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INTRODUCTION

By letter dated March 3, 1999, the Nuclear Energy Institute (NEI) documented the industry's views on how existing plant programs and activities should be credited for license renewal. The issue can be summarized as follows: To what extent should the staff review existing programs relied on for license renewal in determining whether an applicant has demonstrated reasonable assurance that such programs will be effective in managing effects of aging on the functionality of structures and components in the period of extended operation? In a staff paper, SECY-99-148, "Credit for Existing Programs for License Renewal," dated June 3, 1999, the staff described options for crediting existing programs and recommended one option that the staff believed would improve the efficiency of the license renewal process.

By staff requirements memorandum (SRM) dated August 27, 1999, the Commission approved the staff's recommendation and directed the staff to focus the staff review guidance in the Standard Review Plan for License Renewal (SRP-LR) on areas where existing programs should be augmented for license renewal. The staff would develop a "Generic Aging Lessons Learned (GALL)" report to document the staff's evaluation of generic existing programs. The GALL report would document the staff's basis for determining which existing programs are adequate without change and which existing programs should be augmented for license renewal. The GALL report would be referenced in the SRP-LR as a basis for determining the adequacy of existing programs.

GALL REPORT EVALUATION PROCESS

This report builds on a previous report, NUREG/CR-6490, "Nuclear Power Plant Generic Aging Lessons Learned (GALL)," which is a systematic compilation of plant aging information. This report extends the information in NUREG/CR-6490 to provide an evaluation of the adequacy of aging management programs for license renewal. NUREG/CR-6490 was based on information in over 500 documents: Nuclear Plant Aging Research (NPAR) program reports sponsored by the Office of Nuclear Regulatory Research, Nuclear Management and Resources Council (NUMARC, now NEI) industry reports addressing license renewal, licensee event reports (LERs), information notices, generic letters, and bulletins. The staff has also considered information contained in the reports provided by the Union of Concerned Scientists (UCS) in a May 5, 2000 letter.

Following the format of NUREG-0800 for major plant sections in pressurized and boiling water reactor power plants, the staff has reviewed the aging effects on components and structures, identified the relevant existing programs, and evaluated program attributes to manage aging effects for license renewal. This report was prepared with the technical assistance of Argonne National Laboratory and Brookhaven National Laboratory. As directed in the SRM, this report has the benefit of the experience of the staff members who conducted the review of the initial license renewal applications. Also, as directed in the SRM, the staff is seeking stakeholders' participation in the development of this report.

The results of the GALL effort are presented in a table format in Volume 2. The table column headings are: Item, Structure and Component, Region of Interest, Material, Environment, Aging Effects, Aging Mechanism, References, Aging Management Program, Evaluation and Technical Basis, and Further Evaluation. The "References"

column contains a collection of references cited under “Aging Management Program” and “Evaluation and Technical Basis” columns. The “Aging Management Program” column identifies the generic programs being evaluated.

The staff’s evaluation of the adequacy of each generic aging management program in managing certain aging effects for particular structures and components is based on the review of the following 10 program attributes (or elements):

Element	Description
1. Scope of program	The scope of the program should include the specific structures and components subject to an aging management review.
2. Preventive actions	Preventive actions should mitigate or prevent the applicable aging effects.
3. Parameters monitored or inspected	Parameters monitored or inspected should be linked to the effects of aging on the particular structure and component intended functions.
4. Detection of aging effects	Detection of aging effects should occur before there is a loss of any structure and component intended function.
5. Monitoring and trending	Monitoring and trending should provide for prediction of the extent of the effects of aging and timely corrective or mitigative actions. The monitoring, inspection, testing frequency, and sample size should be appropriate for timely detection of aging effects.
6. Acceptance criteria	Acceptance criteria, against which the need for corrective action will be evaluated, should ensure that the particular structure and component intended functions are maintained under all CLB design conditions during the period of extended operation.
7. Corrective actions	Corrective actions, including root cause determination and prevention of recurrence, should be timely.
8. Confirmation process	The confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.
9. Administrative controls	Administrative controls should provide a formal review and approval process.
10. Operating experience	Operating experience involving the aging management program, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support a determination that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the period of extended operation.

If based on its evaluation, the staff determines that a program is adequate to manage certain aging effects for a particular structure or component without change, the "Further Evaluation" entry would indicate that no further staff evaluation is recommended for license renewal. Otherwise, it would recommend areas in which the staff should focus its review.

The Commission's regulations in 10 CFR 54.21(c) require an evaluation of time-limited aging analyses (TLAAs). Examples of TLAAs are applicant analyses of metal fatigue and environmental qualification (EQ) of electric equipment. The GALL report in general refers the reader to the Standard Review Plan for License Renewal on how TLAAs should be evaluated. However, 10 CFR 54.21(c)(1)(iii) allows a TLAAs-associated aging effect to be managed by an aging management program. Chapter X of the GALL report, Volume 2, provides the staff evaluation of several TLAAs under 10 CFR 54.21(c)(1)(iii) based on the initial license renewal reviews.

Some aging management programs are relied on repeatedly in the GALL report, such as the maintenance rule structural monitoring program. To minimize repetition in the GALL tables in Volume 2, these programs are evaluated separately in Chapter XI of Volume 2 of the GALL report. The GALL tables point to these Chapter XI evaluations, as appropriate. Chapter XI does not contain all the aging management programs evaluated in the GALL report. Chapter XI is only used for staff convenience.

