

CALLAWAY PLANT UNIT 1
LICENSE RENEWAL APPLICATION

REQUEST FOR ADDITIONAL INFORMATION (RAI) SET #18 RESPONSE

RAI B1.4-1a

Background:

In its September 6, 2012, response to request for additional information (RAI) B1.4-1, the applicant described the programmatic activities that will be used to evaluate plant-specific and industry operating experience related to aging and the applicant discussed how these activities align with the guidance in License Renewal Interim Staff Guidance (LR-ISG), LR-ISG-2011-05, "Ongoing Review of Operating Experience," Appendix A, Itemized Change No. 7.

Issue:

It is not clear from the applicant's response whether the programmatic activities for the ongoing review of operating experience will be fully consistent with the areas of further review described in LR-ISG-2011-05, Appendix A, Itemized Change No. 7. In addition, the response does not contain sufficient information to facilitate the staff's review of the applicant's operating experience review activities on a case-specific basis. The areas in question follow.

- a) The response states that the sources of industry operating experience will be based on the document categories defined in the Institute of Nuclear Power Operations' "Guidelines for Use of Operating Experience" document. This document lists the typical sources of industry operating experience; however, constraining the source to this list could preclude the capture and evaluation of other U.S. Nuclear Regulatory Commission (NRC or the staff) and industry guidance documents and standards applicable to aging-related degradation and aging management.
- b) The response states that codes will be established within the corrective action program (CAP) to assist in the identification and trending of aging-related degradation; however, the response does not describe how adverse trends will be identified and evaluated.
- c) The response states that evaluations of operating experience related to aging will consider aging management programs (AMPs) associated with the operating experience; however, it is not clear whether activities, criteria, and evaluations integral to the elements of the AMPs will also be considered. As an example, the operating experience may not directly identify a particular AMP, but it may concern an inspection method used in several AMPs.
- d) The response, under item 5, states that certain information will be considered in the evaluation of operating experience related to aging; however, the response is not clear as to whether the assessment of this information will be recorded in the operating experience evaluation.
- e) The response states that the results of the AMP activities will be documented. However, the response does not indicate whether these results, both satisfactory and unsatisfactory, also will be reviewed to determine whether the frequency of future inspections should be adjusted, whether new inspections should be established, and whether the inspection scope should be adjusted or expanded in order to manage the effects of aging.
- f) The response states that the Operating Experience Program Coordinators and Aging Management Coordinator will have key responsibilities in the processing of aging-related

operating experience. The response also states that the individuals in these positions will receive training on aging concepts; however, it is not clear whether this training will be required on a periodic basis or whether there are provisions to account for personnel turnover so that individuals new to these positions also receive training on aging concepts.

- g) The response describes training for and responsibilities of the Aging Management Coordinator with respect to the review and communication of operating experience and states that these responsibilities apply “throughout the period of extended operation.” Elsewhere, the response states that operating experience will be reviewed for impacts to the aging management activities and personnel training will be enhanced “upon receipt of the renewed operating license.” Given these two implementation timeframes, it is unclear when the Aging Management Coordinator’s responsibilities for processing aging-related operating experience will begin.

Request:

Describe consistency between the proposed operating experience review activities and the guidance in LR-ISG-2011-05, Appendix A, Itemized Change No. 7, by responding to the following items.

- a) Clarify whether procedures will direct personnel to submit a guidance document or standard into the Operating Experience Program for evaluation when the guidance document or standard is applicable to aging-related degradation or aging management.
- b) Indicate whether entries in the CAP associated with the aging-related degradation trend codes will be periodically reviewed to identify adverse trends. Also indicate whether any such adverse trends will be entered into the CAP for evaluation.
- c) Indicate whether evaluations of operating experience related to aging will include consideration of activities, criteria, and evaluations integral to the elements of the plant AMPs.
- d) Indicate whether the assessment of the following information will be recorded in the evaluations of aging-related operating experience: (i) systems, structures, and components, (ii) materials, (iii) environments, (iv) aging effects, (v) aging mechanisms, (vi) AMPs, and (vii) the activities, criteria, and evaluations integral to the elements of the AMPs.
- e) Clarify whether satisfactory and unsatisfactory AMP results will be reviewed to determine if it is necessary to adjust the frequency of future inspections, establish new inspections, and adjust or expand the inspection scope to ensure that the effects of aging will be adequately managed.
- f) Clarify whether the Operating Experience Program Coordinators and Aging Management Coordinator will receive training on aging concepts on a periodic basis and indicate whether the training on aging concepts is required of personnel new to these roles.

- g) Clarify whether the Aging Management Coordinator's responsibilities for processing aging-related operating experience will begin on receipt of the renewed operating license.

Describe and justify any areas of inconsistency with LR-ISG-2011-05 or otherwise demonstrate how operating experience will be reviewed to ensure that the effects of aging will be adequately managed.

Based on the response to this RAI, if any enhancements to the existing activities for the ongoing review of operating experience are necessary, provide the schedule for implementing these enhancements. Also provide a justification if implementation is later than the date when the renewed operating license is scheduled to be issued, if approved.

Callaway Response

To assure consistent documentation of Callaway's Operating Experience Program, the following response to RAI B1.4-1a makes reference to the original response to part (a) of RAI B1.4-1. Changes to the original response are shown in line-in/line-out format following this RAI response.

- (a) The response to RAI B1.4-1 a)2) has been updated to clarify that procedures direct personnel to evaluate operating experience derived from a guidance document or standard other than those listed in the original response for applicability to Callaway.
- (b) The response to RAI B1.4-1 a)4) has been updated to clarify how entries in the Corrective Action Program (CAP) associated with the aging-related degradation trend codes are periodically reviewed to identify trends. The revised response also describes that adverse trends that are identified must be entered into CAP for further evaluation.
- (c) The response to RAI B1.4-1 a)5) has been updated to describe how the evaluation of operating experience related to aging includes consideration of activities, criteria, and evaluations integral to the elements of the plant Aging Management Programs.
- (d) The response to RAI B1.4-1 a)5) has been updated to describe how the evaluation of operating experience related to aging and determined to be applicable to Callaway includes a record of the consideration of activities, criteria, and evaluations integral to the elements of the plant Aging Management Programs.
- (e) The response to RAI B1.4-1 a)6) has been updated to describe the periodic review of satisfactory and unsatisfactory AMP results and how these factors are considered relative to program effectiveness.
- (f) The response to RAI B1.4-1 a)7) has been updated to describe how the Operating Experience Program Coordinators, Aging Management Coordinator, subject matter experts and program owners receive periodic training on aging concepts.
- (g) The response to RAI B1.4-1 a)7) has been clarified to state that the Aging Management Coordinator's responsibilities begin prior to or upon receipt of the renewed operating license.

There are no areas of inconsistency with LR-ISG-2011-05.

All enhancements to the existing activities for the ongoing review of operating experience will be completed upon receipt of the renewed operating license. LRA Appendix B1.4 and LRA Table A4-1 item 2 have been revised as shown in Enclosure 2 to indicate completed enhancements and enhancements requiring completion upon receipt of the renewed operating license.

Revised Response to RAI B1.4-1

- a) Callaway has an established, mature plant Operating Experience Program that has its roots in the Institute of Nuclear Power Operations (INPO) Significant Event Evaluation and Information Network (SEE-IN) Program that was implemented to address Item I.C.5 of NUREG-0737 and was endorsed by the NRC in Generic Letter 82-04. This program, which has undergone numerous improvements over the years, has provided an effective process for Callaway to learn from and make improvements to address operating experience, including aging-related degradation. The Callaway Corrective Action Program (CAP) is used with the Operating Experience Program to evaluate and address degraded conditions including plant specific (internal) and industry (external) operating experience. Moving forward, these programs will provide assurance that the license renewal aging management programs (AMPs) are and will continue to be effective in managing the aging effects for which they are credited, and the AMPs will be enhanced or new AMPs will be developed when the review of operating experience indicates that the AMPs may not be fully effective.

As part of the Aging Management Review (AMR) portion of the License Renewal Application (LRA) preparation process, the Callaway LR team performed extensive reviews of internal operating experience to determine the breadth of aging effects potentially impacting SSCs in the scope of license renewal at Callaway. These reviews did not identify any aging effects that had not been accounted for in previous industry LRAs. In addition, the Callaway LRA was prepared in accordance with Revision 2 of the GALL report (NUREG-1801), which has incorporated industry-wide operating experience into the guidance for establishing effective AMPs. These factors provide confidence that lessons learned from many years of aging-related operating experience have already been captured, such that the AMPs specified in Callaway's LRA to manage aging during the period of extended operation (PEO) are designed to address reasonably expected aging effects.

In addition, to ensure that the programmatic activities for the ongoing review of operating experience are adequate for license renewal, the following recommendations of LR-ISG-2011-05 for the SRP-LR new Appendix A.4, "Operating Experience for Aging Management Programs," are addressed.

1. Consideration of operating experience in the 10 CFR Part 50 Appendix B program

Although the existing Operating Experience and Corrective Action Programs already consider and address operating experience related to aging, the programs ~~will be~~ **are being** enhanced to provide specific direction to identify, evaluate and communicate operating experience related to aging. This will ensure that consideration of such aging-related operating experience is not precluded. In addition as noted in LRA Section B1.3, the elements of corrective actions, confirmation process, and administrative controls of the Callaway Plant Quality Assurance (QA) program will be enhanced to include nonsafety-related structures and components within the scope of license renewal.

2. Sources of Operating Experience

Additional documents, largely already included in the scope of the Callaway Operating Experience review process, ~~will be~~ are based on those document categories defined in the INPO "Guidelines for Use of Operating Experience" document, which defines "Sources of Operating Experience." Included are a broad set of sources beyond specific internal and external plant operating experience items. These ~~primarily~~ include INPO Event Report (IER) operating experience documents, NRC Bulletins, Generic Letters, Information Notices and Regulatory Issue Summaries, as well as Topical Reports and vendor correspondence (including 10 CFR Part 21 information). ~~Recognizing that industry operating experience may be derived from many sources, Callaway's Corrective Action Program procedure requires that "the identification of industry operating experience applicable to Callaway," be documented in the Corrective Action Program for further evaluation. For example, guidance documents or standards that are referenced in the primary sources of operating experience may themselves be relevant sources of operating experience that are applicable to aging-related degradation or aging management at Callaway.~~ Callaway is also adding License Renewal Interim Staff Guidance (LR-ISG) documents to the scope of documents reviewed under its Operating Experience Program because they are issued on an ongoing basis, capturing new insights or addressing issues that emerge from license renewal reviews. Periodic (e.g., every five years) updates to NUREG-1801 (the GALL) will not be explicitly reviewed under the Program since these updates, as they relate to operating experience, will lag real-time plant operating experience and LR-ISGs. Should the NRC determine that it is valuable for plants with renewed licenses to review the periodic updates to NUREG-1801, an accompanying Regulatory Issue Summary (RIS) or other generic communication for the periodic update to NUREG-1801 would be reviewed in accordance with the Operating Experience Program.

