component for scheduling repairs or replacements. Inspection results will be evaluated to determine if assumptions in the extent of condition review remain valid. If degradation is associated with infrequent operational alignments, such as surveillances or pump starts/stops, then trending activities may consider the number or duration of these occurrences. The program will be enhanced to consider periodic wall thickness measurements of replacement components, which would continue until the effectiveness of corrective actions has been confirmed. (d) Ensure that updates to the plant predictive models are controlled and independently reviewed by a second qualified flow-accelerated corrosion engineer, consistent with NSAC-202L recommendations. (e) For erosion mechanisms, ensure long-term corrective actions to eliminate the cause will consider adjusting operating parameters or changing component designs, and the effectiveness of these corrective actions will be verified. Periodic monitoring activities should continue for any components replaced with an alternate material, since a material that is completely erosion resistant is not available.		
11	Bolting Integrity (A.2.2.9)	XI.M18	Implement the existing DCPP Bolting Integrity AMP, including enhancements to: (a) Procedures and/or specifications will be enhanced to minimize any future use of bolting material greater than 2 inches (i.e., not spare components currently on site) with	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			an actual yield strength greater than or equal to 150 ksi in portions of systems within the scope of the Bolting Integrity program. If bolting greater than 2 inches with an actual yield strength greater than or equal to 150 ksi is used (including bolting with an unknown actual yield strength with the potential to be greater than or equal to 150 ksi), bolting will be monitored for cracking, with volumetric examinations performed in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1. Specified bolting material properties (e.g., design and procurement specifications, fabrication and vendor drawings, material test reports) may be used to determine if identified bolting exceeds the threshold to be classified as high strength. (b) Explicitly ban the use of MoS2 [molybdenum disulfide] as a lubricant for use on bolts. (c) DCPP Bolting Integrity AMP implementing procedures will be enhanced to incorporate the applicable guidance of EPRI NP-5769, EPRI Report 104213, and the additional recommendations of NUREG-1339 (June 1990) to prevent or mitigate degradation and failure of closure bolting. (d) Perform inspections during the PEO of pressure-retaining closure bolting in piping systems that contain air or gas for which leakage is difficult to detect. Integrity of the bolted joint will be demonstrated by one of the following methods: (a) inspections are performed consistent with that of submerged closure bolting; (b) a visual inspection for discoloration is conducted when leakage of the air or gas inside the piping systems would discolor the external surfaces; (c) monitoring and trending of pressure decay is performed when the bolted connection is located within an isolated boundary; (d) soap bubble testing is performed; (e) when the temperature of the fluid is higher than ambient conditions, thermography testing is performed; or (f) inspection methods capable of detecting leakage for systems containing air or gas. At a minimum, in each 10-year interval during the PEO, inspections shall		LRA Supplement 1 (ML2489A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			be completed on a representative sample of at least 20 percent of the population of bolt heads and threads (defined as bolts with the same material and environmental combination) at each unit, up to a maximum of 19 for each unit, for each material/environment combination. (e) Ensure that submerged closure bolting is visually inspected for loss of material during PEO maintenance activities. Bolt heads will be inspected when made accessible, and bolt threads will be inspected when joints are disassembled. In each 10- year period during the PEO, a representative sample of bolt heads and threads will be inspected. If opportunistic maintenance activities will not provide access to 20 percent of the population (for a material/environment combination) up to a maximum of 19 bolt heads and threads over a 10-year period, then it will be documented how integrity of the bolted joint will be demonstrated. For example: (a) periodic pump vibration measurements are taken and trended; or (b) sump pump operator walkdowns are performed demonstrating that the pumps are appropriately maintaining sump levels. (f) Deleted. (g) DCPP-specific acceptance criteria will be established when alternative inspections or testing is conducted for submerged closure bolting or closure bolting where the piping systems contain air or gas for which leakage is difficult to detect. (h) For sampling-based inspections, if the cause of the aging effect for each applicable material and environment is not corrected by repair or replacement for all components constructed of the same material and exposed to the same environment, additional inspections will be conducted if the results for one of the inspections does not meet acceptance criteria. The number of increased inspections will be determined in accordance with the DCPP CAP [corrective action program]; however, there will be no fewer than five additional inspections for each		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			inspection result that did not meet acceptance criteria, or 20 percent of each applicable material, environment, and aging effect combination will be inspected, whichever is less. If the results of subsequent inspections do not meet acceptance criteria, an extent of condition and extent of cause analysis will be conducted to determine the further extent of inspections. Additional samples will be inspected for any recurring degradation to ensure corrective actions appropriately address the associated causes. Additional inspections will include inspections at both units with the same material, environment, and aging effect combination. The additional inspections will be completed within the interval (e.g., refueling outage interval, 10-year inspection interval) in which the original inspection was conducted. If any projected inspection results will not meet acceptance criteria prior to the next scheduled inspection, sampling frequencies will be adjusted as determined by DCPP's CAP.		
12	Steam Generators (A.2.2.10)	XI.M19	Continue the existing DCPP Steam Generators AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
13	Open-Cycle Cooling Water AMP (A.2.2.11)	XI.M20	Continue the existing DCPP Open-Cycle Cooling Water System AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
14	Closed Treated Water Systems (A.2.2.12)	XI.M21A	Continue the existing DCPP Closed Treated Water Systems AMP, including enhancements to: (a) Include corrosion monitoring of CCW [component cooling water], SCW [service cooling water], and ICW [intake cooling water] system components by inspecting the condition of corrosion coupons installed in the CCW, SCW, and ICW systems. These methods will verify that wetted material exposed to the chemistry of the closed cooling water systems are not experiencing corrosion. The corrosion coupons are strips of metal (i.e., copper, carbon steel, stainless steel, etc.) that are installed in the closed cooling water systems in a manner such that they	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			are exposed to the cooling water. Periodically these coupons will be removed and their condition will be evaluated. This inspection will provide DCPP an indication if significant corrosion is occurring in the system. Plant procedures will be enhanced to include inspections, guidelines, and acceptance criteria. (b) For those components that do not have material represented by the corrosion coupons, enhance procedures to include visual inspection of surfaces exposed to the closed treated water environment for evidence of loss of material, cracking, or fouling whenever the system boundary is opened. At a minimum, in each 10-year period during the PEO, a representative sample (20 percent of the population, up to a maximum of 25 components) of piping and components that do not have material represented by the corrosion coupons will be inspected by qualified personnel using visual or volumetric techniques capable of detecting loss of material, cracking, and fouling, as appropriate. The representative sample will be selected based on the likelihood of corrosion or cracking. Inspections will be conducted in accordance with applicable ASME Code requirements. If there are no ASME Code requirements, such as for SCW components, inspections will be conducted in accordance with the EPRI guideline. Guidance will be included to report and evaluate any detectable loss of material, cracking, or fouling associated with the surfaces exposed to the closed treated water environment per the DCPP CAP. Components will meet system design requirements, such as minimum wall thickness. If visual examination identifies adverse conditions, additional examinations, including ultrasonic testing, are to be conducted. Inspection results will be trended so that the progression of any corrosion or cracking can be evaluated and predicted.		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
15	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (A.2.2.13)	XI.M23	Continue the existing DCPP Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems AMP, including enhancements to: (a) Enhance applicable procedures to specify visual inspections for loose bolts, missing or loose nuts, or other indications of loss of preload and cracking for bolted connections of the containment dome service crane. (b) Enhance applicable procedures to specify that visual inspection frequencies are in accordance with ASME B30.2, “Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist), American Society of Mechanical Engineers,” 2005 Edition, or other appropriate standards in the ASME B30 series. (c) Enhance applicable procedures to specify that all visual indications of aging are evaluated for associated system/component adjustment, repair, or replacement, as necessary, in accordance with ASME B30.2, “Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist), American Society of Mechanical Engineers,” 2005 Edition, or other appropriate standards in the ASME B30 series. (d) Enhance applicable procedures to specify that system/component repairs are performed in accordance with ASME B30.2, “Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist), American Society of Mechanical Engineers,” 2005 Edition, or other appropriate standards in the ASME B30 series.	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
16	Fire Protection (A.2.2.14)	XI.M26	Continue the existing DCPP Fire Protection AMP, including an enhancement to: (a) Include qualification criteria for individuals performing inspection of fire dampers and fire doors.	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
17	Fire Water Program (A.2.2.15)	XI.M27	Continue the existing DCPP Fire Water System AMP, including enhancement to:	Except for items (g)(1), (g)(3), (h), (n), (o), (p), (q), and (r),	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(a) Update the preventive maintenance activities for strainers STR-97 and STR-98 in the makeup water system that support the Fire Water System to require that they are cleaned and inspected on a 24-month frequency during the period of extended operation. (b) Test/replace sprinkler heads in accordance with NFPA [National Fire Protection Association] 25, Section 5.3.1. Sprinklers that have been in service for greater than 50 years prior to the program implementation date will be replaced or tested consistent with NFPA 25 prior to the program being implemented. (c) Develop new procedure(s) to conduct flow tests at hydraulically most remote locations to address NFPA 25 Section 6.3.1. The procedures will measure flow, static pressure, and residual pressure at the hydraulically most remote fire water hose station in major structures. (1) The turbine building is divided into two sections (Unit 1 and Unit 2) with four elevations per unit. DCPP will test a total of eight hydraulically most remote hose stations in the turbine building to represent one hose station per elevation for each unit. (2) The auxiliary building (including the fuel handling buildings [FHBs]) is divided into two sections (Unit 1 and Unit 2). Flow in the radiologically controlled areas increases the amount of liquid radwaste. To minimize the amount of liquid radwaste and sufficiently represent the fire water loop, DCPP will test a total of two hydraulically most remote hose stations in the auxiliary building to represent one hose station for each unit. (3) The containment buildings are supplied from the auxiliary building and turbine building fire water loops. DCPP will test a total of two hydraulically most remote hose stations in the containment buildings to represent one hose station for each unit. (4) DCPP will test a total of one hydraulically most remote hose station in the common intake structure.	enhancements are implemented by 11/02/2024. *(Complete)* Enhancements (g)(1) (g)(3), (n), (o), (p), (q), and (r) are implemented by 01/30/2025. *(Complete)* Enhancement (h) is implemented by 03/30/2025. Augmented inspections to address recurring internal corrosion and inspections (identification, visual inspections, and flow tests) of wetted normally dry piping segments that cannot be drained or that allow water to collect begin prior to Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete)* Volumetric inspections of wetted normally dry piping segments that cannot be drained or that	LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(d) Update procedures that perform main drain testing to include the 18-month testing frequency, the 10 percent acceptance criteria from NFPA 25, Section 13.2.5, and tracking/trending of test results. (e) Update existing procedures to include maintaining hydrant flow for not less than 1 minute in accordance with NFPA 25, Section 7.3.2.2. (f) Update existing procedures to perform a periodic flow test for the buried portions of the fire water system in accordance with NPFA 25, Section 7.3, at a frequency of at least one test in each one-year period. (g) Update procedures so that interior and exterior surface inspections of the FWST [firewater storage tank] are consistent with the following criteria: (1) Inspect the internal and external surfaces of the FWST every five years, consistent with NFPA 25, Section 9.2.6 (with exception to Section 9.2.6.4). Any degradation that does not meet the acceptance criteria will be entered into the CAP for tracking and trending, and engineering evaluation. Degradation shall be documented via camera with nodule measurements and corrosion depth recorded. Deficiencies will be entered into CAP and an engineering evaluation shall be performed to determine whether further actions are required in accordance with NFPA 25, Section 9.2.7, LR-ISG-2012-02, Table 4a, note 4, and LR-ISG-2013-01, Appendix C (for coatings), and may include augmented inspections or inspection interval changes (increased in frequency) to monitor degradation. Procedures will be revised to allow the use of a variety of NDE [nondestructive evaluation] methods, including enhanced visual (EVT-1 or equivalent), volumetric (radiographic testing or UT [ultrasonic testing]), and surface (magnetic particle, liquid penetrant) techniques as discussed in NUREG-1801, Revision 2, Table XI.M32-1, rather	allow water to collect begin after Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete for Unit 1)* Internal lining baseline inspections begin no later than Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete)* The program's remaining inspections begin after Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete for Unit 1)*	