APPLICATION OF GALL REPORT

The GALL report is a technical basis document to the SRP-LR, which provides the staff with guidance in reviewing a license renewal application. The GALL report should be treated in the same manner as an approved topical report that is generically applicable. An applicant may reference the GALL report in a license renewal application to demonstrate that the applicant's programs at its facility correspond to those reviewed and approved in the GALL report, and that no further staff review is required as described in the next paragraph. If the material presented in the GALL report is applicable to the applicant's facility, the staff should find the applicant's reference to the GALL report acceptable. In making this determination, the staff should consider whether the applicant has identified specific programs described and evaluated in the GALL report. The staff, however, should not repeat its review of the substance of the matters described in the GALL report. Rather, the staff should ensure that the applicant verifies that the approvals set forth in the GALL report for generic programs apply to the applicant's programs. The focus of the staff review should be on augmented programs for license renewal. The staff should also review information that is not addressed in the GALL report or is otherwise different from that in the GALL report.

If an applicant takes credit for a program in GALL, it is incumbent on the applicant to ensure that the plant program contains all the elements of the referenced GALL program. In addition, the conditions at the plant must be bounded by the conditions for which the GALL program was evaluated. The above verifications must be documented on-site in an auditable form. The applicant must include a certification in the license renewal application that the verifications have been completed and are documented on-site in an auditable form.

The GALL report contains one acceptable way to manage aging effects for license renewal. An applicant may propose alternatives for staff review in its plant-specific license renewal application.

In addition, the GALL report does not address scoping of structures and components for license renewal. Scoping is plant-specific, and the results depend on the plant design and current licensing basis. The inclusion of a certain structure or component in the GALL report does not mean that this particular structure or component is within the scope of license renewal for all plants. Conversely, the omission of a certain structure or component in the GALL report does not mean that this particular structure or component is not within the scope of license renewal for any plants.

SUMMARY AND RECOMMENDATIONS

The GALL report contains an evaluation of a large number of structures and components. The evaluation result documented in the GALL report indicates that many of the generic existing programs are adequate to manage aging effects for particular structures or components for license renewal without change. The GALL report also contains recommendations on specific areas for which generic existing programs should be augmented for license renewal. The GALL report documents the technical basis for each such determination. Tables 1 through 6 are summaries of the aging management review and these tables are the same as Tables 3.1-1 to 3.6-1, respectively, in the SRP-LR, except for an additional 6th column in Tables 1 to 6 identifying the specific item numbers assigned to each structure and component in the GALL report. Descriptions of the specific item numbers in the various GALL chapters (II through VIII) are given in the Appendix of Volume 1, following a locator for plant systems evaluated in Volume 2 of the GALL report. The specific item number and associated aging effect provide a pointer to the technical evaluation for the specific structure and component in Volume 2 (Tabulation of Results) of the GALL report.

The Appendix of Volume 2 of the GALL report addresses quality assurance (QA) for aging management programs. Those aspects of the aging management review process that affect the quality of safety-related structures, systems, and components, are subject to the QA requirements of Appendix B to 10 CFR Part 50. For non-safety-related structures and components subject to an aging management review, the existing 10 CFR Part 50, Appendix B, QA program may be used by an applicant to address the elements of corrective actions, confirmation process, and administrative controls for an aging management program for license renewal.

The GALL report provides a technical basis for crediting existing aging management programs and recommending areas for program augmentation and further evaluation. The incorporation of the GALL report information into the SRP-LR, as directed by the Commission, should improve the efficiency of the license renewal process and better focus staff resources.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Reactor coolant pressure boundary components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	IV.A1.1.3, IV.A1.2.1 - IV.A1.2.6, IV.A1.3.1 - IV.A1.3.3, IV.A1.4.3, IV.A1.5.1- IV.A1.5.6, IV.A1.6, IV.A1.7, IV.A2.1.1, IV.A2.1.3, IV.A2.2.1, IV.A2.2.2, IV.A2.3.1 - IV.A2.3.3, IV.A2.4.1 - IV.A2.4.3, IV.A2.5.1 - IV.A2.5.3, IV.A2.8.1, IV.B1.1.2, IV.B1.2, IV.B1.3.1 - IV.B1.3.4, IV.B1.4.1 - IV.B1.4.8, IV.B1.5.1, IV.B1.6.1 - IV.B1.6.3, IV.B2.1.1, IV.B2.1.2, IV.B2.1.4 - IV.B2.1.7, IV.B2.2.1 - IV.B2.2.3, IV.B2.3.1 - IV.B2.3.4, IV.B2.4.1, IV.B2.4.2, IV.B2.5.1, IV.B2.5.2, IV.B2.5.4 - IV.B2.5.7, IV.B3.2.1, IV.B3.2.2,