3. Consideration of incoming plant-specific and industry operating experience

Internal Operating Experience

Internal operating experience evaluations involving degraded conditions, including those related to aging, are performed in accordance with the existing Callaway Corrective Action Program and procedures. The scope of what is considered and recorded relative to aging depends upon the nature of the degradation identified, whether the inspection was driven by aging management program activities that contain specific inspection criteria and other factors. Evaluations of internal operating experience involving a degraded condition are documented in the Corrective Action Program making them auditable, searchable, and retrievable.

External Operating Experience

Evaluation of external operating experience, including that related to aging management, is performed in accordance with the Callaway Operating Experience Program. Among other things, the issue or event is evaluated to determine its applicability to Callaway, whether similar conditions or deficiencies have occurred and whether Callaway is vulnerable to a similar issue. If the evaluation identifies an adverse condition, the issue is entered into the Corrective Action Program and addressed as appropriate. Although external aging-related issues have been captured and evaluated in the past, the Operating Experience Program procedures ~~will be~~ have been enhanced to clearly state that aging related issues within the scope of operating experience be considered. Documentation associated with the initial evaluation of external operating experience is

retained in accordance with the Operating Experience Program. As noted above, documentation entered into the Corrective Action Program is auditable and retrievable.

4. Identification of operating experience related to aging

Assignment of identification codes ~~will be~~ **has been** established within the Corrective Action Program to assist in the identification and trending of aging-related degradation, such that in addition to addressing the specific issue, the adequacy of existing aging management programs can be assessed **and trended**, and adjustments can be made. Callaway is working with industry and INPO to determine coding that can be used for identification and sharing of industry level operating experience related to age-related degradation and aging management. The precise definition of this coding is not known at this time, since these activities are currently in progress; **however, existing identification codes presently allow for assessing and trending. Trending of Corrective Action documents is performed semi-annually or more frequently using identification codes and other available data. This trending is performed at both the site level and at a department level.** In addition, existing procedures for engineering programs require performance trending. **Callaway's Corrective Action Program procedure requires that "a trend in performance, frequency of occurrence, which indicates performance adverse to the expected OR established standard," be documented in the Corrective Action Program for further evaluation.**

Upon implementation, Callaway personnel are also required to periodically assess the performance of the **new** aging management programs, including insights obtained through operating experience. This could lead to AMP revisions or the establishment of new AMPs, as appropriate.

5. Information considered in operating experience evaluations

Industry Operating Experience is screened to determine applicability to Callaway. If the operating experience is determined to be applicable, it is assigned to a Subject Matter Expert (SME) for further evaluation. Evaluation of operating experience that relates to aging management will consider **and document**, as appropriate:

- Systems, structures or components that are similar or identical to those involved with the identified operating experience issue, to gain relevant lessons learned.
- Materials of construction, operating environment and aging effects associated with the identified aging issue so that lessons learned can be applied to susceptible SSCs within the scope of license renewal.
- Aging mechanisms associated with the operating experience to confirm that Callaway has appropriate AMPs in place to manage aging that could be caused by these mechanisms.
- AMPs associated with this operating experience so that if the AMPs have been demonstrated to be ineffective, similar AMPs in place at Callaway can be evaluated to determine if AMP changes are appropriate, or if a new AMP is needed. **Included in this review is consideration of activities, criteria and evaluations integral to the elements of the plant AMPs.**

Industry Operating Experience that is determined to be applicable to Callaway is documented in the Corrective Action Program for further evaluation, and a documented response to the four considerations above. The evaluation also considers extent of condition and applicability to other systems, structures and components, as directed by the corrective action procedures. **Industry Operating Experience that is screened using**

~~this criteria and is determined not to be applicable to Callaway is logged and may be distributed to program owners for information purposes. If the operating experience issue reveals site-specific vulnerabilities, the Callaway process directs that the vulnerability be documented in the Corrective Action Program where the issue is then further evaluated for appropriate action.~~

6. Consideration of AMP implementation results as operating experience

The results of AMP inspections, tests, analyses, etc. are documented and captured within Callaway work management system records, whether or not they meet the applicable acceptance criteria. If the results do not meet the acceptance criteria, the results are documented in the Corrective Action Program for further review and action, such as correcting the specific condition and evaluating the adequacy of existing AMPs. If the results of the AMP activity are satisfactory, the results are documented and captured so they are available for trending and future reference. An evaluation as to whether AMPs should be modified or new AMPs created would be conducted within the Corrective Action Program if a deficient condition related to aging is identified and determined to be applicable to SSCs in the scope of license renewal for Callaway. This would occur directly as part of the evaluation activities that stem from the Corrective Action Program once a degraded condition is identified (e.g., acceptance criterion associated with an aging management activity is exceeded).

~~Callaway's procedural instructions for implementing and managing Engineering Programs require monitoring and trending of program performance in operating cycles and in outages. Cycle performance monitoring consists of both cycle failure trending and monitoring of examination and testing results, both satisfactory and unsatisfactory. This ensures that aspects of the program such as inspection frequency, scope, and the need for new inspections are reviewed for effectiveness. Additionally, Callaway procedures require periodic management oversight and challenge of periodic engineering program performance and effectiveness based on available data from trending and monitoring, self assessments and benchmarking, status of industry initiatives, and applicable operating experience.~~

7. Training

Callaway has an established Operating Experience Program with individuals that are assigned and trained in the functions of screening, assigning, evaluating and submitting plant-specific (internal) or industry (external) operating experience. The Callaway Operating Experience Program Coordinators are the central input for all operating experience for Callaway. The Callaway Operating Experience Program Coordinators, ~~among other things, are responsible for processing internal operating experience and outgoing operating experience notifications to the industry.~~ rely primarily upon Subject Matter Experts such as Regulatory Affairs, System, Program and Component Engineers to assist with screening of external operating experience, and to review, evaluate and document operating experience.

~~Not all Program Coordinators are engineers; however, the individuals supporting the Program Coordinators are trained and qualified for their roles in accordance with Callaway training procedures, and generally are considered to be part of the Engineering Support Personnel (ESP) training population as described in Callaway training procedures. Upon assignment to a position within the ESP population, or assignment of an ESP qualification, individuals participate in initial training which includes training on~~

operating experience and aging concepts. Continuing training is presented to all individuals in the engineering training population on an as-needed basis, nominally three sessions per year with exceptions for refuel outage years when two sessions are normally scheduled. Continuing training has included and will continue to include specific training modules on the identification of aging mechanisms, as determined through use of a graded application of the Systematic Approach to Training (SAT) process. The SAT process ensures that quality continuing training is presented that provides the correct solution for performance improvement (based on plant needs) and identifies the desired outcome, using an appropriate delivery method and an appropriate method to determine that students mastered the learning objective(s). Continuing training also includes review of operating experience and aging concepts in specific system and program modules. System and/or program refresher training is conducted at a minimum frequency of once per training session.

Recognizing the increased emphasis on aging management with license renewal, Callaway ~~will has~~ enhanced the existing Operating Experience Program procedures. ~~and the~~ The Operating Experience Program Coordinator training will be updated to ensure that both internal and external aging-related operating experience is properly reviewed and disseminated for evaluation.

Callaway will assign responsibilities of an Aging Management Coordinator (AMC) ~~as part of license renewal implementation prior to or upon receipt of the renewed operating license. Throughout the period of extended operation,~~ The individual(s) with these responsibilities will oversee the effective implementation of activities related to license renewal. Among the responsibilities of the AMC will be the review of internal and external operating experience for lessons learned applicable to Callaway as well as aging-related OE that should be shared external to Callaway. These responsibilities will be captured in a Callaway Aging Management Program implementation procedure. The Callaway AMC ~~will be within the ESP population and will attend all applicable initial and continuing training associated with training of engineering personnel.~~ The AMC also will be trained in the concepts of license renewal for proficiency in screening and evaluating aging-related OE.

The Callaway AMP owners for existing and new AMPs are selected based upon having appropriate educational background, work experience or duties. The AMP owners are involved with development, review and approval of the aging management programs credited for aging management in the Callaway License Renewal Application, and are therefore familiar with the aging management approach for their AMPs. Currently, the AMP owners have received classroom training that includes information on component aging. Training enhancements ~~are will be~~ made to periodically include ~~relevant operating experience, including that related to aging concepts information related to aging management.~~ Documentation showing that these individuals have been trained is retrievable.

Callaway provides appropriate training for those personnel performing key license renewal roles, including AMP owners, to provide greater assurance that they are effectively fulfilling their license renewal related duties. With regard to personnel turnover, personnel assigned to these roles are evaluated for inclusion in the Engineering Support Personnel (ESP) population and receive ~~initial, continuing, and position-specific~~ training as required by that accredited program. Furthermore, existing procedural guidance for 'Transitioning of Engineering Programs and/or Personnel' is

used to ensure that turnovers are effective, comprehensive, and that the new assignee understands their responsibilities. Associated records ~~will be~~ **are** retained, making them auditable and retrievable.

8. Reporting operating experience to industry

Callaway Operating Experience Program procedures ~~will be~~ **have been** enhanced to include direction and criteria for reporting Callaway plant-specific operating experience on aging-related degradation to the industry. ~~It is expected that t~~The criteria ~~will~~ **includes**:

- Observation of aging-related degradation significantly beyond what was expected, based upon an existing AMP inspection frequency, methodology, etc.
- Aging effects or mechanisms not previously seen or accounted for in Callaway AMPs
- Significant changes required or being made to AMPs that may be of interest to the industry

9. Implementation schedule

~~Implementation of~~ The above enhancements will be implemented at Callaway no later than the issue date of the renewed operating license.

Corresponding Amendment Changes

Refer to the Enclosure 2 Summary Table "Amendment 18, LRA Changes from RAI Responses," for a description of LRA changes with this response.