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			than vacuum box testing to meet NFPA-25, Section 9.2.7.6. (2) The inspections will include use of tools necessary to adequately conduct inspection for aging mechanisms (e.g., adequate lighting will be provided). (3) Inspections of FWST coatings will be in accordance with the training and qualification of personnel, acceptance criteria (except for cementitious coatings/linings), and corrective actions from LR-ISG-2013-01, Appendix C. Individuals responsible for conducting coating inspections will be qualified in accordance with ASTM D4537-12. Individuals responsible for assessing the type and extent of coating degradation will be qualified in accordance with ASTM D7108-05. (4) A one-time UT inspection of the tank bottom will be performed prior to November 2, 2024. (h) Update existing procedures so that testing of the turbine building deluge valves is consistent with NFPA 25. Dry piping downstream of the deluge valves will be tested with air, smoke, or other medium during every second visual inspection (i.e., every three years) to ensure that the piping and nozzles are clear. (i) Update existing procedures to state that deluge system nozzles will be cleaned and the respective systems retested when obstructions are identified during flow testing. (j) Update existing procedures to: (1) Internally inspect wet sprinkler systems using a method capable of detecting flow blockage due to fouling in addition to loss of material as described in NFPA 25, Section 14.2. (2) Perform obstruction investigations as required by and consistent with NFPA 25, Section 14.3. (3) Specify that external wall thickness measurements will not be used in lieu of prescribed internal visual examinations (or flow test) for managing flow blockage.		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(k) Create a new procedure to implement the following activities: (1) After identifying any portions of the fire water deluge system piping that are normally dry and periodically subject to flow, but are unable to be drained, perform either: (a) a flow test or flush sufficient to detect potential flow blockage, or (b) an inspection of 100 percent of the internal surface on those portions unable to be drained. This activity shall be conducted in each 5-year period during the PEO. If the results of a 100-percent internal visual inspection are acceptable, and the segment is not subsequently wetted, no further augmented tests or inspections are necessary. (2) During each 5-year period in the PEO, 20 percent of the identified portion will be volumetrically tested so that after 25 years, 100 percent has been volumetrically tested. Measurement points are obtained to the extent that each potential degraded condition can be identified (e.g., general corrosion, MIC [microbiologically influenced corrosion]). (3) If and when the turbine building deluge system spray piping becomes wetted, an inspection will be conducted to determine if any portions of the spray piping cannot be drained or allow water to collect, and the flow testing and inspection criteria for normally dry wet sprinkler systems above will be applied. (l) Include the following requirements for monitoring recurring internal corrosion (RIC): (1) Loss of material will be monitored using ultrasonic testing (UT) examinations. Representative inspection sites will be selected based on pipe configuration, flow conditions, operating history (known degradation or leakage), and will be updated periodically based on operating experience.		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(2) The UT measurements will be compared to the nominal pipe wall thickness for initial measurements or to previous thickness measurements to determine rates of corrosion and the estimated time to reach minimum wall thickness. (3) If UT examination results indicate that the component does not meet DCPP acceptance criteria or is experiencing a reduction in wall thickness greater than 50 percent regardless of the minimum wall thickness, the issue will be entered into the CAP for resolution. PG&E will consider multiple RIC locations in the technical evaluation of the structural integrity of the pipe when RIC is identified by the volumetric RIC inspections. (4) The effectiveness of the corrective actions taken to address the previous RIC operating experience will be evaluated. A minimum of five RIC UT examinations will be conducted per year until the rate of RIC occurrences no longer meets the criteria for RIC. If more than one RIC caused leak or wall thickness less than minimum allowable wall thickness is identified in the annual inspection period, an additional five RIC UT examinations over the following 12-month period will be performed for each RIC leak or finding of wall thickness less than minimum allowable wall thickness. The total number of inspections need not exceed 25 RIC inspections per year. (5) The cause of any newly identified RIC will be entered into the CAP for further evaluation and corrective actions. (6) Perform internal visual inspections during opportunistic inspections. (m) Update inspection and test procedures to require trending of data. (n) Update existing procedures to ensure visual inspections used to detect loss of material use inspection techniques capable of detecting surface irregularities that could		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			indicate wall loss to below nominal pipe wall thickness due to corrosion and corrosion product deposition. Where such irregularities are detected, follow-up volumetric wall thickness examinations are performed. (o) Create a new procedure or revise preventive maintenance activities to remove and inspect water system mainline strainers every 5 years in accordance with NFPA 25 Sections 10.2.1.7, 10.2.7.3, and 10.2.7.4. (p) Update procedures to require that mainline strainers be flushed after each operation or flow test in accordance with NFPA-25 Section 10.2.7.1. (q) Update existing procedures such that DCPP's CLB (License Amendments 225 and 227) for performance-based inspection, testing, and maintenance frequencies will not be applied to the FWST inspections/tests, underground flow tests, and inspections of normally dry but periodically wetted piping that will not drain due to its configuration. (r) Update existing procedure acceptance criteria to include the following: • The ability of the fire protection system to maintain required pressure and flow rates. • Minimum design wall thickness is maintained. • No fouling exists in the sprinkler system that could cause blockage in the sprinkler heads.		
18	Aboveground Metallic Tanks (A.2.2.16)	XI.M29	Implement the new DCPP Aboveground Metallic Tanks AMP.	AMP is implemented and inspections start by: Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
19	Fuel Oil Chemistry (A.2.2.17)	XI.M30	Continue the existing DCPP Fuel Oil Chemistry AMP, including enhancements to: (a) Include the emergency diesel generator diesel fuel oil day tanks, portable diesel electric generator fuel oil tanks, portable diesel-driven fire water pump	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)* Implement the enhancements	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			tanks, emergency diesel fuel oil pump head (priming) tanks, and portable caddy fuel oil tanks. (b) Drain, clean, and visually inspect the internal surfaces of the emergency diesel generator fuel oil day tanks, portable diesel-driven fire water pump fuel oil tanks, portable diesel electric generator fuel oil tanks, emergency diesel fuel oil pump head (priming) tanks and portable caddy fuel oil tanks every 10 years. Volumetrically inspect the tanks, if evidence of degradation is observed during visual inspection, or if visual inspection is not possible. (c) Include the addition of biocide to the portable diesel electric generator fuel oil tanks, and portable caddy fuel oil tanks. (d) Include periodic sampling of the fuel oil stored in the portable diesel-driven fire water pump fuel oil tanks, the portable diesel electric generator fuel oil tanks and the portable caddy tanks. The periodic samples will be multi-level samples or, if tank design features do not allow for multi-level sampling, a representative sample from the lowest point in the tank will be used. If accumulated water is found in one of the fuel oil tanks, it will be promptly removed via the CAP. (e) Provide for sampling of new diesel fuel oil prior to introduction into the portable diesel-driven fire water pump tanks and the portable diesel electric generator fuel oil tanks. Include annual monitoring and trending of water and sediment content, total particulate concentration, and the levels of microbiological organisms in the fuel oil for the portable diesel-driven fire water pump tanks and the portable diesel electric generator fuel oil tanks. Testing for microbiological organisms will be performed annually. Acceptance criteria will be in accordance with industry standards and equipment manufacturer or fuel oil supplier recommendations.	and start the one-time and 10-year interval inspections no earlier than 10 years prior to the PEO. *(Complete)*	LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(f) Credit the fuel oil storage tank inspections for the one-time inspection of the fuel oil system components, if the material and environment are the same. (g) State that trending of water and particulate levels is controlled in accordance with DCPP Technical Specifications and plant procedures for the emergency diesel generator diesel fuel oil storage tanks and the emergency diesel generator diesel fuel oil day tanks. (h) Plant procedures will be enhanced to check and drain water from the portable diesel electric generators and portable diesel-driven fire water pumps filtration devices prior to use which will minimize any water entry.		