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Reactor coolant pressure boundary components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	(cont'd) IV.B3.4.1 - IV.B3.4.3, IV.B3.5.1 - IV.B3.5.6, IV.B4.1.1 - IV.B4.1.5, IV.B4.2.1 - IV.B4.2.5, IV.B4.3.1 - IV.B4.3.6, IV.B4.4.1 - IV.B4.4.4, IV.B4.5.1 - IV.B4.5.5, IV.B4.6.1 - IV.B4.6.10, IV.C1.1.1 - IV.C1.1.11, IV.C1.2.1 - IV.C1.2.4, IV.C1.3.1 - IV.C1.3.4, IV.C2.1.1 - IV.C2.1.4, IV.C2.2.1 - IV.C2.2.7, IV.C2.3.1 - IV.C2.3.3, IV.C2.4.1 - IV.C2.4.3, IV.C2.5.1 - IV.C2.5.7, IV.C2.5.10, IV.C2.5.12, IV.C2.6.1, IV.C2.6.2, IV.D1.1.1 - IV.D1.1.6, IV.D1.1.8 IV.D1.1.9, IV.D1.2.1, IV.D2.1.3 - IV.D2.1.6, IV.D2.2.1.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Steam generator shell assembly	Loss of material from pitting and crevice corrosion	Inservice inspection; water chemistry	Yes, detection of aging effects should be further evaluated	IV.D1.1.3, IV.D1.1.4, IV.D2.1.4.
BWR	Isolation condenser	Crack initiation and growth from SCC and unanticipated cyclic loading; loss of material from general, pitting, and crevice corrosion	Inservice inspection; water chemistry	Yes, plant specific	IV.C1.4.1 - IV.C1.4.4.
BWR/ PWR	Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm ² (E>1 MeV)	Loss of fracture toughness from neutron irradiation embrittlement	TLAA evaluated in accordance with Appendix G and H of 10 CFR50 and RG 1.99	Yes, TLAA	IV.A1.2.4, IV.A1.2.6, IV.A1.3.4, IV.A2.3.1 - IV.A2.3.3, IV.A2.5.1, IV.A2.5.2.
BWR/ PWR	Reactor vessel beltline shell and welds	Loss of fracture toughness from neutron irradiation embrittlement	Reactor vessel materials surveillance	Yes, plant specific	IV.A1.2.4, IV.A1.2.6, IV.A2.3.1 - IV.A2.3.3, IV.A2.5.1, IV.A2.5.2.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Reactor vessel internals in fuel zone region (except Westing-house and B&W baffle bolts)	Loss of fracture toughness from neutron irradiation embrittlement	Inservice inspection	Yes, detection of aging effects should be further evaluated	IV.B2.3.1 - IV.B2.3.4, IV.B2.4.1, IV.B2.5.1, IV.B2.5.2, IV.B2.5.5, IV.B3.3.1, IV.B3.3.2, IV.B3.4.1 - IV.B3.4.3, IV.B3.5.1 - IV.B3.5.6, IV.B4.2.1 - IV.B4.2.5, IV.B4.4.1 - IV.B4.4.5, IV.B4.5.1 - IV.B4.5.4, IV.B4.6.1 - IV.B4.6.10, IV.B4.7.1 - IV.B4.7.4, IV.B4.8.
PWR	Westing-house and B&W baffle/former bolts	Loss of fracture toughness from neutron irradiation embrittlement	Plant-specific	Yes; plant-specific	IV.B2.4.2, IV.B4.5.5.
BWR/ PWR	Small-bore reactor coolant system and connected systems piping	Crack initiation and growth from SCC and unanticipated cyclic loading	Inservice inspection; water chemistry; one-time inspection	Yes, detection of aging effects should be further evaluated	IV.C1.1.13, IV.C2.1.5, IV.C2.2.8.
BWR	Jet pump sensing line, reactor vessel flange leak detection line, and separator support ring	Crack initiation and growth from SCC, IGSCC or unanticipated cyclic loading	Plant specific	Yes, plant specific	IV.A1.1.5, IV.B1.4.9, IV.B1.7.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR	Shroud support structure	Crack initiation and growth from SCC, IGSCC, and IASCC	Inservice Inspection; BWRVIP-38; water chemistry	Yes, plant specific BWRVIP-38	IV.B1.1.5.
PWR	Reactor internals	Changes in dimension from void swelling	Plant-specific	Yes; plant-specific	IV.B2.1.1 - IV.B2.1.7, IV.B2.2.1 - IV.B2.2.3, IV.B2.3.1 - IV.B2.3.4, IV.B2.4.1, IV.B2.4.2, IV.B2.5.1 - IV.B2.5.7, IV.B2.6.1, IV.B3.1.1 - IV.B3.1.3, IV.B3.2.1, IV.B3.2.2, IV.B3.3.1, IV.B3.3.2, IV.B3.4.1 - IV.B3.4.3, IV.B3.5.1 - IV.B3.5.6, IV.B4.1.1 - IV.B4.1.5, IV.B4.2.1 - IV.B4.2.5, IV.B4.3.1 - IV.B4.3.6, IV.B4.4.1 - IV.B4.4.5, IV.B4.5.1 - IV.B4.5.5, IV.B4.6.1 - IV.B4.6.10, IV.B4.7.1 - IV.B4.7.4, IV.B4.8.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Reactor vessel flange leak detection line, core support pads, reactor vessel penetrations, pressurizer spray head, SG Instrument and drain nozzles	Crack initiation and growth from SCC and/or PWSCC	Plant-specific	Yes, plant-specific	IV.A2.1.4, IV.A2.6, IV.A2.7.1, IV.A2.7.2, IV.C2.5.4, IV.D1.1.10, IV.D2.1.7, IV.D2.1.8.
PWR	Cast austenitic SS reactor coolant system piping	Crack initiation and growth from SCC	Plant-specific	Yes, plant-specific	IV.C2.1.1 - IV.C2.1.3, IV.C2.2.7, IV.C2.5.3.
PWR	Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni-alloys	Crack initiation and growth from PWSCC	Inservice inspection; water chemistry	Yes, plant-specific	IV.C2.5.6, IV.C2.5.10.
PWR	Primary nozzles and safe ends	Crack initiation and growth from SCC	Inservice inspection; water chemistry	Yes, detection of aging effects should be further evaluated	IV.D1.1.9, IV.D2.1.3.
PWR	Upper and lower heads, tubesheets	Crack initiation and growth from SCC	Inservice inspection; water chemistry	Yes, detection of aging effects should be further evaluated	IV.D2.1.1, IV.D2.1.2.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Vessel internals (except Westing- house and B & W baffle former bolts)	Crack initiation and growth from SCC and IASCC	Inservice inspection; water chemistry	Yes, detection of aging effects should be further evaluated	IV.B2.1.1, IV.B2.1.4 - IV.B2.1.7, IV.B2.2.1 - IV.B2.2.3, IV.B2.3.1 - IV.B2.3.4, IV.B2.4.1, IV.B2.5.1 - IV.B2.5.7, IV.B2.6.1, IV.B3.1.1 - IV.B3.1.3, IV.B3.2.1, IV.B3.2.2, IV.B3.3.1, IV.B3.3.2, IV.B3.4.1 - IV.B3.4.3, IV.B3.5.1 - IV.B3.5.6, IV.B4.1.1 - IV.B4.1.5, IV.B4.2.1 - IV.B4.2.5, IV.B4.3.1 - IV.B4.3.6, IV.B4.4.1 - IV.B4.4.5, IV.B4.5.1 - IV.B4.5.4, IV.B4.6.1 - IV.B4.6.10, IV.B4.7.1 - IV.B4.7.4, IV.B4.8, IV.D2.1.1, IV.D2.1.2.
PWR	Westing- house and B & W baffle former bolts	Crack initiation and growth from SCC and IASCC	Plant-specific	Yes; plant-specific	IV.B2.4.2, IV.B4.5.5.
PWR	Westing- house and B & W baffle former bolts	Loss of preload from stress relaxation	Plant-specific	Yes; plant-specific	IV.B2.4.2, IV.B4.5.5.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Reactor internals (B&W screws and bolts)	Loss of preload from stress relaxation	Inservice inspection	Yes, detection of aging effects should be further evaluated	IV.B4.3.4, IV.B4.4.2, IV.B4.5.2, IV.B4.5.3, IV.B4.6.3, IV.B4.6.7, IV.B4.7.2.
PWR	Steam generator feedwater impingement plate and support	Loss of section thickness from erosion	Plant specific	Yes, plant specific	IV.D1.1.6.
BWR/ PWR	Reactor vessel closure studs and stud assembly	Crack initiation and growth from SCC and/or IGSCC	Inservice inspection; minimization and control of SCC	No	IV.A1.1.4, IV.A2.1.3.
BWR/ PWR	Cast austenitic stainless steel (CASS) pump casing and valve body	Loss of fracture toughness from thermal aging embrittlement	Inservice inspection	No	IV.C1.2.1, IV.C1.3.1, IV.C1.3.2, IV.C2.3.1, IV.C2.4.1.
BWR/ PWR	Cast austenitic stainless steel (CASS) piping	Loss of fracture toughness from thermal aging embrittlement	Thermal aging and neutron embrittlement	No	IV.A2.2.2, IV.C1.1.6 - IV.C1.1.11, IV.C2.1.1 - IV.C2.1.3, IV.C2.2.7, IV.C2.5.3, IV.C2.5.4.
BWR/ PWR	BWR piping and fittings, Steam generator components	Wall thinning from flow accelerated corrosion	Flow accelerated corrosion	No	IV.C1.1.1, IV.C1.1.2, IV.C1.1.12, IV.C1.3.1, IV.D1.2.2, IV.D2.1.5 .