Amendment 18, LRA Changes for LRA Annual Update

Enclosure 2 Summary Table

<u>Affected LRA Section</u>	<u>LRA Page</u>
Section 2.1.5	2.1-21 through 23
Table 3.0-1	3.0-13
Table 3.1.2-2	3.1-87, 88, 89, 93, 94, 96, and 97
Table 3.2-1	3.2-19 and 3.2-20
Table 3.2-1	3.2-29
Table 3.2.2-1	3.2-34 through 3.2-37
Table 3.2.2-5	3.2-55, 56, 60, 61, 62, 63, 65, and 66
Table 3.2.2-5	3.2-59
Table 3.2.2-6	3.2-68, 69, 70, 72, 74, 75, 77, 79, and 80
Section 3.3.2.1.10	3.3-13 through 3.3-15
Table 3.3-1	3.3-47 and 3.3-81
Table 3.3-1	3.3-73 through 3.3-75
Table 3.3.2-1	3.3-82 through 3.3-85
Table 3.3.2-2	3.3-86 through 3.3-91
Table 3.3.2-4	3.3-94, 95, 96, and 98
Table 3.3.2-5	3.3-100
Table 3.3.2-7	3.3-111 and 3.3-112
Table 3.3.2-9	3.3-118 through 3.3-121
Table 3.3.2-10	3.3-122, 124 through 133, 135, 139, 140, 143, 146 and 147
Table 3.3.2-11	3.3-158
Table 3.3.2-14	3.3-180
Table 3.3.2-20	3.3-204, 207, and 214
Table 3.3.2-21	3.3-217 through 3.3-221
Table 3.3.2-22	3.3-226
Table 3.3.2-24	3.3-246, 248, 250 through 254
Table 3.3.2-28	3.3-272, 276 and 281 through 283
Table 3.4-1	3.4-26 and 3.4-27
Table 3.4.2-5	3.4-54
Table A4-1, item 2	A-36
Section B1.4	B-3, 4, and 5
Section B2.1.25	B-87 through B-91

Summary of Changes Related to the LRA Annual Update

Plant modification and FSAR revision to change the material of the diesel generator intercooler from copper alloy to stainless steel.

Affected LRA Sections

Table 3.3.2-22 Auxiliary Systems - Summary of Aging Management Evaluation – Standby Diesel Generator Engine System

Plant modification and FSAR revision to remove carbon steel drain valves to eliminate a potential pathway for air to bypass safety related filter/adsorber units in the control building and the fuel building.

Affected LRA Sections

Table 3.3.2-11 Auxiliary Systems - Summary of Aging Management Evaluation – Control Building HVAC System

Table 3.3.2-14 Auxiliary Systems - Summary of Aging Management Evaluation – Fuel Building HVAC System

Plant modification to install stainless steel component cooling water valves with an intended function of pressure boundary

Affected LRA Sections

Table 3.3.2-7 Auxiliary Systems - Summary of Aging Management Evaluation – Component Cooling Water System

Implementation of LR-ISG-2011-01, Aging Management of Stainless Steel Structures and Components in Treated Borated Water

Affected LRA Sections

Section 2.1.5 Interim Staff Guidance

Table 3.0-1 Mechanical Environments

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System

Table 3.2-1 Summary of Aging Management Programs in Chapter V of NUREG-1801 for Engineered Safety Features

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation – Containment Spray

Table 3.2.2-5 Engineered Safety Features – Summary of Aging Management Evaluation – High Pressure Coolant Injection

Table 3.2.2-6 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Section 3.3.2.1.10 Chemical and Volume Control System

Table 3.3-1 Summary of Aging Management Programs in Chapter VII of NUREG-1801 for Auxiliary Systems

Table 3.3.2-1 Auxiliary Systems - Summary of Aging Management Evaluation – Fuel Storage and Handling System

- Table 3.3.2-2 Auxiliary Systems - Summary of Aging Management Evaluation – Fuel Pool Cooling and Cleanup System
- Table 3.3.2-9 Auxiliary Systems - Summary of Aging Management Evaluation – Nuclear sampling System
- Table 3.3.2-10 Auxiliary Systems - Summary of Aging Management Evaluation – Chemical and Volume Control System
- Table 3.3.2-24 Auxiliary Systems - Summary of Aging Management Evaluation – Liquid Radwaste System
- Table 3.3.2-28 Auxiliary Systems - Summary of Aging Management Evaluation – Miscellaneous Systems in Scope ONLY for Criterion 10 CFR 54.4(a)(a)

Implementation of LR-ISG-2011-03. Aging Management Program for Buried and Underground Piping and Tanks

Affected LRA Sections

- Section 2.1.5 Interim Staff Guidance
- Table 3.2-1 Summary of Aging Management Programs in Chapter V of NUREG-1801 for Engineered Safety Features
- Table 3.2.2-5 Engineered Safety Features – Summary of Aging Management Evaluation – High Pressure Coolant Injection
- Table 3.3-1 Summary of Aging Management Programs in Chapter VII of NUREG-1801 for Auxiliary Systems
- Table 3.3.2-4 Auxiliary Systems - Summary of Aging Management Evaluation – Essential Service Water
- Table 3.3.2-5 Auxiliary Systems - Summary of Aging Management Evaluation – Service Water System
- Table 3.3.2-20 Auxiliary Systems - Summary of Aging Management Evaluation – Fire Protection System
- Table 3.3.2-21 Auxiliary Systems - Summary of Aging Management Evaluation – Emergency Diesel Engine Fuel Oil Storage and Transfer System
- Table 3.4-1 Summary of Aging Management Programs in Chapter VIII of NUREG-1801 for Steam and Power Conversion System
- Table 3.4.2-5 Steam and Power Conversion Systems - Summary of Aging Management Evaluation – Auxiliary Feedwater
- Appendix B2.1.25 Buried and Underground Piping and Tanks

Implementation of LR-ISG-2011-05, Ongoing Review of Operating Experience

Affected LRA Sections

- Section 2.1.5 Interim Staff Guidance
- Table A4-1 item 2 Operating Experience Commitment
- Appendix B1.4 Operating Experience

Callaway Plant
 License Renewal Application
 Amendment 18

Updated LR-ISGs for current status.

Section 2.1.5 (pages 2.1-21 through 2.1-23) is revised as follows (deleted text shown in strikethrough, and new text shown underlined):

2.1.5 Interim Staff Guidance

As lessons are learned during license renewal application reviews, the NRC staff has developed guidance documents to capture new insights or address emerging issues. To document these lessons learned, the staff has developed an interim staff guidance (ISG) process that provides guidance to future license renewal applicants until the emerging issues can be incorporated into the next revision of the license renewal guidance documents. Many of the previous issues have been closed and incorporated into license renewal guidance documents. [Table 2.1-2, NRC Interim Staff Guidance Associated with License Renewal](#) provides the current status of ISGs topics from the NRC website.

Table 2.1-2 NRC Interim Staff Guidance Associated with License Renewal

Issue Number	Purpose	Discussion Status
LR-ISG-2006-03	Staff Guidance for Preparing Severe Accident Mitigation Alternatives (SAMA) Analyses	The staff has issued LR-ISG-2006-03.
LR-ISG-2011-01	Aging Management of Stainless Steel Structures and Components in Treated Borated Water	This ISG has been issued in draft for public comment. The staff has issued LR-ISG-2011-01
LR-ISG-2011-02	Aging Management Program for Steam Generators	The staff has issued LR-ISG-2011-02.
<u>LR-ISG-2011-03</u>	<u>Aging Management Program for Buried and Underground Piping and Tanks</u>	<u>The staff has issued LR-ISG-2011-03</u>
<u>LR-ISG-2011-04</u>	<u>Updated Aging Management Criteria for Reactor Vessel Internal Components of Pressurized Water Reactors</u>	<u>This ISG has been issued in draft for public comment.</u>
LR-ISG-2011-05	Ongoing Review of Operating Experience	This ISG has been issued in draft for public comment. The staff has issued LR-ISG-2011-05
<u>LR-ISG-2012-01</u>	<u>Wall Thinning Due to Erosion Mechanisms</u>	<u>This ISG has been issued in draft for public comment.</u>

The following sections provide a summary discussion of each of the current NRC Interim Staff Guidance positions.

2.1.5.1 (LR-ISG-2006-03) Staff Guidance for Preparing Severe Accident Mitigation Alternatives (SAMA) Analyses

This LR-ISG was issued as final and is applicable to Callaway. The Callaway severe accident mitigation alternatives analysis, provided as a part of [Appendix E](#) of this application, is consistent with the guidance of NEI 05-01, *Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document*, Revision A as discussed in this LR-ISG.

2.1.5.2 (LR-ISG-2011-01) Aging Management of Stainless Steel Structures and Components in Treated Borated Water

This LR-ISG was issued ~~in draft~~ as final and is applicable to Callaway. The One-Time Inspection program ([B2.1.18](#)) is used to verify the effectiveness of the Water Chemistry program ([B2.1.2](#)) to manage stainless steel structures and components in a treated water environment. Results are provided in [Chapter 3, Aging Management Review](#).

2.1.5.3 (LR-ISG-2011-02) Aging Management Program for Steam Generators

This LR-ISG was issued as final and is applicable to Callaway. The aging management program for the steam generators is discussed in [Section B2.1.9, Steam Generators](#).

2.1.5.4 (LR-ISG-2011-03) Aging Management Program for Buried and Underground Piping and Tanks

This LR-ISG was issued as final and is applicable to Callaway. The aging management program for the buried and underground piping and tanks is discussed in [Section B2.1.25, Buried and Underground Piping and Tanks](#).

2.1.5.5 (LR-ISG-2011-04) Updated Aging Management Criteria for Reactor Vessel Internal Components of Pressurized Water Reactors

This LR-ISG was issued in draft and is applicable to Callaway. The aging management program for the reactor vessel internal components is discussed in [Section B2.1.6, PWR Vessel Internals](#). Results are provided in [Chapter 3, Aging Management Review](#).

2.1.5.6 (LR-ISG-2011-05) Ongoing Review of Operating Experience

This LR-ISG was issued ~~in draft~~ as final ~~for public comment~~ and is applicable to Callaway. Ongoing review of operating experience is discussed in [Section B1.4, Operating Experience](#).

2.1.5.7 (LR-ISG-2012-01) Wall Thinning Due to Erosion Mechanisms

This LR-ISG was issued in draft for public comment and is applicable to Callaway.

Callaway Plant
 License Renewal Application
 Amendment 18

Revise Table 3.0-1 to add new environment of Treated Borated Water (Primary, oxygen levels controlled) in accordance with LR-ISG-2011-01.