20	Reactor Vessel Surveillance (A.2.2.18)	XI.M31	Continue the existing DCPP Reactor Vessel Surveillance AMP.	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
21	One-Time Inspection (A.2.2.19)	XI.M32	Implement the new DCPP One-Time Inspection AMP.	The AMP will be completed by 03/31/2026.	LRA Supplement 1 (ML24289A118)
22	Selective Leaching (A.2.2.20)	XI.M33	Implement the new DCPP Selective Leaching AMP.	Complete initial sample size inspections prior to 03/31/2026. Complete follow-up or expansion inspections by 12/1/2028.	LRA Supplement 1 (ML24289A118)
23	One-Time Inspection of ASME Code Class 1 Small-Bore Piping (A.2.2.21)	XI.M35	Implement the new DCPP One-Time Inspection of ASME Code Class 1 Small-Bore Piping AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
24	External Surfaces Monitoring of Mechanical Components (A.2.2.22)	XI.M36	Implement the new DCPP External Surfaces Monitoring of Mechanical Components AMP. (1) The implementation schedule for initiating inspections is consistent with LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation."	AMP is implemented by 05/02/2024. *(Complete)* Inspections begin after[(1)]: Unit 1: 11/02/2024 Unit 2: 08/26/2025	LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
25	Flux Thimble Tube Inspection (A.2.2.23)	XI.M37	Continue the existing DCPP Flux Thimble Tube Inspection AMP.	Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete).*	LRA Supplement 1 (ML24289A118)
26	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (A.2.2.24)	XI.M38	Implement the new DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP including the following: (a) Replace in-scope domestic water system copper alloy piping with a material that is more corrosion-resistant or install pipe shielding to ensure that no adverse 10 CFR 54.4(a)(2) spatial interactions could occur. (b) Based on operating experience, loss of material due to RIC will be managed such that additional inspections will be performed if any sample-based inspections in the saltwater system do not meet the acceptance criteria, unless the cause of the aging effect for each applicable material and environment is corrected by repair or replacement. The DCPP Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP will also state that the number of inspections will be increased in accordance with the DCPP CAP; however, no fewer than five additional inspections are conducted for each inspection that did not meet acceptance criteria, or 20 percent of each applicable material, environment, and aging effect combination is inspected, whichever is less.	AMP is implemented by 05/02/2024 *(Complete)*; Inspections begin after: Unit 1: 11/02/2024 Unit 2: 08/26/2025 Copper alloy piping of the domestic water system that are in the scope of license renewal will be replaced or pipe shielding will be installed prior to 12/01/2028.	LRA Supplement 1 (ML24289A118)
27	Lubricating Oil Analysis (A.2.2.25)	XI.M39	Continue the existing DCPP Lubricating Oil Analysis AMP, including the following enhancements: (a) Include periodic sampling and analysis to maintain lubricating and hydraulic oil contaminants, primarily water and particulates, within acceptable limits; (b) Perform sampling for water, particle count, and other parameters to detect evidence of contamination by moisture or excessive corrosion; (c) Include acceptance criteria for lubricating and hydraulic oil associated with the equipment within the scope of the Lubricating Oil Analysis AMP. The acceptance criteria for lubricating and hydraulic oil analysis will be derived from original equipment manufacturer vendor manuals,	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			industry guidance ASTM D 6224-02, and plant-specific operating experience; (d) Monitor water and particle concentration of the lubricating and hydraulic oil and check for unusual trends; (e) Clarify that phase-separated water in any amount is not acceptable for any component within the scope of License Renewal; (f) Conditions where action limits are reached or exceeded are put into the corrective action program to be evaluated and addressed.		
28	Buried and Underground Piping and Tanks (A.2.2.26)	XI.M41	Continue the existing DCPP Buried and Underground Piping and Tanks AMP, including enhancements to: (a) Enhance operating procedures to provide direction to evaluate and close Makeup Water isolation valve MU-0-881 as appropriate in case of a pressure boundary failure further along the flow path or in the event the RWSRs [raw water storage reservoirs] are in use for long-term cooling. (b) Install cathodic protection for remaining portions of the buried auxiliary saltwater system discharge and supply piping in contact with soil. (c) Revise DCPP backfill procedure to include the guidance in LR-ISG-2015-01, Appendix B, Section 2.f, including a maximum size that meets ASTM D 448-08 size number 67 (size number 10 for polymeric materials) for backfill that is located within 6 inches of the component. (d) Incorporate the qualification recommendations in LR-ISG-2015-01, Appendix B, Section 6.a for individuals evaluating coating degradation. (e) Revise the inspection plan to align with the recommendation from LR-ISG-2015-01 Table XI.M41-2 and Section 4.c. (f) Revise the firewater system flow test to align with the annual frequency recommended in LR-ISG-2015-01. (g) Revise DCPP cathodic protection procedure to specify that for steel components, where the acceptance criteria for the effectiveness of the cathodic protection is other than -850 mV instant off, loss of material rates will be	Except for items (e), (j), and (k), enhancements are implemented by 11/02/2024 *(Complete)* Enhancements (e), (j), and (k) are implemented by 01/30/2025 *(Complete)* Initial inspections completed and additional cathodic protection installed by 12/01/2028	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			measured per the recommendations in LR-ISG-2015-01, Appendix B, Section 6.m. (h) Revise DCPP buried piping program procedure and backfill procedure to include the following: Cracks in controlled low strength material backfill that could admit groundwater to the surface of the component are not acceptable. Where significant coating damage due to non-conforming backfill is identified, the extent of condition will be evaluated to ensure the as-left condition of the backfill in the vicinity of the observed damage will not lead to further degradation. (i) Revise the DCPP buried piping program procedure to include the corrective actions recommended by LR-ISG-2015-01, Appendix B, Section 7. (j) Enhance procedure(s) to state the limiting critical potential should not be more negative than -1200 mV. (k) Revise the DCPP buried piping program procedure acceptance criteria to include the following: 1. Blistering, gouges, or wear of nonmetallic piping is evaluated. 2. The measured wall thickness projected to the end of the PEO meets minimum wall thickness requirements. 3. Indications of cracking in metallic pipe are managed in accordance with the CAP. 4. Cementitious piping may exhibit minor cracking and spalling provided there is no evidence of leakage, exposed or rusted staining from rebar reinforcing “hoop” bands.		
29	Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks (A.2.2.27)	XI.M42	Implement the new DCPP Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks AMP. (a) Perform initial coatings/linings inspections and follow-up periodic inspections.	AMP implemented by 11/02/2024. *(Complete)* Initial inspections completed by 12/01/2028.	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
30	ASME Section XI, Subsection IWE (A.2.2.28)	XI.S1	Continue the existing DCPP ASME Section XI, Subsection IWE AMP, including enhancements to: (a) Identify the selection of bolting material, installation torque or tension, and the use of lubricants and sealants is in accordance with the guidelines of EPRI NP-5769, EPRI TR-104213, and the additional recommendations of NUREG-1339 (June 1990), to prevent or mitigate degradation and failure of structural bolting. If the structural bolting consists of ASTM A325, ASTM F1852, and/or ASTM A490 bolts, the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC (Research Council for Structural Connections) publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts," need to be considered. (b) Explicitly prohibit the use of MoS_2 as a lubricant for structural bolts to prevent SCC. (c) Deleted. (d) Identify that non-coated surface examinations include arc strikes as an inspection element. (e) Supplement the requirements of the DCPP ASME Code Section XI, Subsection IWE AMP to require a one-time volumetric examination of metal liner surfaces that are inaccessible from one side, only if triggered by plant-specific OE. The trigger for this supplemental examination is a plant-specific occurrence of measurable metal liner corrosion (base metal material loss exceeding 10 percent of nominal plate thickness) initiated on the inaccessible side or areas. (f) A supplemental one-time inspection will be performed by qualified personnel using methods capable of detecting cracking due to SCC, such as volumetric (UT), surface (MT), or enhanced visual (EVT-1), comprising a representative sample (2 penetrations) of the ten stainless steel penetrations or DMWs [dissimilar metal welds] associated with high-temperature (above 140°F) stainless steel piping systems per unit in frequent use. These inspections are intended to confirm the absence of	11/02/2024 for all items except item (f). *(Complete)* Item (f) will be completed prior to completion of first refueling outage after 11/02/2024 and 08/26/2025 for each unit, respectively.	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			SCC aging effects. If cracking is detected as a result of the supplemental one-time inspections, additional inspections will be conducted in accordance with the site's corrective action process. Periodic inspection of subject penetrations with dissimilar metal welds for cracking will be added to the ASME Section XI, Subsection IWE AMP if necessary, depending on the inspection results.		