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	RCPB valve closure bolting, man way and holding bolting, closure bolting in high-pressure and high- temperature systems	Loss of material from atmospheric corrosion; loss of preload from stress relaxation; and crack initiation and growth from cyclic loading, stress corrosion cracking	Bolting integrity	No	IV.C1.2.3, IV.C1.2.4, IV.C1.3.4, IV.C2.3.3, IV.C2.4.3 IV.C2.5.9 IV.D1.1.7, IV.D1.1.11, IV.D1.1.12, IV.D2.1.9, IV.D2.1.10.
BWR	Feedwater and CRD return line nozzles	Crack initiation and growth from cyclic loading	Feedwater and CRD inspection	No	IV.A1.3.2, IV.A1.3.3.
BWR	Vessel Internals, Vessel Shell and Nozzle, and reactor coolant pressure piping	Crack initiation and growth from SCC, IGSCC, IASCC or unanticipated cyclic loading	Inservice Inspection; BWRVIP; water chemistry	No	IV.A1.2.7, IV.A1.4.1 - IV.A1.4.5, IV.A1.5.1 - IV.A1.5.6, IV.B1.1.1 - IV.B1.1.6, IV.B1.2, IV.B1.1.7, IV.B1.3.1- IV.B1.3.4, IV.B1.4.1 - IV.B1.4.8, IV.B1.5.2, IV.B1.6.1 - IV.B1.6.3, IV.C1.1.5- IV.C1.1.11, IV.C1.2.1, IV.C1.3.1, IV.C1.3.2.
BWR	Jet pump assembly castings, orificed fuel support	Loss of fracture toughness from thermal aging and neutron embrittlement	Thermal aging and neutron Irradiation embrittlement	No	IV.B1.4.8, IV.B1.5.1, IV.B1.7.1.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR	Unclad top head and nozzles	Loss of material from general, pitting, and crevice corrosion	Inservice inspection; water chemistry	No	IV.A1.1.1, IV.A1.1.2.
PWR	CRD nozzle	Crack initiation and growth from PWSCC	Inservice inspection; vessel closure head penetration program; water chemistry	No	IV.A2.2.1.
PWR	(Alloy 600) Steam generator tubes, repair sleeves, and plugs	Crack initiation and growth from PWSCC, ODSCC, and/or IGA or loss of material from general and pitting corrosion or deformation from corrosion at tube support plate intersections	Steam generator tube integrity; water chemistry	No	IV.D1.2.1, IV.D1.2.3, IV.D2.2.1, IV.D2.2.2.
PWR	Reactor vessel nozzles safe ends and CRD housing, reactor coolant system components (except CASS and bolting)	Crack initiation and growth from unanticipated cyclic loading and/or SCC	Inservice inspection; water chemistry	No	IV.A2.2.2, IV.A2.4.1 - IV.A2.4.3, IV.C2.1.1 - IV.C2.1.4, IV.C2.2.1 - IV.C2.2.7, IV.C2.3.1, IV.C2.4.1, IV.C2.5.1 - IV.C2.5.3, IV.C2.5.6 - IV.C2.5.8, IV.C2.5.10, IV.C2.6.1, IV.C2.6.2.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Reactor vessel internals cast austenitic stainless steel components	Loss of fracture toughness from thermal aging and neutron irradiation embrittlement	Thermal aging and neutron irradiation embrittlement; inservice inspection	No	IV.B2.1.2, IV.B2.5.3, IV.B2.5.4, IV.B3.2.1, IV.B3.5.4, IV.B4.3.2, IV.B4.4.3, IV.B4.4.4.
PWR	External surfaces of carbon steel components in reactor coolant system pressure boundary	Loss of material from boric acid corrosion	Boric acid corrosion	No	IV.A2.1.1 - IV.A2.5.3, IV.A2.8.1 - IV.A2.8.3, IV.C2.1.1, IV.C2.1.2, IV.C2.2.5, IV.C2.2.6, IV.C2.3.3, IV.C2.4.3, IV.C2.5.1, IV.C2.5.9, IV.C2.5.12, IV.C2.6.1, IV.D1.1.8, IV.D1.1.11, IV.D2.1.1, IV.D2.1.4 - IV.D2.1.6, IV.D2.1.9, IV.D2.1.10.
PWR	Steam generator secondary manways and handholds (CS)	Loss of material from erosion	Inservice inspection	No	IV.D2.1.10.
PWR (CE)	Steam generator feedwater inlet ring	Loss of material from flow accelerated corrosion	CE steam generator feedwater ring inspection	No	IV.D1.3.1.
PWR	Steam generator tubes	Loss of material from fretting and wear	Inservice inspection	No	IV.D1.2.1.