Table 3.0-1 (page 3.0-13), is revised as follows (new text is underlined):

Table 3.0-1 Mechanical Environments (Continued)

Mechanical Environments		
Evaluated Environment	NUREG-1801 Environment	Description
<u>Treated Borated Water (Primary, oxygen levels controlled)</u>	<u>Treated Borated Water (Primary, oxygen levels controlled)</u>	<u>Treated water with boric acid in non-reactor coolant pressure boundary systems that is monitored for quality under the Water Chemistry program, but which does not require augmenting with the One-Time Inspection program.</u>

Callaway Plant
 License Renewal Application
 Amendment 18

Revise Table 3.1.2-2 to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01.

Table 3.1.2.-2 (pages 3.1-87, 88, 89, 93, 94, 96, and 97), is revised as follows (deleted text shown with strikethrough and new text is underlined).

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A
Heat Exchanger (RCP Thermal Barrier Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 C
<u>Heat Exchanger (RCP Thermal Barrier Cooler)</u>	<u>HT, PB</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Ext)</u>	<u>Reduction of heat transfer</u>	<u>Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)</u>	<u>V.D1.E-20</u>	<u>3.2.1.019</u>	<u>A</u>
Heat Exchanger (RCP Thermal Barrier Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 C
Instrument Bellows	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Instrument Bellows	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A
Rupture Disc	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A
Rupture Disc	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A
Tank	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	E, 2 A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	E, 2 A

Notes for Table 3.1.2-2:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG 1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.

Plant Specific Notes:

- 1 Water Chemistry (B2.1.2) and ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) are used to manage this aging effect for cast austenitic stainless steel (CASS) components.
- ~~2 The One-Time Inspection program (B2.1.18) is used to verify the effectiveness of the Water Chemistry program (B2.1.2) to manage these aging effects.~~

Callaway Plant
 License Renewal Application
 Amendment 18

Revised Table 3.2-1 to incorporate changes from LR-ISG-2011-01.

Table 3.2-1 (pages 3.2-19 and 3.2-20), is revised as follows (deleted text shown with strikethrough and new text is underlined).

Table 3.2-1 Summary of Aging Management Programs in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.020	Stainless steel Piping, piping components, and piping elements; tanks exposed to Treated water (borated) >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2), <u>and One-Time Inspection (B2.1.18)</u>	No	<u>Consistent with NUREG-1801. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program. Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18) are credited.</u>
3.2.1.022	Stainless steel Piping, piping components, and piping elements; tanks exposed to Treated water (borated)	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2), <u>and One-Time Inspection (B2.1.18)</u>	No	<u>Consistent with NUREG-1801. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program. Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18) are credited.</u>

Callaway Plant
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Table 3.2-1 with LR-ISG-2011-03. Nickel alloy was added as an applicable material. All reference to exceptions to B2.1.25 removed from discussion column.

Table 3.2-1 (page 3.2-29) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.2-1 Summary of Aging Management Programs in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.053	Stainless steel, <u>Nickel Alloy</u> Piping, piping components, and piping elements exposed to Soil or Concrete	Loss of material due to pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)
3.2.1.053a	Steel; stainless steel, <u>Nickel Alloy</u> Underground piping, piping components, and piping elements exposed to air-indoor uncontrolled or condensation (external)	Loss of material due to general (steel only), pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Not applicable. Callaway has no in-scope steel, or stainless steel or nickel alloy underground piping, piping components, or piping elements exposed to air-indoor uncontrolled or condensation (external) in the emergency core cooling system, so the applicable NUREG-1801 line was not used. The accessibility for the inspections of the piping components contained within the pipe tunnel is not restricted.

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01.

Table 3.2.2-1 (pages 3.2-34 through 3.2-37), is revised as follows (deleted text shown with strikethrough and new text is underlined).

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation - Containment Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Closure Bolting	<u>LBS, PB, SIA</u>	Stainless Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.8)	VII.I.AP-125	3.3.1.012	A
Eductor	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.EP-41	3.2.1.022	AE, 1
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.EP-41	3.2.1.022	AE, 1
Flow Orifice	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.EP-41	3.2.1.022	AE, 1
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.EP-41	3.2.1.022	AE, 1
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.EP-41	3.2.1.022	AE, 1
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.EP-41	3.2.1.022	AE, 1

Notes for Table 3.2.2-1:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG 1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- ~~E Consistent with NUREG 1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG 1801 identifies a plant specific aging management program.~~

Plant Specific Note:

~~None¹ The One Time Inspection program (B2.1.18) is used to verify the effectiveness of the Water Chemistry program (B2.1.2) to manage these aging effects.~~

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01.

Table 3.2.2-5 (pages 3.2-55, 56, 60, 61, 62, 63, 65, and 66), is revised as follows (deleted text shown with strikethrough and new text is underlined).

Table 3.2.2-5 *Engineered Safety Features – Summary of Aging Management Evaluation – High Pressure Coolant Injection System*

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flow Element	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1
Flow Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1
Strainer	FIL, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1
Tank	PB	Carbon Steel with Stainless Steel Cladding	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1

Table 3.2.2-5 Engineered Safety Features – Summary of Aging Management Evaluation – High Pressure Coolant Injection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Tank	PB	Stainless Steel	Atmosphere/ Weather (Ext)	Cracking	Aboveground Metallic Tanks (B2.1.15)	V.D1.EP-103	3.2.1.007	E, 12
Tank	PB	Stainless Steel	Atmosphere/ Weather (Ext)	Loss of material	Aboveground Metallic Tanks (B2.1.15)	V.D1.EP-107	3.2.1.004	E, 12
Tank	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.A.E-12	3.2.1.020	A E, +
Tank	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	A E, +
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	A E, +
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	A E, +

Notes for Table 3.2.2-5:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.

Plant Specific Notes:

~~1~~ The One-Time Inspection program (B2.1.18) is used to verify the effectiveness of the Water Chemistry program (B2.1.2) to manage these aging effects.

12 The bottom of this tank rests on a concrete foundation. Therefore, the Aboveground Metallic Tanks program (B2.1.15) is credited.

Callaway
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Aging Management Tables with LR-ISG-2011-03. Standard notes revised due to removal of exceptions from Aging Management Program B2.1.25, *Buried and Underground Piping and Tanks*.

Table 3.2.2-5 (page 3.2-59) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.2.2-5 *Engineered Safety Features – Summary of Aging Management Evaluation – High Pressure Coolant Injection System*

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	PB	Stainless Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (<u>B2.1.25</u>)	V.D1.EP-72	<u>3.2.1.053</u>	B <u>A</u>

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01.

Table 3.2.2-6, (pages 3.2-68, 69, 70, 72, 74, 75, 77, 79, and 80), is revised as follows (deleted text shown with strikethrough and new text is underlined).

Table 3.2.2-6 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flexible Hoses	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	<u>3.2.1.020</u>	AE, 1
Flexible Hoses	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	<u>3.2.1.022</u>	AE, 1
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	<u>3.2.1.020</u>	AE, 1
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	<u>3.2.1.022</u>	AE, 1
Flow Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	<u>3.2.1.020</u>	AE, 1

Table 3.2.2-6 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flow Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , 4
Heat Exchanger (Residual Heat Removal)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	None	None	H, 23
Heat Exchanger (Residual Heat Removal)	PB	Stainless Steel	Treated Borated Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	None	None	H, 23
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , 4
<u>Heat Exchanger (Residual Heat Removal)</u>	<u>HT, PB</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Int)</u>	<u>Reduction of heat transfer</u>	<u>Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)</u>	<u>V.D1.E-20</u>	<u>3.2.1.019</u>	<u>A</u>
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , 4
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , 4

Table 3.2.2-6 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Reduction of heat transfer	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-20	3.2.1.019	A
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , +
Insulation	INS	Insulation Calcium Silicate	Plant Indoor Air (Ext)	None	None	None	None	J, 12
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , +
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , +
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , +
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , +

Table 3.2.2-6 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , +
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , +
Strainer	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , +
Strainer	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , +
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , +
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE , +
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.E-12	3.2.1.020	AE , +

Table 3.2.2-6 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	V.D1.EP-41	3.2.1.022	AE, 1

Notes for Table 3.2.2-6:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- ~~E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.~~
- H Aging effect not in NUREG-1801 for this component, material and environment combination.
- J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

- ~~1 The One-Time Inspection program (B2.1.18) is used to verify the effectiveness of the Water Chemistry program (B2.1.2) to manage these aging effects.~~
- 12 Based on plant operating experience, there are no aging effects requiring management for calcium silicate insulation in a metal jacket in a plant indoor air environment. The insulation does not experience aging effects unless exposed to temperatures, radiation, or chemicals capable of attacking the specific chemical composition of the insulation. The insulation is contained in metal jacket with a vapor barrier to prevent moisture intrusion and is in a non-aggressive air environment that does not experience significant aging effects.
- 23 These TLAAAs are applicable to the Class 2 Heat Exchangers. Section 4.3.8 describes the evaluation of these TLAAAs.

Callaway Plant
License Renewal Application
Amendment 18

Include treated borated water (Primary, oxygen levels controlled) to list of environments due to incorporation of LR-ISG-2011-01.

Section 3.3.2.1.10 (page 3.3-13 through 3.3-15) is revised as follows (new text is shown underlined):

3.3.2.1.10 Chemical and Volume Control System

Materials

The materials of construction for the chemical and volume control system component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper Alloy
- Copper Alloy (> 15% Zinc)
- Insulation Calcium Silicate
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The chemical and volume control system component types are exposed to the following environments:

- Borated Water Leakage
- Closed-Cycle Cooling Water
- Condensation
- Demineralized Water
- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Raw Water
- Reactor Coolant
- Secondary Water
- Steam

- Treated Borated Water
- Treated Borated Water (Primary, oxygen levels controlled)
- Waste Water

Aging Effects Requiring Management

The following chemical and volume control system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the chemical and volume control system component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.8)
- Boric Acid Corrosion (B2.1.4)
- Closed Treated Water Systems (B2.1.11)
- External Surfaces Monitoring of Mechanical Components (B2.1.21)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.23)
- Lubricating Oil Analysis (B2.1.24)
- One-Time Inspection (B2.1.18)
- One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B2.1.20)
- Selective Leaching (B2.1.19)
- Water Chemistry (B2.1.2)

Callaway
 License Renewal Application
 Amendment 18

Revised Table 3.3-1 to incorporate changes from LR-ISG-2011-01.

Table 3.3-1 (pages 3.3-47 and 3.3-81), is revised as follows (deleted text shown with strikethrough and new text is underlined).

Table 3.3-1 Summary of Aging Management Programs in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.028	Stainless steel, Steel (with stainless steel or nickel alloy cladding) Spent fuel storage racks (BWR), Spent fuel storage racks (PWR); Piping, piping components, and piping elements, Piping, piping components, and piping elements; tanks exposed to Treated water >60°C (>140°F) , Treated borated water (Primary, oxygen levels controlled) >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18) is credited.