31	ASME Section XI, Subsection IWL (A.2.2.29)	XI.S2	Continue the existing DCPP ASME Section XI, Subsection IWL AMP including enhancements to: (a) Evaluate items for which examination results do not meet the acceptance standards in accordance with IWL-3300, "Evaluation," and document the evaluation results in an engineering report. The report is to include an evaluation of whether the concrete containment is acceptable without repair of the item and, if repair is required, the extent, method, and completion date of the repair or replacement. The report shall identify the cause of the condition and the extent, nature, and frequency of additional examinations. (b) Update the acceptance criteria guidance to be consistent with ACI 349.3R-02. (c) Revise implementing procedures to inspect accessible concrete for visual indications of potential ASR [alkali-silica reaction], such as "map" or "patterned" cracking, alkali-silica gel exudations, surface staining, expansion causing structural deformation, relative movement or displacement, or misalignment/distortion of attached components.	Except for item (c), enhancements are implemented by: Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)* Enhancement (c) is implemented by 01/30/2025. *(Complete)*	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)
32	ASME Section XI, Subsection IWF (A.2.2.30)	XI.S3	Continue the existing DCPP ASME Section XI, Subsection IWF AMP, including the following enhancements: (a) Bolting procedures will be enhanced to explicitly prohibit the use of MoS2 as a lubricant for structural bolts to prevent SCC. (b) Bolting practice procedures will be enhanced to identify that the selection of bolting material, installation torque or tension, and the use of lubricants and sealants is in accordance with the guidelines of EPRI NP-5769, EPRI	11/02/2024 *(Complete)*	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			TR-104213, and the additional recommendations of NUREG-1339 (June 1990), to prevent or mitigate degradation and failure of structural bolting. If the structural bolting consists of ASTM A325, ASTM F1852, and/or ASTM A490 bolts, the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC (Research Council for Structural Connections) publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts," need to be considered. (c) Ensure replacement and maintenance activities for high-strength structural bolting specify that the replaced bolting material has an actual measured yield strength less than 150 ksi or 1,034 MPa. (d) Perform monitoring of high-strength structural bolting (actual measured yield strength greater than or equal to 150 ksi or 1,034 MPa and greater than one inch nominal diameter), using volumetric examination comparable to that of ASME Code, Section XI, Table IWB-2500-1, Examination Category B-G-1 to detect cracking in addition to the VT-3 examination. (e) Any adverse results from the examinations of high-strength structural bolting will be entered into the CAP and will be evaluated to determine if additional actions are warranted such as expansion of inspection scope, and frequency of any additional supplemental visual or volumetric examinations. (f) ISI Examination procedures for Class 1, 2, and 3 supports will include the following conditions as unacceptable unless the technical basis for their acceptance is documented: (1) Loss of material due to corrosion or wear, which reduces the load bearing capacity of the component support; (2) Debris, dirt, or excessive wear that could prevent or restrict sliding of the sliding surfaces as intended in the design basis of the support;		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(3) Cracked or sheared bolts, including high-strength bolts, and anchors; and (4) Arc strikes, weld splatter, paint scoring, roughness, or general corrosion on close tolerance machined or sliding surfaces.		
33	10 CFR Part 50, Appendix J (A.2.2.31)	XI.S4	Continue the existing DCPP 10 CFR Part 50, Appendix J AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
34	Masonry Walls (A.2.2.32)	XI.S5	Continue the existing DCPP Masonry Walls AMP, including enhancements to: (a) Include condition monitoring for evidence of shrinkage and/or separation of masonry walls and gaps between the supports and masonry walls that could impact the intended function or potentially invalidate its evaluation basis. (b) Require inspections to be performed at least every five years for masonry walls.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
35	Structures Monitoring (A.2.2.33)	XI.S6	Continue the existing DCPP Structures Monitoring AMP, including enhancements to: (a) Revise procedures to require that whenever an in-scope pull box is going to be opened, the appropriate personnel will be notified to allow them to determine whether an opportunistic inspection of the pull box should be performed. The criteria for determining whether an opportunistic inspection will be performed may include (1) previous inspection results for the subject pull box, or (2) consideration of new industry or DCPP-specific OE for pull boxes. (b) Add embedments, jet impingement shields, racks, structural sealants (including weatherproofing boots), and sliding surfaces to the scope of the DCPP Structures Monitoring AMP. (c) Include preventive actions delineated in NUREG-1339 and in EPRI NP-5769, NP-5067, and TR-104213 to ensure structural bolting integrity. These actions emphasize proper selection of bolting material, lubricants, and installation torque or tension to prevent or minimize loss of bolting preload and cracking of structural	Enhancements (a), (d), (e), (h), (i), and (j) are implemented by: Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)* Enhancements (b), (c), (f), (g), (k), (l), (m), and (t) are implemented by 01/30/2025. *(Complete)* Enhancement (o) walkdowns completed and enhancements (n), (o), (p), and (q) implemented prior to completion of first refueling outage after 11/02/24 and 8/26/25	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118) RAI Set 2 (ML25002A050) RAI Set 3 (ML25056A500)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			bolting. If the structural bolting consists of ASTM A325, ASTM F1852, and/or ASTM A490 bolts, the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC publication “Specifications for Structural Joints Using ASTM A325 or A490 Bolts,” will be used. Molybdenum disulfide will explicitly be prohibited as a lubricant for structural bolts to prevent SCC. (d) Monitor groundwater samples at least every five years for pH, sulfates, and chloride concentrations, including consideration for potential seasonal variations, and assess the impact of changes in its chemistry on below-grade concrete structures. (e) Monitor accessible sliding surfaces for indication of significant loss of material due to wear or corrosion, debris, or dirt. In addition, specify the acceptance criteria for sliding surfaces are no indications of excessive loss of material due to corrosion or wear and no debris or dirt that could restrict or prevent sliding of the surfaces as required by design. (f) Monitor/inspect structural sealants (including weatherproofing boots) for cracking, loss of material, and hardening. (g) Monitor all structures on a frequency not to exceed 5 years such that all structures will be inspected within the five years after 11/02/2024 for Unit 1 and 08/26/2025 for Unit 2. (h) Conduct a baseline inspection of all safety and non-safety-related structure’s concrete elements in accordance with ACI 349.3R-02 acceptance criteria. (i) Align the inspector qualifications with the guidance in ACI 349.3R-02. (j) Specify that structural sealants (including weatherproofing boots) are acceptable if the observed loss of material, cracking, and hardening will not result in loss of sealing. (k) Monitor structural sealants (including weatherproofing boots) on an interval not to exceed 5 years, except for	for Units 1 and 2, respectively. Enhancement (r) will be implemented prior to completion of the second Unit 1 refueling outage in the Unit 1 PEO. Enhancement (s) will be completed six months following completion of the first Unit 2 refueling outage in the Unit 2 PEO.	