**Table 1. Summary of Aging Management Programs for Reactor Coolant System
Evaluated in Chapter IV of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Reactor internals, reactor vessel closure studs, and core support pads	Loss of material from wear	Inservice inspection	No	IV.A2.1.3, IV.A2.5.3, IV.A2.6, IV.B2.1.5, IV.B2.2.1, IV.B2.3.2, IV.B2.5.6, IV.B2.6.2, IV.B3.1.2 - IV.B3.1.4, IV.B3.2.3, IV.B3.3.2, IV.B3.3.3, IV.B3.5.2, IV.B3.5.6, IV.B4.2.3, IV.B4.2.4, IV.B4.4.1- IV.B4.4.5, IV.B4.6.2, IV.B4.6.8.
PWR	Upper and lower internals assembly (Westing- house)	Loss of preload from stress relaxation	Inservice inspection and loose part and/or neutron noise monitoring	No	IV.B2.1.7, IV.B2.5.7.
PWR	Reactor internals (CE bolts, tie rods)	Loss of preload from stress relaxation	Inservice inspection and loose part monitoring	No	IV.B2.1.3, IV.B2.5.5, IV.B3.2.2, IV.B3.4.2, IV.B3.4.3.

**Table 2. Summary of Aging Management Programs for Engineered Safety
Features Evaluated in Chapter V of the GALL Report**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Piping, fittings and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	V.D1.1.1- V.D1.1.4, V.D1.4.1, V.D2.1.1.
PWR	Tanks in emergency core cooling system	Crack initiation and growth from SCC	Water chemistry and inservice inspection	Yes, detection of aging effect should be further evaluated	V.D1.7.3, V.D1.8.1- V.D1.8.3.
BWR	Piping, fittings, pumps and valves in emergency core cooling system	Loss of material from general corrosion	Water chemistry	Yes, detection of aging effect should be further evaluated	V.D2.1.1- V.D2.1.7, V.D2.2.1- V.D2.2.3, V.D2.3.1.
BWR/ PWR	Components in containment spray (PWR only), standby gas treatment system (BWR only), containment isolation, and emergency core cooling systems	Loss of material from general corrosion	Plant-specific	Yes, plant-specific	V.A.2.1- V.A.2.4, V.A.5.1, V.B.1.1, V.B.1.2, V.B.2.1, V.C.2.1, V.C.2.2, V.D2.1.8, V.D2.5.1- V.D2.5.4.
BWR	Piping, fittings, pumps and valves in emergency core cooling system	Loss of material from crevice and pitting corrosion	Water chemistry	Yes, detection of aging effect should be further evaluated	V.D2.1.1- V.D2.1.7, V.D2.2.1- V.D2.2.3, V.D2.3.1.

**Table 2. Summary of Aging Management Programs for Engineered Safety
Features Evaluated in Chapter V of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Components in containment spray (PWR only), standby gas treatment system (BWR only), containment isolation, and emergency core cooling systems	Loss of material from pitting and crevice corrosion	Plant-specific	Yes, plant-specific	V.A.2.1- V.A.2.4, V.A.5.1, V.B.1.1, V.B.1.2, V.B.2.1, V.C.2.1, V.C.2.2, V.D1.8.5, V.D2.1.8, V.D2.5.1- V.D2.5.4.
BWR/ PWR	Containment isolation valves and associated piping	Loss of material from microbiologically-influenced corrosion	Plant-specific	Yes, plant-specific	V.C.2.1, V.C.2.2.
BWR	Seals in standby gas treatment system	Changes in properties from elastomer degradation	Plant-specific	Yes, plant-specific	V.B.1.3, V.B.1.4, V.B.2.3.
BWR	Filter in standby gas treatment system	Loss of filter capacity from absorption of moisture	Plant-specific	Yes, plant-specific	V.B.2.2.
BWR/ PWR	Containment isolation valves and associated piping	Buildup of deposit from biofouling	Plant-specific	Yes, plant-specific	V.C.2.1, V.C.2.2.
PWR	High-pressure safety injection (charging) pump miniflow orifice	Loss of material from erosion	Plant-specific	Yes, plant-specific	V.D1.2.3.
BWR/ PWR	Containment purge/vent valve disc seal	Changes in properties from elastomer degradation	Inservice inspection and containment leak rate tests	No	V.C.1.1.