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.029	Steel (with stainless steel cladding); stainless steel Piping, piping components, and piping elements exposed to Treated borated water (Primary oxygen levels controlled)	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18) is credited.
<u>3.3.1.124</u>	<u>Stainless steel, Steel (with stainless steel or nickel-alloy cladding) Spent fuel storage racks (BWR), Spent fuel storage racks (PWR), Piping, piping components, and piping elements; exposed to Treated water >60°C (>140°F), Treated borated water >60°C (>140°F)</u>	<u>Cracking due to stress corrosion cracking</u>	<u>Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)</u>	<u>No</u>	<u>Consistent with NUREG-1801.</u>

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.125	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, Treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	No	Consistent with NUREG-1801.

Callaway Plant
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Table 3.3-1 with LR-ISG-2011-03. Added nickel alloy to items 107, 108 and 109a. Deleted discussion of exceptions from applicable items.

Table 3.3-1 (page 3.3-73 through 3.3-75) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3-1 Summary of Aging Management Programs in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.104	HDPE, Fiberglass Piping, piping components, and piping elements exposed to Soil or concrete	Cracking, blistering, change in color due to water absorption	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)
3.3.1.106	Steel (with coating or wrapping) Piping, piping components, and piping elements exposed to Soil or concrete	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)

Table 3.3-1 Summary of Aging Management Programs in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.107	Stainless steel, nickel alloy Piping, piping components, and piping elements exposed to Soil or concrete	Loss of material due to pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)
3.3.1.108	Titanium, Super austenitic, Aluminum, Copper Alloy, Stainless Steel, nickel alloy Piping, piping components, and piping elements, Bolting exposed to Soil or concrete	Loss of material due to pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Not applicable. Callaway has no in-scope piping, piping components or piping elements constructed of titanium, super austenitic stainless steel, aluminum, or copper alloy, or nickel alloy exposed to soil or concrete in the auxiliary systems. Nor does Callaway have any in-scope stainless steel bolting exposed to soil or concrete in the auxiliary systems. Therefore the applicable NUREG-1801 lines were not used.

Table 3.3-1 Summary of Aging Management Programs in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.109	Steel Bolting exposed to Soil or concrete	Loss of material due to general, pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)
3.3.1.109a	Underground Aluminum, Copper Alloy, Stainless Steel, nickel alloy and Steel Piping, piping components, and piping elements	Loss of material due to general (steel only), pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01.

Table 3.3.2-1 (pages 3.3-82 through 3.3-85) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Storage and Handling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.12)	III.B4.TP-261	3.5.1.088	E, 4 <u>3</u>
Bolting (Structural)	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.12)	III.B4.TP-248	<u>3.5.1.080</u>	E, 3 <u>2</u>
Bolting (Structural)	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.12)	III.B4.TP-261	<u>3.5.1.088</u>	E, 4 <u>3</u>
Crane	SS	Carbon Steel	Plant Indoor Air (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	None	None	H, 54
<u>Crane</u>	<u>SS</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Ext)</u>	<u>Cracking</u>	<u>Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)</u>	<u>VII.A2.A-97</u>	<u>3.3.1.124</u>	<u>C</u>

Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Storage and Handling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Crane	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A2.AP-79 <u>VII.A2.A-99</u>	3.3.1.029 <u>3.3.1.125</u>	E, 1 C
<u>Fuel Handling Equip</u>	<u>SS</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Ext)</u>	<u>Cracking</u>	<u>Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)</u>	<u>VII.A2.A-97</u>	<u>3.3.1.124</u>	<u>C</u>
Fuel Handling Equip	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A2.AP-79 <u>VII.A2.A-99</u>	3.3.1.029 <u>3.3.1.125</u>	E, 1 C
Fuel Storage Racks	SS	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A2.A-97	3.3.1.028 <u>3.3.1.124</u>	E, 1 A
Fuel Storage Racks	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A2.AP-79 <u>VII.A2.A-99</u>	3.3.1.029 <u>3.3.1.125</u>	E, 1 A
Fuel Storage Racks	SS	Stainless Steel	Treated Borated Water (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VII.E1.A-57	<u>3.3.1.002</u>	C, 2 <u>1</u>

Notes for Table 3.3.2-1:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
- H Aging Effect not in NUREG-1801 for this component, material and environment combination.

Plant Specific Notes:

- ~~1~~ ~~The One-Time Inspection program (B2.1.18) verifies the effectiveness of the Water Chemistry program (B2.1.2) in managing the aging of stainless steel components exposed to treated borated water.~~
- ~~2~~ 1 Fatigue design of the spent fuel pool liner and racks for seismic events is a TLAA as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1). [Section 4.3.6](#) describes the evaluation of these TLAAs for the fatigue design of the spent fuel pool liner and racks.
- ~~3~~ 2 NUREG 1801 requires aging management for loss of material for structural bolting components associated with the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems ([B2.1.12](#)). Note E is used here to ensure the proper aging management program is employed for the managing of this aging effect for carbon steel structural bolting.
- ~~4~~ 3 NUREG 1801 requires aging management for loss of preload for structural bolting components associated with the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems ([B2.1.12](#)). Note E is used here to ensure the proper aging management program is employed for the managing of this aging effect for carbon steel structural bolting.
- ~~5~~ 4 This TLAA is applicable to the stainless steel refueling machine. [Section 4.7.1](#) describes the evaluation of this TLAA.

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01.

Table 3.3.2-2 (pages 3.3-86 through 3.3-91) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Pool Cooling and Cleanup System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Expansion Joint	ES	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 1 <u>A</u>
Expansion Joint	ES	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.A3.A-56</u>	3.3.1.028 <u>3.3.1.124</u>	E, 1 <u>A</u>
Expansion Joint	ES	Stainless Steel	Plant Indoor Air (Int)	None	None	V.F.EP-82	<u>3.2.1.063</u>	<u>A, 2</u> 1
Flow Element	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 1 <u>A</u>
Flow Element	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.A3.A-56</u>	3.3.1.028 <u>3.3.1.124</u>	E, 1 <u>A</u>
Fuel Transfer Tube	PB	Stainless Steel	Plant Indoor Air (Int)	None	None	VII.J.AP-17	<u>3.3.1.120</u>	<u>A, 2</u> 1
Fuel Transfer Tube	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 1 <u>A</u>
Fuel Transfer Tube	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.A3.A-56</u>	3.3.1.028 <u>3.3.1.124</u>	E, 1 <u>A</u>

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Pool Cooling and Cleanup System(Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger (Fuel Pool Cooling)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + C
Heat Exchanger (Fuel Pool Cooling)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + C
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A
Pump	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A
Pump	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A
Strainer	SIA	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A
Strainer	SIA	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A
Strainer	PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Strainer	PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A
Thermowell	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A
Thermowell	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.A3.AP-79	3.3.1.029 3.3.1.125	E, + A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.A3.A-56	3.3.1.028 3.3.1.124	E, + A

Notes for Table 3.3.2-2:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- ~~E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.~~

Plant Specific Notes:

- ~~1~~ — The One-Time Inspection program (B2.1.18) is used to verify the effectiveness of the Water Chemistry program (B2.1.2) to manage these aging effects.
- 2 1 This evaluation is applicable to the component surfaces between the fuel transfer tube and the sleeve that encloses the fuel transfer tube. The sleeve that encloses the fuel transfer tube is evaluated as a generic structural component.

Callaway Plant
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 Amendment 18

Changes made to reconcile LRA Aging Management Tables with LR-ISG-2011-03. Standard notes revised due to removal of exceptions from Aging Management Program B2.1.25, *Buried and Underground Piping and Tanks*.

Table 3.3.2-4 (pages 3.3-94, 95, 96 and 98) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.C1.AP-198	3.3.1.106	B A
Piping	PB	HDPE	Buried (Ext)	Cracking, blistering, change in color	Buried and Underground Piping and Tanks (B2.1.25)	VII.C1.AP-175	3.3.1.104	B A
Piping	PB	Stainless Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.C1.AP-137	3.3.1.107	B A
Piping	PB	Stainless Steel	Underground (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.I.AP-284	3.3.1.109a	B A
Valve	PB	Stainless Steel	Underground (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.I.AP-284	3.3.1.109a	B A

Callaway Plant
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 Amendment 18

Changes made to reconcile LRA Aging Management Tables with LR-ISG-2011-03. Standard notes revised due to removal of exceptions from Aging Management Program B2.1.25, *Buried and Underground Piping and Tanks*.

Table 3.3.2-5 (page 3.3-100) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-5 Auxiliary Systems – Summary of Aging Management Evaluation – Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	PB, SIA	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.C1.AP-198	3.3.1.106	B A

Callaway Plant
 License Renewal Application
 Amendment 18

Stainless steel valves with an intended function of pressure boundary were added by a plant modification. No new Plant Notes are added.

Table 3.3.2-7, Component Cooling Water System, (Pages 3.3-111 and 3.3-112) is revised as follows (new text underlined):

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	<u>PB</u> , LBS, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed Treated Water Systems (<u>B2.1.11</u>)	VII.C2.A-52	<u>3.3.1.049</u>	A
Valve	<u>PB</u> , LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J.AP-17	<u>3.3.1.120</u>	A

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01. Table 3.3.2-9 (pages 3.3-118 through 3.3-121) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Nuclear Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, + A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, + A
Pump	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, + A
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, + A
Tank	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, + A
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, + A

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Nuclear Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A

Notes for Table 3.3.2-9:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- ~~E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.~~

Plant Specific Notes:

~~None1 The One-Time Inspection program (B2.1.18) is used to verify the effectiveness of the Water Chemistry program (B2.1.2) to manage these aging effects.~~

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01. Table 3.3.2-10 (pages 3.3-122, 124 through 133, 135, 139, 140, 143, 146, and 147) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Bellows	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 2 <u>A</u>
Bellows	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, 2 <u>A</u>
<u>Demineralizer</u>	<u>LBS, SIA</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Primary, oxygen levels controlled) (Int)</u>	<u>Loss of material</u>	<u>Water Chemistry (B2.1.2)</u>	<u>VII.E1.A-88</u>	<u>3.3.1.029</u>	<u>A</u>
<u>Demineralizer</u>	<u>LBS, SIA</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Primary, oxygen levels controlled) (Int)</u>	<u>Cracking</u>	<u>Water Chemistry (B2.1.2)</u>	<u>VII.E1.AP-82</u>	<u>3.3.1.028</u>	<u>A</u>
Demineralizer	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 2 <u>A</u>