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			those associated with the CSTs [condensate storage tanks], RWSTs [refueling water storage tanks], PWSTs [primary water storage tanks], and transfer tank that will be monitored on a refueling outage frequency. (l) Clarify that fiberglass roofing is acceptable if there is no evidence of blistering, cracking, or loss of material that could cause a loss of function prior to the next scheduled inspection. (m) Revise implementing procedures to inspect accessible concrete for visual indications of potential ASR, such as "map" or "patterned" cracking, alkali-silica gel exudations, surface staining, expansion causing structural deformation, relative movement or displacement, or misalignment/distortion of attached components. (n) Perform rodding, snaking or video inspections of all Units 1 and 2 SFP [spent fuel pool] and TC [transfer canal] leak chase tell-tale drains to identify potential blockages prior to PEO. Subsequent periodic tell-tale drain internal inspections will initially be performed in the PEO on a frequency of once per every 5 years. The long-term frequency may be adjusted by evaluating internal and external operating experience. (o) Periodic walkdowns of accessible interior walls and ceilings that are adjacent to the Reactor Cavity, Refueling Canal, SFPs, and TCs will be performed on an interval not to exceed 5 years to identify in-leakage into the structure in accordance with EPRI 3002007348. Any newly identified leaks or changes in existing leak sites will be entered into CAP and evaluated to assure that Reactor Cavity, Refueling Canal, SFP, and TC leakage is being effectively managed. (p) Reactor Cavity, Refueling Canal, SFP, and TC leak chase sampling parameters and acceptance criteria will be enhanced consistent with Table A-1 of EPRI TR-3002007348 as follows with initial frequencies provided. The long-term frequencies may be adjusted by evaluating internal and external operating experience. The following is conducted for the SFP and TC:		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			• Chlorides (conditional if leak rate has increased by 3x previous value and total volume collected >300 ml): <500 ppm • Sulfates (conditional if leak rate has increased by 3x previous value and total volume collected >300 ml): <1,500 ppm • Integrated review (quarterly): compile and trend the integrated data to determine whether leakage conditions have changed. In addition, the following is conducted on a refueling outage frequency for the Reactor Cavity and Refueling Canal except for conditional sampling as noted below: • Flow rate: 0 drips per minute unless identified as a known leaker. No discharge from a tell-tale that had previous leakage may indicate a blockage. New leakage may indicate a change to leakage pathways. Significant changes to the leak rate will be reviewed as part of the overall trend analysis. • pH: >5 • Boron: an additional information tool to monitor for groundwater dilution and to provide context for leakage constituent. Therefore, a specific acceptance criterion for boron concentration is not warranted. • Chlorides (conditional if leak rate has increased by 3x previous value and total volume collected >300 ml): <500 ppm • Sulfates (conditional if leak rate has increased by 3x previous value and total volume collected >300 mL): <1,500 ppm • Integrated review: compile and trend the integrated data to determine whether leakage conditions have changed. • Iron: an additional information tool to monitor for changes in iron corrosion occurring behind the Reactor Cavity and Refueling Canal liner. Therefore,		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			a specific acceptance criterion for iron concentration is not warranted. • Tritium: an additional information tool to monitor for changes in leakage composition. Therefore, a specific acceptance criterion for tritium concentration is not warranted. • Gamma Isotropic: an additional information tool to inform the collected water source analysis. Therefore, a specific acceptance criterion for gamma isotropic concentration is not warranted. (q) Procedure(s) will be developed or revised to manage the Reactor Cavity, Refueling Canal, SFP, and TC surveillance and maintenance activities consistent with Elements 1 and 3 through 6 of EPRI 3002007348. Analysis results of data collected from the Reactor Cavity, Refueling Canal, SFPs, and TCs that do not meet acceptance criteria will be entered into CAP and evaluated, including consideration of revisiting structural evaluations to determine whether any future observed indications of changes in the leakage conditions cause structural margin to become inadequate. (r) During the first Unit 1 refueling outage in the PEO, PG&E will perform a Reactor Cavity and Refueling Canal leak chase internal inspection feasibility determination. Prior to completion of the second Unit 1 refueling outage in the PEO, PG&E will perform an internal inspection of all Unit 1 Reactor Cavity and Refueling Canal leak chases. During the first Unit 2 refueling outage in the PEO, PG&E will perform an internal inspection of all Unit 2 Reactor Cavity and Refueling Canal leak chases. Subsequent periodic tell-tale drain internal inspections will be performed in the PEO on an initial frequency of once per every 3 refueling outages for the Reactor Cavity and Refueling Canal leak chases. The long-term frequency may be adjusted by evaluating internal and external operating experience. (s) Perform a structural evaluation of any identified degradation of concrete and structural steel due to		