Table 2. Summary of Aging Management Programs for Engineered Safety Features Evaluated in Chapter V of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Piping and fittings of cast austenitic stainless steel (CASS) in emergency core cooling systems	Loss of fracture toughness from thermal aging embrittlement	Thermal aging embrittlement of CASS	No	V.D1.1.1- V.D1.1.6, V.D2.1.1- V.D2.1.7.
BWR/ PWR	Components serviced by open-cycle cooling system	Local loss of material from corrosion and/or buildup of deposit from biofouling	Open-cycle cooling water system	No	V.A.6.1- V.A.6.4, V.D1.6.1- V.D1.6.3, V.D2.4.1- V.D2.4.4.
BWR/ PWR	Components serviced by closed-cycle cooling system	Loss of material from general, pitting and crevice corrosion	Closed-cycle cooling water system	No	V.A.6.1- V.A.6.4, V.D1.5.1- V.D1.5.4, V.D1.6.1- V.D1.6.3, V.D2.4.1- V.D2.4.4.
BWR	Emergency core cooling system valves and lines to and from HPCI and RCIC pump turbines	Wall thinning from flow-accelerated corrosion	Flow-accelerated corrosion	No	V.D2.1.9, V.D2.1.10, V.D2.3.1.
BWR/ PWR	Pumps, valves, piping and fittings in containment spray (PWR only) and emergency core cooling systems	Crack initiation and growth from SCC	Water chemistry and inservice inspection	No	V.A.1.1- V.A.1.3, V.A.1.5, V.A.3.1, V.A.4.1, V.D1.1.1- V.D1.1.6, V.D1.2.1, V.D1.4.1, V.D2.1.1- V.D2.1.7, V.D2.3.1.

**Table 2. Summary of Aging Management Programs for Engineered Safety
Features Evaluated in Chapter V of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Carbon steel components	Loss of material from boric acid corrosion	Boric acid corrosion	No	V.A.1.4, V.A.3.2, V.A.4.2, V.A.5.2, V.A.6.3- V.A.6.5, V.D1.1.7, V.D1.2.1, V.D1.2.2, V.D1.3.1, V.D1.4.1, V.D1.4.2, V.D1.5.3- V.D1.5.5, V.D1.6.3, V.D1.6.4, V.D1.7.1- V.D1.7.3, V.D1.8.4, V.E.1.1.
BWR/ PWR	External surface of carbon steel components	Loss of material from atmospheric corrosion	Protective coating monitoring and maintenance program	No	V.E.1.1.
BWR/ PWR	Closure bolting in high-pressure or high-temperature systems	Loss of material from atmospheric corrosion, loss of preload from stress relaxation, and crack initiation and growth from cyclic loading, stress-corrosion cracking	Bolting integrity	No	V.E.2.1.

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Components in spent fuel pool cooling and cleanup	Loss of material from general and pitting and crevice corrosion	Water chemistry	Yes, detection of aging effects should be further evaluated	VII A3.2.1 VII A3.3.1 VII A3.5.1 VII A3.5.2 VII A4.1.1 VII A4.2.1 VII A4.3.1 VII A4.4.2- VII A4.4.4 VII A4.5.1 VII A4.5.2 VII A4.6.1
BWR/ PWR	Valve lining in spent fuel pool cooling and cleanup system, and seals in ventilation systems	Materials degradation from cracking, wear, or hardening from loss of strength	Plant-specific	Yes, plant-specific	VII A3.3.3 VII A4.3.2 VII F1.1.3 VII F1.1.4 VII F1.4.3 VII F2.1.3 VII F2.1.4 VII F2.4.3 VII F3.1.3 VII F3.1.4 VII F3.4.3 VII F4.1.3 VII F4.1.4
BWR/ PWR	Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21 (c)	Yes, TLAA	VII B.1.1 VII E1.1.1 VII E1.1.2 VII E1.3.1 VII E1.3.2 VII E1.5.1 VII E1.5.2 VII E1.7.1 - VII E1.7.5 VII E1.8.1- VII E1.8.5 VII E3.1.1 VII E3.2.1 VII E3.2.2 VII E4.1.1
BWR/ PWR	Heat exchangers in reactor water cleanup system (BWR) and chemical and	Crack initiation and growth from SCC or unanticipated cyclic loading	Plant-specific	Yes, plant-specific	VII E1.7.1- VII E1.7.4 VII E1.8.1- VII E1.8.3 VII E3.3.1- VII E3.3.4 VII E3.4.1-

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
	chemical and volume control system (PWR)				VII E3.4.4
BWR/ PWR	Ducts, piping in air handling, and filters in heating /cooling ventilation systems, and components in emergency diesel generator systems	Loss of material from MIC, corrosion, wear or erosion/corrosion	Plant-specific	Yes, plant-specific	VII F1.1.1 VII F1.1.2 VII F1.2.1 VII F1.3.1 VII F1.4.1 VII F2.1.1 VII F2.1.2 VII F2.2.1 VII F2.3.1 VII F2.4.1 VII F3.1.1 VII F3.1.2 VII F3.2.1 VII F3.3.1 VII F3.4.1 VII F4.1.1 VII F4.1.2 VII F4.2.1 VII F4.3.1 VII H2.1.1 VII H2.1.2 VII H2.2.1- VII H2.2.4 VII H2.3.1- VII H2.3.3 VII H2.4.1 VII H2.4.2.
BWR/ PWR	Charcoal absorber filler in ventilation systems	Loss of iodine retention capacity from absorption of moisture	Plant-specific	Yes, plant-specific	VII F1.4.2 VII F2.4.2 VII F3.4.2
BWR/ PWR	Components in reactor coolant pump oil collect system	Loss of material from galvanic, general, pitting, and crevice corrosion	Fire Protection	Yes, detection and aging effects should be further evaluated	VII G.7.1 VII G.7.2