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Demineralizer	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, 2 A
Filter	FIL, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 A
Filter	FIL, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, 2 A
<u>Flow Element</u>	<u>LBS, PB</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Primary, oxygen levels controlled) (Int)</u>	<u>Loss of material</u>	<u>Water Chemistry (B2.1.2)</u>	<u>VII.E1.A-88</u>	<u>3.3.1.029</u>	<u>A</u>
<u>Flow Element</u>	<u>LBS, PB</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Primary, oxygen levels controlled) (Int)</u>	<u>Cracking</u>	<u>Water Chemistry (B2.1.2)</u>	<u>VII.E1.AP-82</u>	<u>3.3.1.028</u>	<u>A</u>
Flow Element	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 A
Flow Element	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, 2 A

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flow Orifice	PB, TH	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2)	VII.E1.A-88	3.3.1.029	A
Flow Orifice	PB, TH	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Cracking	Water Chemistry (B2.1.2)	VII.E1.AP-82	3.3.1.028	A
Flow Orifice	LBS, PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 A
Flow Orifice	LBS, PB, TH	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, 2 A
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
Heat Exchanger (CVCS BTRS Letdown Reheat - Shell)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger (CVCS BTRS Letdown Reheat - Tube)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
Heat Exchanger (CVCS BTRS Letdown Reheat - Tube)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79 VII.E1.A-88	3.3.1.029	E, 2 A
Heat Exchanger (CVCS BTRS Letdown Reheat - Tube)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-118 VII.E1.AP-82	3.3.1.020 3.3.1.028	A
Heat Exchanger (CVCS BTRS Moderating)	LBS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
Heat Exchanger (CVCS BTRS Moderating)	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79 VII.E1.A-88	3.3.1.029	E, 2 A

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-118 VII.E1.AP-82	3.3.1.020 3.3.1.028	A
Heat Exchanger (CVCS Letdown)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79 VII.E1.A-88	3.3.1.029	E, 2 A
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
<u>Heat Exchanger (CVCS Regenerative)</u>	<u>PB</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Primary, oxygen levels controlled) (Ext)</u>	<u>Loss of material</u>	<u>Water Chemistry (B2.1.2)</u>	<u>VII.E1.A-88</u>	<u>3.3.1.029</u>	<u>A</u>

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Ext)	Cracking	Water Chemistry (B2.1.2)	VII.E1.AP-82	3.3.1.028	A
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2)	VII.E1.A-88	3.3.1.029	A
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Cracking	Water Chemistry (B2.1.2)	VII.E1.AP-82	3.3.1.028	A
Heat Exchanger (CVCS Seal Water Return)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 C
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2)	VII.E1.A-88	3.3.1.029	A

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	<u>LBS, PB, SIA</u>	<u>Stainless Steel</u>	<u>Treated Borated Water (Primary, oxygen levels controlled) (Int)</u>	<u>Cracking</u>	<u>Water Chemistry (B2.1.2)</u>	<u>VII.E1.AP-82</u>	<u>3.3.1.028</u>	<u>A</u>
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 2 <u>A</u>
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, 2 <u>A</u>
Pump	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 2 <u>A</u>
Tank	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 2 <u>A</u>
Tank	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, 2 <u>A</u>
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 2 <u>A</u>
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, 2 <u>A</u>

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2)	VII.E1.A-88	3.3.1.029	A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Cracking	Water Chemistry (B2.1.2)	VII.E1.AP-82	3.3.1.028	A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-118 VII.E1.A-103	3.3.1.020 3.3.1.124	C A
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Loss of material	Water Chemistry (B2.1.2)	VII.E1.A-88	3.3.1.029	A
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Primary, oxygen levels controlled) (Int)	Cracking	Water Chemistry (B2.1.2)	VII.E1.AP-82	3.3.1.028	A
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 2 A

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
 (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-118 VII.E1.A-103	3.3.1.020 3.3.1.124	G A

Callaway Plant
 License Renewal Application
 Amendment 18

Carbon steel valves with an environment of ventilation atmosphere (int) and an intended function of pressure boundary were removed by a plant modification to eliminate a potential pathway for air to bypass safety related filter/adsorber units. No new Plant Notes are added.

Table 3.3.2-11, Control Building HVAC System, (Page 3.3-158) is revised as follows (deleted text shown in strikethrough):

Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Control Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	LBS, PB , SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B2.1.21)	VII.I.A-77	3.3.1.078	A
Valve	PB , SIA	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.23)	VII.F1.A-08	3.3.1.090	D

Callaway Plant
 License Renewal Application
 Amendment 18

Carbon steel valves with an environment of ventilation atmosphere (int) and an intended function of pressure boundary were removed by a plant modification to eliminate a potential pathway for air to bypass safety related filter/adsorber units. No new Plant Notes are added.

Table 3.3.2-14, Fuel Building HVAC System, (Page 3.3-180) is revised as follows (deleted text shown in strikethrough):

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Valve	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B2.1.21)	VII.I.A-77	3.3.1.078	A
Valve	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.23)	VII.E5.AP-280	3.3.1.095	B

Callaway Plant
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Aging Management Tables with LR-ISG-2011-03. Standard notes revised due to removal of exceptions from Aging Management Program B2.1.25, *Buried and Underground Piping and Tanks*.

Table 3.3.2-20 (pages 3.3-204, 3.3-207, and 3.3-214) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Closure Bolting	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (<u>B2.1.25</u>)	VII.I.AP-241	<u>3.3.1.109</u>	B <u>A</u>
Piping	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (<u>B2.1.25</u>)	VII.G.AP-198	<u>3.3.1.106</u>	B <u>A</u>
Valve	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (<u>B2.1.25</u>)	VII.G.AP-198	<u>3.3.1.106</u>	B <u>A</u>
Valve	PB	Cast Iron (Gray Cast Iron)	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (<u>B2.1.25</u>)	VII.G.AP-198	<u>3.3.1.106</u>	B <u>A</u>

Callaway Plant
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Aging Management Tables with LR-ISG-2011-03. Standard notes revised due to removal of exceptions from Aging Management Program B2.1.25, *Buried and Underground Piping and Tanks*.

Table 3.3.2-21 (pages 3.3-217 through 3.3-221) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-21 *Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Diesel Engine Fuel Oil Storage and Transfer System*

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.H1.AP-198	3.3.1.106	B A
Piping	LBS, PB, SIA	Carbon Steel	Underground (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.I.AP-284	3.3.1.109a	B A
Tank	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.H1.AP-198	3.3.1.106	D C
Tank	PB	Carbon Steel	Underground (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VII.I.AP-284	3.3.1.109a	D C

Notes for Table 3.3.2-21:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- ~~C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.~~
- D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

Callaway Plant
 License Renewal Application
 Amendment 18

A plant modification changed the material for the standby diesel generator intercooler heat exchanger tubes from copper alloy to stainless steel. No new Plant Notes are added.

Table 3.3.2-22, Standby Diesel Generator Engine System, (Page 3.3-226) is revised as follows (deleted text shown in strikethrough and new text underlined):

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Engine System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
<u>Heat Exchanger (DG Intercooler)</u>	<u>HT, PB</u>	<u>Stainless Steel</u>	<u>Closed Cycle Cooling Water (Ext)</u>	<u>Cracking</u>	<u>Closed Treated Water Systems (B2.1.11)</u>	<u>VII.C2.AP-186</u>	<u>3.3.1.043</u>	<u>C</u>
Heat Exchanger (DG Intercooler)	HT, PB	Copper Alloy <u>Stainless Steel</u>	Closed Cycle Cooling Water (Ext)	Loss of material	Closed Treated Water Systems (B2.1.11)	VII.C2.AP-199 <u>VII.C2.A-52</u>	3.3.1.046 <u>3.3.1.049</u>	C
Heat Exchanger (DG Intercooler)	HT, PB	Copper Alloy <u>Stainless Steel</u>	Closed Cycle Cooling Water (Ext)	Reduction of heat transfer	Closed Treated Water Systems (B2.1.11)	VII.C2.AP-205 <u>VII.C2.AP-188</u>	3.3.1.050	A
Heat Exchanger (DG Intercooler)	HT, PB	Copper Alloy <u>Stainless Steel</u>	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.10)	VII.C1.AP-179 <u>VII.H2.AP-55</u>	3.3.1.038 <u>3.3.1.041</u>	A <u>C</u>
Heat Exchanger (DG Intercooler)	HT, PB	Copper Alloy <u>Stainless Steel</u>	Raw Water (Int)	Reduction of heat transfer	Open-Cycle Cooling Water System (B2.1.10)	VII.C1.A-72 <u>VII.H2.AP-187</u>	3.3.1.042	A

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01. Table 3.3.2-24 (pages 3.3-246, 248, 250 through 3.3-254) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Radwaste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flow Element	LBS, PB, SIA, TH	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, 1 <u>A</u>
Flow Element	LBS, PB, SIA, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 1 <u>A</u>
Heat Exchanger (RCDT Heat Exchanger)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 1 <u>A</u>
Heat Exchanger (RCDT Heat Exchanger)	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 1 <u>A</u>
Instrument Bellows	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 1 <u>A</u>
Instrument Bellows	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, 1 <u>A</u>
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, 1 <u>A</u>

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Radwaste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Piping	LBS	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Piping	LBS	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Tank	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Tank	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Thermowell	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Thermowell	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Tubing	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Radwaste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Tubing	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 3.3.1.125	E, + A
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 VII.E1.A-103	3.3.1.028 3.3.1.124	E, + A

Notes for Table 3.3.2-24:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- ~~E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.~~

Plant Specific Notes:

~~None1 The One-Time Inspection program (B2.1.18) verifies the effectiveness of the Water Chemistry program (B2.1.2) in managing the aging of stainless steel components exposed to treated borated water~~

Callaway Plant
 License Renewal Application
 Amendment 18

Revise to incorporate GALL line changes to stainless steel components in treated borated water in accordance with LR-ISG-2011-01. Table 3.3.2-28 (pages 3.3-272, 276, 281 through 283) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.3.2-28 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Flexible Hoses	LBS	Elastomer	Demineralized Water (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.23)	None	None	G, 2 1
Piping	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 1 A
Piping	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, 1 A
Valve	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-79	3.3.1.029 <u>3.3.1.125</u>	E, 1 A
Valve	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.18)	VII.E1.AP-82 <u>VII.E1.A-103</u>	3.3.1.028 <u>3.3.1.124</u>	E, 1 A

Notes for Table 3.3.2-28:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- ~~E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.~~
- G Environment not in NUREG-1801 for this component and material.

Plant Specific Notes:

- ~~1 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.18) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.18) includes selected components at susceptible locations.~~
- 2 1 The environment evaluated is the internal surface of the flexible hose. Therefore, the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.23) is credited.