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			leakage of borated water from the Rx [Reactor] Cavity and RC [refueling canal] and a conservative projection of the potential degradation of those surfaces for the PEO. (t) Monitor fiberglass roofing panels for blistering, cracking, and loss of material.		
36	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (A.2.2.34)	XI.S7	Continue the existing DCPP RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP, including enhancements to: (a) Revise implementing procedures to include miscellaneous steel (e.g., bar racks) in the scope of the DCPP RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP. (b) Revise implementing procedures to specify: (1) Structural bolting replacement and maintenance activities will include appropriate preload and proper tightening (torque or tension) as recommended in EPRI documents, American Society for Testing of Materials (ASTM) standards, American Institute of Steel Construction (AISC) Specification, and in Section 2 of RCSC (Research Council for Structural Connections) publication "Specifications for Structural Joints Using ASTM A325 or A490 Bolts," as applicable. (2) Molybdenum disulfide will not be used. (c) Revise implementing procedures to monitor structural concrete for movements (e.g., heaving, deflection), conditions at junctions with abutments and embankments, loss of material, and increase in porosity and permeability. (d) Develop the requirements for future discharge conduit inspections, including those to be performed during the PEO, based on the findings from the 1R17/2R17 (2012/2013) inspections. These requirements will address the following: (1) inspection interval (not to exceed 5 years); (2) extent and frequency of marine growth removal; and (3) inspection extent (100 percent vs. sampling).	Except for item (g), enhancements are implemented by: Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)* Enhancement (g) is implemented by 01/30/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			(e) Revise implementing procedures to align the inspector qualifications with the guidance in ACI 349.3R-02. (f) Perform LR baseline inspections of all concrete water-control structures in accordance with ACI 349.3R-02 acceptance criteria. (g) Revise implementing procedures to inspect accessible concrete for visual indications of potential ASR, such as “map” or “patterned” cracking, alkali-silica gel exudations, surface staining, expansion causing structural deformation, relative movement or displacement, or misalignment/distortion of attached components.		
37	Protective Coating Monitoring and Maintenance (A.2.2.35)	XI.S8	Continue the existing DCPP Protective Coatings Monitoring and Maintenance AMP, including enhancement to: (a) Specify that a pre-inspection review of the previous two monitoring reports be performed.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
38	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (A.2.2.36)	XI.E1	Implement the new DCPP Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP. (a) Implement a solution to prevent or divert oil from the cables affected by oil residue.	AMP is implemented by Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)* A solution to prevent or divert oil from the cables affected by oil residue will be implemented prior to 12/31/2025.	LRA, Appendix A, Table A (ML25069A508) RAI Set 2 (ML25002A050)
39	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (A.2.2.37)	XI.E2	Continue the existing DCPP Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits AMP, including enhancements to: (a) Procedures/work orders will be developed or revised to include the cables and connections used in nuclear instrumentation channels (source range, intermediate range, and power range). (b) Procedures/work orders for cable testing will be developed to specify the parameters that require monitoring for indications of age-related degradation for	Unit 1: 11/02/2024 Unit 2: 8/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			nuclear instrumentation channels (source range, intermediate range, and power range). (c) Procedures associated with calibration/surveillance tests of radiation monitors will be developed or revised to implement the review of results obtained during calibration or surveillance tests that fail to meet acceptance criteria, to determine whether the associated circuits continue to perform their intended function in light of any aging effects on cables and connectors insulation. Review of the calibration/surveillance test results will be completed prior to November 2, 2024, and August 26, 2025, for Units 1 and 2, respectively, and at least every 10 years thereafter. Calibration/ surveillance results that do not meet acceptance criteria are reviewed for aging effects when the results will be available. (d) Procedures/work orders will be developed to implement cable system testing for the nuclear instrumentation monitors (SRM/IRM/PRM) using a proven test for detecting deterioration of the insulation system, such as insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable system insulation condition. Cable system testing will be performed at least once every 10 years, with the first tests completed prior to November 2, 2024, and August 26, 2025, for Units 1 and 2, respectively. Procedure/work orders will specify the parameters that require monitoring for indications of age-related degradation and acceptance criteria for the cable tests. (e) Procedures/work orders will be developed to implement testing of nuclear instrumentation channels (source range, intermediate range, and power range) cables to specify the test acceptance criteria.		
40	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification	XI.E3	Continue the DCPP Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP including enhancements to: (a) Enhance procedure/work orders to implement aging effects management of the inaccessible and	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete, except for enhancement (f) for Unit 2 first tests)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
	Requirements (A.2.2.38)		underground in-scope power cables (greater than or equal to 400 volts). (b) Enhance maintenance plans for periodic inspection of pull boxes with potential for water intrusion that contain in-scope power cables (greater than or equal to 400 volts) to determine if water has accumulated at least once a year, except for intake structure pull boxes that are inspected every refueling outage. If cables are submerged (i.e., cable exposed to significant moisture), corrective actions are taken to keep the cable dry, assess cable degradation, and to determine the cause of pull box water accumulation. (c) Perform baseline inspection of pull boxes, which will include inspections for excessive drooping or sagging of cables, and visible indications of damage or degradation of cables and cable supports. (d) Enhance maintenance plans for intake structure pull boxes to revise the inspection frequency to every refueling outage, include inspection of accessible conduit ends for water collection, and include inspection of cables and cable support structures for visible signs of degradation. Enhance maintenance plans to initiate an Engineering evaluation to assess cable degradation and to determine the cause of water accumulation, when cables are found submerged. (e) Enhance maintenance plans to perform testing of pull box sump and sump alarm features at least once annually prior to the rainy season, with the first tests completed prior to November 2, 2024, and August 26, 2025, for Units 1 and 2, respectively. (f) Create procedure/work orders to implement testing of power cables (greater than or equal to 400 volts) to provide an indication of the condition of cable insulation, using a proven test for detecting deterioration of the insulation system due to wetting or submergence. The condition of cable insulation will be assessed with reasonable confidence using one or more of the following techniques: dielectric loss (dissipation factor or power		LRA Supplement 1 (ML24289A118)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
			factor), AC voltage withstand, partial discharge, step voltage, time domain reflectometry, insulation resistance and polarization index, line resonance analysis, or other testing that is state-of the-art at the time the tests are performed. Testing will be performed at least once every six years with the first test completed prior to November 2, 2024, and August 26, 2025, for Units 1 and 2, respectively. Test results that are trendable will be used to provide additional information on the rate of cable insulation degradation. More frequent testing may occur based on test results and operating experience. (g) Create procedure/work orders to define acceptance criteria for pull box inspections and cable testing. The acceptance criteria for each test will be defined by the specific type of test performed and the specific cable tested.		
41	Metal Enclosed Bus (A.2.2.39)	XI.E4	Continue the existing DCPP Metal Enclosed Bus AMP, including an enhancement to: (a) Create procedure(s) to formalize the existing inspection and testing of the MEBs and include specific inspection scope, inspection methods, inspection frequencies, and actions to be taken when acceptance criteria are not met.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
42	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (A.2.2.40)	XI.E6	Implement the new DCPP Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
43	Periodic Inspections for Selective Leaching (A.2.2.41)	N/A; Plant-Specific	Implement the new DCPP Periodic Inspections for Selective Leaching AMP.	AMP is implemented by: Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)* Complete initial inspections prior to 03/31/2026.	LRA, Appendix A, Table A (ML25069A508) LRA Supplement 1 (ML24289A118)
44	Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators (A.2.2.42)	N/A; Plant-Specific	Continue the existing DCPP Transmission Conductor and Connections, Switchyard Bus and Connections, and High-Voltage Insulators AMP including enhancements to: (a) Identify transmission and substation components required to support station blackout recovery which are in the scope of license renewal aging management. In the 230 kV switchyard, these are the components between the startup transformers and disconnects 217 and 219. In the 500 kV switchyard these are the components between the main transformers and switchyard breakers 532/632 (associated with Unit 1) and 542/642 (associated with Unit 2). (b) Include gathering and reviewing completed maintenance and inspection results, by the plant staff, to identify adverse trends. (c) Require that an engineering evaluation will be conducted when a degraded condition is detected that considers the extent of the condition, reportability of the event, potential causes, probably of recurrence, and the corrective actions required.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)
45	Quality Assurance (A.1.3)	Appendix A	Continue the existing QA Program, including enhancement, to include nonsafety-related SSCs [systems, structures, and components] that are subject to AMR for LR.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