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Diesel engine cooling water subsystem	Cracking from cycle loading	Plant-specific	Yes, plant-specific	VII H2.1.1 VII H2.1.2
BWR/ PWR	Diesel fuel oil strainer and tanks	Loss of material from corrosion, buildup of deposit from biofouling	Fuel oil chemistry	Yes, detection of aging effects should be further evaluated	VII H1.4.1 VII H2.5.1 VII H2.5.2
BWR	Piping, pump casing, and valve body and bonnets in shutdown cooling system (older BWR)	Loss of material from general and pitting and crevice corrosion	Water chemistry	Yes, detection of aging effects should be further evaluated	VII E4.1.1 VII E4.2.1 VII E4.3.1
BWR	Piping in contact with reactor coolant in standby liquid control system	Crack initiation and growth from SCC	Plant-specific	Yes, plant-specific	VII E2.1.1
PWR	External surfaces of low-pressure stainless steel piping and valves in chemical and volume control system (PWR)	Crack initiation and growth from SCC from electrical heat tracing tape adhesive	Plant-specific	Yes, plant-specific	VII E1.2.1 VII E1.4.1
BWR/ PWR	New fuel rack assembly	Loss of material from corrosion or coating degradation	Structural monitoring	No	VII A1.1.1
BWR/ PWR	Neutron absorbing sheets in	Reduction in neutron absorbing	Boraflex monitoring	No	VII A2.1.1

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
	spent fuel storage racks	capacity from aging degradation			
BWR/ PWR	Closure bolting and external surfaces of carbon steel components	Loss of material from boric acid corrosion	Boric acid corrosion	No	VII A3.1.1 VII A3.2.1 VII A3.2.2 VII A3.3.1 VII A3.3.2 VII A3.4.1- VII A3.4.3 VII A3.5.1- VII A3.5.3 VII A3.6.1 VII E1.1.2 VII E1.2.2 VII E1.3.2 VII E1.4.2 VII E1.5.2 VII E1.6.1 VII E1.6.2 VII E1.7.5 VII E1.8.5 VII E1.9.1 VII E1.10.1 I.1.1
BWR/ PWR	Components in or serviced by closed- cycle cooling water	Loss of material from corrosion	Closed-cycle cooling water system	No	VII A3.4.1 VII A3.4.2 VII A4.4.1- VII A4.4.3 VII C2.1.1 VII C2.2.1 VII C2.3.1 VII C2.4.1 VII C2.5.1 VII E1.8.4 VII E1.10.2- VII E1.10.4 VII E3.4.4 VII E4.4.1- VII E4.4.4 VII F1.3.1 VII F2.3.1 VII F3.3.1 VII F4.3.1 VII H2.1.1 VII H2.1.2

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Bridge and trolleys in load handling system and rail system	Loss of material from corrosion and wear	Overhead and gantry cranes inspection and maintenance	No	VII B.1.1 VII B.2.1
BWR/ PWR	Components in or serviced by open-cycle cooling water systems	Loss of material from corrosion, or cavitation, or buildup of deposit from biofouling	Open-cycle cooling water system	No	VII C1.1.1 VII C1.2.1 VII C1.3.1- VII C1.3.5 VII C1.4.1 VII C1.5.1 VII C1.6.1 VII C3.1.1 VII C3.2.1 VII C3.3.1 VII H2.1.1 VII H2.1.2
BWR/ PWR	Buried piping	Loss of material from corrosion	Outer surface of buried piping and components	No	VII C1.1.2 VII H1.1.2
BWR/ PWR	Components in compressed air system	Loss of material from corrosion	Compressed air inspection and maintenance	No	VII D.1.1 VII D.1.2 VII D.2.1 VII D.2.2 VII D.3.1 VII D.3.2 VII D.4.1 VII D.4.2 VII D.5.1 VII D.5.2 VII D.6.1
BWR/ PWR	Components (doors, barrier penetration seals) and concrete structures in fire protection	Loss of material from wear; hardness and shrinkage from weathering; or concrete cracking and spalling	Fire protection	No	VII G.1.1- VII G.1.3 VII G.2.1- VII G.2.3 VII G.3.1- VII G.3.3 VII G.4.1- VII G.4.3 VII G.5.1 VII G.5.2

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Components in water based fire protection	Loss of material and buildup of deposit from corrosion	Fire water system	No	VII G.6.1 VII G.6.2
BWR/ PWR	Components in diesel fire system	Loss of material from galvanic, general, pitting, and crevice corrosion	Fire protection	No	VII G.8.1
BWR/ PWR	Tanks in diesel fuel oil system	Loss of material from corrosion	Outer surface of above ground carbon steel tanks	No	H.1.4.2
BWR/ PWR	External surfaces of carbon steel components	Loss of material from atmospheric corrosion	Protective coating monitoring and maintenance	No	VII H1.1.1 VII H1.2.1 VII H1.2.2 VII H1.3.1 VII H1.3.2 VII I.1.1
BWR/ PWR	Closure bolting	Loss of material from atmospheric corrosion, or loss of preload, from stress relaxation, or crack initiation and growth from cyclic loading, or stress corrosion cracking	Bolting integrity	No	VII I.2.1.
BWR	Components in contact with sodium pentaborate solution in standby liquid control	Crack initiation and growth from SCC	Inservice inspection	No	VII E2.1.1 VII E2.2.1 VII E2.2.2 VII E2.3.1 VII E2.4.1

**Table 3. Summary of Aging Management Programs for Auxiliary Systems
Evaluated in Chapter VII of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
	systems (BWR)				
BWR	Components in reactor water cleanup system and shutdown cooling system (older BWR)	Crack initiation and growth from SCC	BWRVIP water chemistry inservice inspection	No	VII E3.1.1 VII E3.2.1 VII E4.1.1 VII E4.3.1

Table 4. Summary of Aging Management Programs for Steam and Power Conversion System Evaluated in Chapter VIII of the GALL Report

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
PWR	Piping and fittings in main feedwater line and in steam line	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	VIII B1.1.1, VIII D1.1.1.
PWR/ BWR	Carbon steel piping, valve bodies, pump casing, and tanks. (except main steam system)	Loss of material from general, crevice, and pitting corrosion	Water chemistry	Yes, detection of aging effects should be further evaluated	VIII D1.1.1, VIII D1.2.1, VIII D1.3.1- VIII D1.3.2, VIII D2.1.1, VIII D2.2.1, VIII D2.3.1, VIII D2.3.2, VIII E.5.1, VIII E.6.1- VIII E.6.4, VIII F.1.1, VIII F.1.2, VIII F.2.1, VIII F.3.1, VIII G.1.1, VIII G.1.2, VIII G.2.1, VIII G.2.2, VIII G.3.1, VIII G.4.1.
PWR	Oil coolers and AFW piping	Loss of material from general and microbiologically influenced corrosion, and buildup of deposit from biofouling	Plant-specific	Yes, plant specific	VIII G.1.1, VIII G.2.1, VIII G.5.1- VIII G.5.3.