Callaway Plant
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Table 3.4-1 with LR-ISG-2011-03. Added nickel alloy (Item 47 also adds stainless steel). Deleted reference to exceptions in item 47.

Table 3.4-1 (page 3.4-26 and 3.4-27) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.4-1 Summary of Aging Management Programs in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.047	Steel (with coating or wrapping), <u>Stainless Steel</u> , <u>Nickel Alloy</u> Piping, piping components, and piping elements; tanks exposed to Soil or Concrete	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried and Underground Piping and Tanks (B2.1.25)
3.4.1.048	<u>Stainless Steel</u> , <u>Nickel Alloy</u> Bolting exposed to Soil	Loss of material due to pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Not applicable. Callaway has no in-scope stainless steel <u>or nickel alloy</u> bolting exposed to soil in the steam and power conversion systems, so the applicable NUREG-1801 line was not used.
3.4.1.049	<u>Stainless steel</u> , <u>Nickel Alloy</u> Piping, piping components, and piping elements exposed to Soil or Concrete	Loss of material due to pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Not applicable. Callaway has no in-scope stainless steel <u>or nickel alloy</u> piping, piping components, and piping elements exposed to soil or concrete in the steam and power conversion systems, so the applicable NUREG-1801 lines were not used.

Table 3.4-1 Summary of Aging Management Programs in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.050a	Underground Stainless Steel, <u>Nickel Alloy</u> and Steel Piping, piping components, and piping elements	Loss of material due to general (steel only), pitting and crevice corrosion	Buried and Underground Piping and Tanks (B2.1.25)	No	Not applicable. Callaway has no in-scope underground stainless steel, <u>nickel alloy</u> and steel piping, piping components, and piping elements in the steam and power conversion systems, so the applicable NUREG-1801 line was not used.

Callaway Plant
 License Renewal Application
 Amendment 18

Changes made to reconcile LRA Aging Management Tables with LR-ISG-2011-03. Standard notes revised due to removal of exceptions from Aging Management Program B2.1.25, *Buried and Underground Piping and Tanks*.

Table 3.4.2-5 (page 3.4-54) is revised as follows (new text underlined and deleted text shown in strikethrough):

Table 3.4.2-5 *Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System*

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	PB, SIA	Carbon Steel	Buried (Ext)	Loss of material	Buried and Underground Piping and Tanks (B2.1.25)	VIII.G.SP-145	3.4.1.047	B A

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
2	<p>Upon receipt of the renewed operating license, the station operating experience review process and Corrective Action Program will perform reviews of plant-specific and industry operating experience to confirm the effectiveness of the license renewal aging management programs, to determine the need for aging management programs to be enhanced, or indicate the need to develop a new aging management program. Industry and plant-specific operating experience will be evaluated during the development and implementation of new aging management programs.</p> <p>In order to provide additional assurance that internal and external operating experience related to aging management continues to be used effectively in the aging management programs, Callaway will enhance its operating experience program to:</p> <ul style="list-style-type: none"> • Explicitly require the review of operating experience for age-related degradation. (Completed Amendment 18) • Establish criteria to define age-related degradation. In general, the criteria will be used to identify aging that is considered excessive relative to design, previous inspection experience, and inspection intervals. (Completed Amendment 18) • Establish coding for use in identification, trending and communications of age-related degradation. This coding will assist plant personnel in ensuring that, in addition to addressing the specific issue, the adequacy of existing aging management programs is assessed. This could lead to AMP revisions or the establishment of new AMPs, as appropriate. (Completed Amendment 18) 	B1.4	Upon receipt of the renewed operating license

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
	<ul style="list-style-type: none"> • Require communication of significant internal age-related degradation, associated with SSCs in the scope of license renewal, to the industry. Criteria will be established for determining when aging-related degradation is significant. (Completed Amendment 18) • Require review of external operating experience for information related to aging management, and evaluation of such information for potential improvements to Callaway aging management activities. License Renewal Interim Staff Guidance (LR-ISG) documents will be reviewed as part of this external operating experience information as they are issued on an ongoing basis, capturing new insights or addressing issues that emerge from license renewal reviews. Other guidance documents such as NUREG-1801 revisions may not be explicitly considered unless communicated in the form of one of the NRC generic communications. • Provide training to those responsible for screening, evaluating and communicating operating experience items related to aging-related degradation. This training will be commensurate with their role in the process, • <u>Explicitly require AMP activities, criteria, and evaluations integral to the elements of the AMPs be included in the operating experience evaluation.</u> 		

Appendix B
AGING MANAGEMENT PROGRAMS

B1.4 OPERATING EXPERIENCE

Operating experience is used at Callaway to enhance plant programs, prevent repeat events, and prevent events that have occurred at other plants from occurring at Callaway. The operating experience process screens, evaluates, and acts on operating experience documents and information to prevent or mitigate the consequences of similar events. The operating experience process reviews operating experience from external (also referred to as industry operating experience) and internal (also referred to as plant-specific operating experience) sources. External operating experience includes INPO documents, NRC generic communications (e.g., NRC Generic Letters, Bulletins, Information Notices, Regulatory Issue Summaries), [License Renewal Interim Staff Guidance](#), and other documents (e.g., 10 CFR 21 Reports, Licensee Event Reports). [Recognizing that industry operating experience may be derived from other sources, the Corrective Action Program procedure requires that the identification of industry operating experience applicable to Callaway be documented in the Corrective Action Program for further evaluation.](#) Internal operating experience includes event investigations, trending reports, lessons learned from in-house events, self-assessments, and the 10 CFR 50, Appendix B, corrective action process.

Each aging management program summary in this appendix contains a discussion of operating experience relevant to the program. This information was obtained through the review of in-house operating experience in the Corrective Action Program and the review of industry operating experience. Plant-specific operating experience was obtained by a review of the Callaway corrective action program records for the period January 1999 through June 2011 and applicable industry operating experience was reviewed based on plant responses to specific NRC Generic Letters, Generic Safety Issues, Information Circulars, IE Bulletins, Information Notices, and Regulatory Issue Summaries. This population of industry experience was supported by plant documentation available since the beginning of the project and includes the operating experience associated to the NUREG-1801, Revision 2 (January 2004 to approximately April 2009). These reviews ensured that there was no unique, plant-specific operating experience in addition to that provided in NUREG-1801. This review was augmented with information from the Callaway staff.

The applicable operating experience for each aging management program was reviewed and summarized in the Appendix B program summaries. Detailed records on the performance and effectiveness of each program are maintained in the Callaway records management system (including the Corrective Action Program). New programs utilized plant and/or industry operating experience as applicable, and discussed the operating

Appendix B
AGING MANAGEMENT PROGRAMS

experience and associated corrective actions as they relate to the implementation of the new program. The operating experience summary in each aging management program identifies past corrective actions and provides objective evidence that the effects of aging have been, and will continue to be, adequately managed so that the intended functions of the structures and components within the scope of each program will be maintained during the period of extended operation.

Upon receipt of the renewed operating license, the station operating experience review process and Corrective Action Program will perform reviews of plant-specific and industry operating experience to confirm the effectiveness of the license renewal aging management programs, to determine the need for aging management programs to be enhanced, or indicate the need to develop a new aging management program. ~~Industry and plant-specific operating experience will be evaluated during the development and implementation of new aging management programs.~~ Evaluation of operating experience that relates to aging management will consider and document as appropriate:

- Systems, structures or components that are similar or identical to those involved with the identified operating experience issue, to gain relevant lessons learned.
- Material of construction, operating environment and aging effects associated with the identified aging issue so that lessons learned can be applied to susceptible SSCs within the scope of license renewal.
- Aging mechanisms associated with the operating experience to confirm that Callaway has appropriate AMPs in place to manage aging that could be caused by these mechanisms.
- AMPs associated with this operating experience so that if the AMPs have been demonstrated to be ineffective, similar AMPs in place at Callaway can be evaluated to determine if AMP changes are appropriate, or a new AMP is needed. Included in this review is consideration of activities, criteria, and evaluations integral to the elements of the plant AMPs.

Training on age-related degradation and aging management is provided to those personnel responsible for implementing the AMPs and who are likely to submit, screen, assign, evaluate, or otherwise process plant-specific and industry operating experience. Plant-specific operating experience associated with aging management and age-related degradation is reported to the industry in accordance with guidelines established in the operating experience program.

In order to provide additional assurance that internal and external operating experience related to aging management continues to be used effectively in the aging management programs, Callaway will enhance its operating experience program to:

- ~~1. Explicitly require the review of operating experience for age-related degradation.~~

- ~~2. Establish criteria to define age-related degradation. In general, the criteria will be used to identify aging that is considered excessive, relative to design, previous inspection experience and inspection intervals.~~
- ~~3. Establish coding for use in identification, trending and communications of age-related degradation. This coding will assist plant personnel in ensuring that, in addition to addressing the specific issue, the adequacy of existing aging management programs is assessed. This could lead to AMP revisions or the establishment of new AMPs, as appropriate.~~
- ~~4. Require communication of significant internal age-related degradation, associated with SSCs in the scope of license renewal, to the industry. Criteria will be established for determining when aging-related degradation is significant.~~
1. Require review of external operating experience for information related to aging management, and evaluation of such information for potential improvements to Callaway aging management activities. License Renewal Interim Staff Guidance (LR-ISG) documents will be reviewed as part of this external operating experience information as they are issued on an ongoing basis, capturing new insights or addressing issues that emerge from license renewal reviews. Other guidance documents such as NUREG-1801 revisions may not be explicitly considered unless communicated in the form of one of the above-listed NRC communications (e.g. Regulatory Issue Summaries, LR-ISG).
2. Provide training to those responsible for screening, evaluating and communicating operating experience items related to aging-related degradation. This training will be commensurate with their role in the process,
3. Explicitly require AMP activities, criteria, and evaluations integral to the elements of the AMPs be included in the operating experience evaluation.

Appendix B
AGING MANAGEMENT PROGRAMS

B2.1.25 Buried and Underground Piping and Tanks

Program Description

The Buried and Underground Piping and Tanks program manages loss of material, cracking, blistering, and changes in color of external surfaces of buried and underground piping and tanks. The program augments other programs that manage the aging of internal surfaces of buried and underground piping and tanks. The materials managed by this program include steel, stainless steel and high-density polyethylene. The program manages aging through preventive, mitigative, and inspection activities.