No.	Aging Management Program or Activity (Section)	NUREG-1801 Section	Commitment	Implementation Schedule	Source (ADAMS Accession No.)
46	Operating Experience (A.1.4)	N/A	Continue the existing Operating Experience Program, including enhancement to: (a) Require the review of internal and external OE for aging-related degradation or impacts to aging management activities, to determine if improvements to aging management activities are warranted. NRC and industry guidance documents and standards applicable to aging management are considered part of this information. (b) Provide procedural guidance for identifying and reviewing OE including descriptions of aging-related degradation. In general, the descriptions will be used to identify aging that is in excess of what would be expected, relative to design, previous inspection experience and the inspection intervals. (c) Establish coding for use in identification, trending, and communication of age-related degradation. (d) Establish guidelines for reporting plant-specific OE on age-related degradation and aging management to the industry. (e) Provide training, on a periodic basis, to those responsible for AMP implementation and those responsible for reviewing, evaluating, and communicating OE items related to age-related degradation and aging management.	Unit 1: 11/02/2024 Unit 2: 08/26/2025 *(Complete)*	LRA, Appendix A, Table A (ML25069A508)

APPENDIX B

CHRONOLOGY

B. Chronology

This appendix to the safety evaluation (SE) of the license renewal application (LRA) for the Diablo Canyon Nuclear Power Plant (DCPP), Units 1 and 2 lists chronologically the routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff and Pacific Gas and Electric Company (PG&E, the applicant). This appendix also lists other correspondence related to the staff's safety review of the DCPP LRA. 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, at 301-415-4737, or by e-mail to PDR.Resource@nrc.gov.