Preventive and mitigative actions include the selection of component materials, external coatings for corrosion control, backfill quality control, and the application of cathodic protection. The cathodic protection system is operated consistent with the guidance of NACE SP0169-2007 for piping and NACE RP 0285-2002 for tanks. Trending of the cathodic protection system is performed to identify changes in the effectiveness of the system and to ensure that the rectifiers are available to protect buried components. An annual cathodic protection survey is performed consistent with NACE SP0169-2007. Corrosion coupons are used to ensure that the cathodic protection system is providing sufficient protection for buried steel components within the scope of license renewal.

Inspection activities may include nondestructive evaluation of pipe and tank wall thicknesses, and visual inspections of pipe and tank exterior surfaces, as permitted by opportunistic or directed excavations. The fire protection system jockey pump is monitored to identify changes in jockey pump activity.

Direct visual inspections will be performed on buried steel piping, stainless steel, ~~and high density polyethylene~~ piping, and carbon steel tanks. Inspection locations will be selected based on susceptibility to degradation and consequences of failure. A minimum of 10 feet of pipe of each material type must be inspected. The inspection will consist of a 100 percent visual inspection of the exposed pipe. If adverse indications are detected, inspection sample sizes within the affected piping categories are doubled. If adverse indications are found in the expanded sample, further increases in inspection sample size would be based on an analysis of extent of cause and extent of condition. Visual inspections will be supplemented with surface or volumetric nondestructive testing (NDT) if significant indications are observed, to determine local area wall thickness. All buried high density polyethylene piping is encased in controlled low strength material; therefore, no direct visual inspections are required.

Direct visual inspections will be performed on underground steel, stainless steel and high density polyethylene piping, tank access covers, and valves to detect external corrosion.

Appendix B
AGING MANAGEMENT PROGRAMS

Inspection locations will be selected based on susceptibility to degradation and consequences of failure.

Inspections will begin during the 10-year period prior to entering the period of extended operation. Upon entering the period of extended operation, inspections will occur every 10 years.

The internal surfaces of buried and underground piping and tanks are managed through other programs. Internal surfaces may be managed by the Open-Cycle Cooling Water System (B2.1.10), Closed Treated Water Systems (B2.1.11), Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.23), Fuel Oil Chemistry (B2.1.16), Fire Water System (B2.1.14) or Water Chemistry (B2.1.2) programs. The Selective Leaching program (B2.1.19) works in conjunction with this program to manage buried or underground components subject to selective leaching.

NUREG-1801 Consistency

The Buried and Underground Piping and Tanks program is a new program that, when implemented, will be consistent with ~~exception to~~ NUREG-1801, Section XI.M41, *Buried and Underground Piping and Tanks*.

Exceptions to NUREG-1801

None

~~Program Elements Affected:~~

~~Preventive Actions (Element 2)~~

~~NUREG-1801, Section XI.M41, Table 2a, Note 6 states that for polymeric piping, backfill is acceptable if the inspections conducted by this program do not reveal evidence of mechanical damage to buried pipe coatings due to backfill. However the high density polyethylene (HDPE) piping at Callaway is not coated, nor does NUREG-1801 Section XI.M41 Table 2a require HDPE piping to be coated. The HDPE piping at Callaway is backfilled with controlled low strength materials (flowable fill) that uses fine aggregate consistent with ASTM C33. NUREG-1801, Section XI.M41, Table 2a, Note 6 states that the use of flowable fill meets the backfill objectives of SP0169-2007.~~

~~Detection of Aging Effects (Element 4)~~

Appendix B
AGING MANAGEMENT PROGRAMS

~~NUREG-1801, Section XI.M41.4.c.iv states that underground pipe shall be inspected by a volumetric technique such as UT to detect internal corrosion. As mentioned in the NUREG-1801 program description, other aging management programs are used to manage the internal surface of buried components. Therefore, ultrasonic testing of underground piping to detect internal corrosion is not included in this program.~~

~~NUREG-1801, Section XI.M41.4.f.iv states that if adverse indications are found in the expanded sample, the inspection sample size is again doubled. This doubling of the inspection sample size continues as necessary. If adverse indications are found in the expanded sample at Callaway, further increases in inspection sample size would be based on an analysis of extent of cause and extent of condition.~~

Enhancements

None

Operating Experience

The following discussion of operating experience provides objective evidence that the Buried and Underground Piping and Tanks program will be effective in ensuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In the winter of 2005, an alarm was triggered for fire protection loop jockey pump excessive run time and an investigation was initiated. The location of the leak was determined and promptly isolated from the main fire water loop. The isolation of the leak did not affect any required suppression systems. The leak was promptly repaired and the fire water piping was returned to service.
2. Prior to Refuel 15 (Spring 2007), Close Interval Surveys (CIS) were performed on various tanks and associated piping systems to identify cathodic protection effectiveness. The CIS testing measures cathodic protection levels along the pipeline at approximately 2.5 foot intervals. These surveys were performed on the following structures and components within the scope of license renewal: emergency fuel oil storage tanks, fire water storage tank bottoms, ESW system piping, and condensate storage tank piping. The results indicated that emergency fuel oil storage tanks, condensate storage tank piping, and one quadrant of the fire water storage tank, were not meeting the 850mV polarization potential criterion of the National Association of Corrosion Engineers (NACE). Corrective actions were taken to correct these

Appendix B
AGING MANAGEMENT PROGRAMS

deficiencies by adjusting the cathodic protection where possible. In some instances the cathodic protection system could not be adjusted to correct a condition. Cathodic protection system refurbishment and modifications are planned in areas where the system does not meet the NACE criteria.

3. From 2008 to 2009, the underground portions of the ESW supply from the ESW pump house and return to the ultimate heat sink cooling tower were replaced with HDPE piping. In addition, sections of above ground or underground carbon steel piping that interfaces with the buried piping was replaced with stainless steel piping. These modifications were performed as a result of the material condition of the ESW system. These modifications were performed as a result of corrective action documents that have been written concerning pinhole leaks, pitting, and other localized degradation of the ESW piping system.
4. In the summer of 2011, the annual cathodic protection survey was performed. Several locations in the fire water system had a negative potential below the NACE criteria of 850 mV. Modification and refurbishment of the cathodic protection system will address areas of low negative potential identified during the annual survey and the CIS described above.
5. Due to industry operating experience with buried condensate system piping, Callaway reviewed cathodic protection records related to the buried carbon steel piping for the condensate storage tank to determine if the external corrosion control provided for this piping was adequate. The review of the cathodic protection for this line found that the negative potential was below the NACE criteria. The cathodic protection system will be refurbished/modified in areas where it does not meet the NACE criteria. The buried portion of the condensate storage tank suction line will be inspected prior to the period of extended operation.

Inspection and preventive measures that will be implemented by the Buried and Underground Piping and Tanks program will be effective in managing aging of underground and buried components. Occurrences that would be identified under the Buried and Underground Piping and Tanks program will be evaluated to ensure there is no significant impact to safe operation of the plant and corrective actions will be taken to prevent recurrence. Guidance for re-evaluation, repair, or replacement is provided for locations where aging is found. There is confidence that the implementation of the Buried and Underground Piping and Tanks program will effectively identify aging prior to loss of intended function.

Appendix B
AGING MANAGEMENT PROGRAMS

Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The implementation of the Buried and Underground Piping and Tanks program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

CALLAWAY PLANT UNIT 1
 LICENSE RENEWAL APPLICATION

Summary of LRA Correspondence

Original Application: ULNRC-05830 dated 12/15/2011

Safety Correspondence:

Letter Number	Date	Amendment	Subject
ULNRC-05856	4/25/12	1	<ul style="list-style-type: none"> Amendment 1
ULNRC-05860	5/3/12	2	<ul style="list-style-type: none"> Amendment 2
ULNRC-05874	6/5/12	3	<ul style="list-style-type: none"> Amendment 3
ULNRC-05877	7/2/12	4	<ul style="list-style-type: none"> RAI Set #1, Amendment 4
ULNRC-05885	7/20/12	-	<ul style="list-style-type: none"> RAI Set #2
ULNRC-05886	8/6/12	5	<ul style="list-style-type: none"> RAI Set #3, Amendment 5
ULNRC-05891	8/9/12	6	<ul style="list-style-type: none"> RAI Set #4, Amendment 6
ULNRC-05892	8/21/12	7	<ul style="list-style-type: none"> RAI Set #5, Amendment 7, Amended certain RAI Set #3 Responses
ULNRC-05897	8/16/12	-	<ul style="list-style-type: none"> Amended certain RAI Set #3 Responses
ULNRC-05903	9/6/12	8	<ul style="list-style-type: none"> RAI Set #6, Amendment 8
ULNRC-05906	9/20/12	9	<ul style="list-style-type: none"> RAI Set #7, Amendment 9
ULNRC-05907	9/20/12	10	<ul style="list-style-type: none"> RAI Set #8, Amendment 10
ULNRC-05910	9/18/12	-	<ul style="list-style-type: none"> Amended certain RAI Set #3 Responses
ULNRC-05915	10/11/12	11	<ul style="list-style-type: none"> RAI Set #9, Amendment 11, Amended certain RAI Set #4 Responses
ULNRC-05918	10/15/12	12	<ul style="list-style-type: none"> RAI Set #10, Amendment 12
ULNRC-05920	10/24/12	13	<ul style="list-style-type: none"> RAI Set #11 and #12, Amendment 13
ULNRC-05923	10/31/12	14	<ul style="list-style-type: none"> RAI Set #13 and #14, Amendment 14, Amended certain RAI Set #3 Responses

Letter Number	Date	Amendment	• Subject
ULNRC-05928	11/8/12	15	<ul style="list-style-type: none"> • RAI Set #15, • Amendment 15
ULNRC-05929	11/20/12	16	<ul style="list-style-type: none"> • RAI Set #16, • Amendment 16
ULNRC-05938	(12/13/12)	17	<ul style="list-style-type: none"> • RAI Set #17, • Amendment 17, • Amended certain RAI Set #9 Responses
ULNRC-05939	(12/19/12)	18	<ul style="list-style-type: none"> • Annual Update, • RAI Set #18 • Amendment 18

Environmental Correspondence:

Letter Number	Date	Subject
ULNRC-05893	8/13/12	<ul style="list-style-type: none"> • E-RAI Set #1
ULNRC-05902	8/30/12	<ul style="list-style-type: none"> • E-RAI Set #2
ULNRC-05912	9/18/12	<ul style="list-style-type: none"> • Supplemented certain E-RAI Set #1 Responses
ULNRC-05908	9/24/12	<ul style="list-style-type: none"> • SAMA RAI Set #1
ULNRC-05919	10/17/12	<ul style="list-style-type: none"> • Supplemented certain SAMA RAI Set #1 Responses