Table B-1 Chronology

Date	ADAMS Accession No.	Subject
November 7, 2023	ML23311A154	Letter from PG&E to NRC Submitting DCPP, Units 1 and 2, License Renewal Application
November 14, 2023	ML23293A105	Letter from Smith, B., NRC, to PG&E, Receipt and Availability of the License Renewal Application for the Diablo Canyon Nuclear Power Plant, Units 1 and 2
November 15, 2023	ML23293A106	Federal Register Notice, Notice of Receipt and Availability of Application for Renewal of Diablo Canyon Nuclear Power Plant, Units 1 and 2
December 14, 2023	ML23341A003	Federal Register Notice, Notice of Acceptance for Docketing and Opportunity to Request a Hearing and to Petition for Leave to Intervene Regarding the Application for Renewal of Diablo Canyon Nuclear Power Plant, Units 1 and 2
December 19, 2023	ML23341A004	Letter from Harris, B., NRC, to PG&E, Diablo Canyon Nuclear Power Plant, Units 1 and 2, Determination of Acceptability and Sufficiency for Docketing and Notice of Opportunity to Request a Hearing Regarding Pacific Gas & Electric Company's Application for License Renewal
January 17, 2024	ML24017A322	Letter from PG&E to NRC, Schedule Considerations for Review of the DCPP License Renewal Application
January 26, 2024	ML24018A015	Letter from Harris, B., NRC, to PG&E, License Renewal Application Review Schedule Letter for the Diablo Canyon Nuclear Power Plant, Units 1 and 2
January 29, 2024	ML24002B180	Letter from Harris, B., NRC, to PG&E, Diablo Canyon Nuclear Power Plant, Units 1 and 2, Aging Management Audit Plan Regarding the License Renewal Application Review
September 6, 2024	ML24250A053	Letter from Harris, B., NRC, to PG&E, Request for Additional Information by the Office of Nuclear Reactor Regulation Related to the Safety Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application

Date	ADAMS Accession No.	Subject
October 3, 2024	ML24277A067	Letter from Zawalick, M. R., PG&E, to NRC, Response to Request for Additional Information by the Office of Nuclear Reactor Regulation Related to the Safety Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application
October 14, 2024	ML24289A118	Letter from Zawalick M. R., PG&E, to NRC, Supplement and Annual Update of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application
October 23, 2024	ML24281A149	Letter from Harris, B., NRC, to PG&E, Breakout Audit Questions Related to the Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application
November 14, 2024	ML24311A123	Letter from Harris, B., NRC, to PG&E, Audit Report Related to the Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application
December 4, 2024	ML24339B881	Letter from Harris, B., NRC, to PG&E, Request for Additional Information by the Office of Nuclear Reactor Regulation Related to the Safety Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application, Set 2
January 2, 2025	ML25002A050	Letter from Zawalick, M. R., PG&E, to NRC, Response to Request for Additional Information by the Office of Nuclear Reactor Regulation Related to the Safety Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application, Set 2
January 28, 2025	ML25028A011	Letter from Harris, B., NRC, to PG&E, Request for Additional Information by the Office of Nuclear Reactor Regulation Related to the Safety Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application, Set 3
February 25, 2025	ML25056A500	Letter from Zawalick, M. R., PG&E, to NRC, Response to Request for Additional Information by the Office of Nuclear Reactor Regulation Related to the Safety Review of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application, Set 3
March 6, 2025	ML25069A508	Letter from Zawalick, M. R., PG&E, to NRC, Supplement and Annual Update of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application
April 24, 2025	ML25114A242	Letter from Zawalick, M. R., PG&E, to NRC, Supplement of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application
May 13, 2025	ML25133A223	Letter from Zawalick, M. R., PG&E, to NRC, Supplement of the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application

APPENDIX C

PRINCIPAL CONTRIBUTORS

C. Principal Contributors

This appendix lists the principal contributors to the development of this safety evaluation and their areas of responsibility.

Table C-1 Principal Contributors

Name	Area of Responsibility
Allik, Brian	Reviewer—Mechanical and Materials
Alvarado, Lydiana	Reviewer—Mechanical and Materials
Amani, Noushin	Reviewer—Mechanical and Materials
Bhatt, Santosh	Reviewer—Mechanical and Materials
Bloom, Steven	Management Oversight
Boruk, Reena	Reviewer—Mechanical and Materials
Buford, Angela	Management Oversight
Chu, Yi-Lun	Reviewer—Mechanical and Materials
Cintron-Riviera	Reviewer—Electrical
Collins, Jau	Reviewer—Mechanical and Materials
Correll, Brian	Reviewer—Electrical
Dijamco, David	Reviewer—Mechanical and Materials
Donohoe, Justin	Reviewer—Mechanical and Materials
Fairbanks, Carolyn	Reviewer—Mechanical and Materials
Foli, Adakou	Reviewer—Electrical
Fu, Bart	Reviewer—Mechanical and Materials
Gardner, Tony	Reviewer—Mechanical and Materials
Gavula, James	Reviewer—Mechanical and Materials
Gibson, Lauren	Management Oversight
Harris, Brian	Project Manager
Haywood, Emma	Reviewer—Mechanical and Materials
Hoang, Dan	Reviewer—Structural
Iqbal, Naeem	Reviewer—Scoping and Screening Methodology
Jenkins, Joel	Reviewer—Mechanical and Materials
Johnson, Andy	Reviewer—Mechanical and Materials
Jung, Se-Kwon	Reviewer—Structural
Kalikian, Varoujan	Reviewer—Mechanical and Materials
Klein, Paul	Reviewer—Mechanical and Materials
Lai, Shaohua	Reviewer—Structural
Lee, Brian	Reviewer—Scoping and Screening Methodology
Lee, Samuel	Management Oversight
Levitus, Steven	Reviewer—Mechanical and Materials
Makar, Gregory	Reviewer—Mechanical and Materials
McConnell, Matthew	Reviewer—Electrical
Min, Sueng	Reviewer—Mechanical and Materials
Mitchell, Matthew	Management Oversight
Morton, Wendell	Management Oversight
Moyer, Carol	Reviewer—Mechanical and Materials
Nold, David	Reviewer—Scoping and Screening Methodology
Paige, Jason	Management Oversight

Name	Area of Responsibility
Palmer, Eric	Reviewer—Mechanical and Materials
Parker, Cory	Reviewer—Mechanical and Materials
Ramadan, Liliana	Reviewer—Electrical
Ray, Devendra	Reviewer—Mechanical and Materials
Rezai, Ali	Reviewer—Mechanical and Materials
Rogers, Bill	Reviewer—Scoping and Screening Methodology
Ross, Miranda	Reviewer—Mechanical and Materials
Sahd, Phillip	Management Oversight
Sampson, Michele	Management Oversight
Sida, Karen	Reviewer—Mechanical and Materials
Terry, Leslie	Reviewer—Mechanical and Materials
Thomas, George	Reviewer—Structural
Tsao, John	Reviewer—Mechanical and Materials
Tseng, Ian	Management Oversight
Tyree, Christopher	Reviewer—Scoping and Screening Methodology
Valentine, Milton	Management Oversight
Wagage, Hanry	Reviewer—Scoping and Screening Methodology
Wang, George	Reviewer—Structural
Wise, John	Senior Technical Advisor
Yee, On	Reviewer—Mechanical and Materials
Yoder, Matthew	Reviewer—Mechanical and Materials

APPENDIX D

REFERENCES

D. References

Table D-1, below, lists the references used throughout this safety evaluation (SE) by the staff of the U.S. Nuclear Regulatory Commission (NRC) for the review of the license renewal application (LRA) for Diablo Canyon Nuclear Power Plant (DCPP) Units 1 and 2.

Table D-1 References

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