Table 4. Summary of Aging Management Programs for Steam and Power Conversion System Evaluated in Chapter VIII of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Carbon steel piping, valve bodies, and pump casings	Wall thinning from flow- accelerated corrosion	Flow- accelerated corrosion	No	VIII A.1.1, VIII A.1.2, VIII A.2.1, VIII B1.1.1- VIII B1.1.6, VIII B1.2.1, VIII B2.1.1- VIII B2.1.7, VIII B2.2.1, VIII C.1.1, VIII C.1.2, VIII C.2.1, VIII D1.1.1, VIII D1.2.1, VIII D1.3.1, VIII D1.3.2, VIII D2.1.1, VIII D2.2.1, VIII D2.3.1, VIII D2.3.2, VIII E.1.1, VIII E.2.1, VIII E.3.1, VIII F.1.1, VIII F.1.2, VIII F.2.1, VIII F.3.1, VIII G.1.1.
BWR/ PWR	Carbon steel piping and valve bodies in main steam system	Loss of material from crevice and pitting corrosion	Water chemistry	No	VIII B1.1.1, VIII B1.1.2, VIII B1.2.1, VIII B2.1.1, VIII B2.1.2, VIII B2.2.1.
BWR/ PWR	Closure bolting in high- pressure or high- temperature systems	Loss of material from atmospheric corrosion, loss of preload from stress relaxation, and crack initiation and	Bolting integrity	No	VIII H.2.1.

Table 4. Summary of Aging Management Programs for Steam and Power Conversion System Evaluated in Chapter VIII of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
		growth from cyclic loading, stress corrosion cracking.			
BWR/ PWR	Heat exchangers and coolers/ condensers serviced by open-cycle cooling water	Loss of material from general and microbio-logically influenced corrosion, and buildup of deposit from biofouling	Open-cycle cooling water system	No	VIII E.4.1- VIII E.4.4, VIII F.4.1- VIII F.4.4, VIII G.5.1- VIII G.5.3.
BWR/ PWR	Heat exchangers and coolers/ condensers serviced by closed-cycle cooling water	Loss of material from general corrosion	Closed-cycle cooling water system	No	VIII E.4.1- VIII E.4.4, VIII F.4.1- VIII F.4.4, VIII G.5.1- VIII G.5.3.
BWR/ PWR	External surface of above-ground condensate storage tank	Loss of material from general corrosion	Outer surface of above ground carbon steel tanks	No	VIII E.5.1, VIII G.4.1.
BWR/ PWR	External surface of buried condensate storage tank and AFW piping	Loss of material from general, galvanic, & microbio-logically influenced corrosion	Outer surface of buried piping and components	No	VIII E.5.1, VIII G.1.2, VIII G.4.1.
PWR	External surface of carbon steel components	Loss of material from boric acid corrosion	Boric acid corrosion	No	VIII H.1.1.
BWR/ PWR	External surface of carbon steel components	Loss of material from atmospheric corrosion	Protective coating monitoring and maintenance	No	VIII H.1.1.

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
Common Components of All Types of PWR and BWR Containment					
BWR/ PWR	Penetration sleeves, penetration bellows, and dissimilar metal welds	Cumulative fatigue damage	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	II.A3.1, II.B4.1.
BWR/ PWR	Penetration sleeves, bellows, and dissimilar metal welds. For BWR only Steel Elements: downcomers and vent header	Cracking for cyclic loading & crack initiation and growth from SCC	Containment inservice inspection and containment leak rate test	Yes, detection of aging effects should be further evaluated	II.A3.1, II.B4.1, II.B2.2.2, II.B1.1, II.B2.1.1, III.A7.2, III.A8.2, III.B1.1.1, III.B1.2.1, III.B1.3.1.
BWR/ PWR	Penetration sleeves, penetration bellows, and dissimilar metal welds	Loss of material from corrosion	Containment inservice inspection and containment leak rate test	No	II.A3.1, II.B4.1.
BWR/ PWR	Personnel airlock and equipment hatch	Loss of material from corrosion	Containment inservice inspection and containment leak rate test	No	II.A3.2, II.B4.2.
BWR/ PWR	Personnel airlock and equipment hatch	Fretting/lock-up from wear of locks, hinges, and closures mechanisms	Containment inservice inspection	No	II.A3.2, II.B4.2.

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Seals, gaskets, and moisture barriers	Loss of sealant and leakage through containment from deterioration of seals, gaskets, and moisture barriers	Containment inservice inspection and containment leak rate test	No	II.A3.3, II.B4.3.
PWR Concrete (Reinforce and Prestressed) and Steel Containment BWR Concrete (Mark II and III) and Steel (Mark I, II and III) Containment					
BWR/ PWR	Concrete elements: Basemat, exterior walls below grade.	Aging of inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment inservice inspection	Yes, for inaccessible areas	II.A1.1, II.A2.2, II.B2.2.1, II.B3.1.2, II.B3.2.1.
BWR/ PWR	Concrete elements: Basemat	Cracks, distortion, and increases in components stress level from settlement	Containment structure settlement monitoring	Yes. if applicable, proper functioning of de-watering system should be evaluated	II.A1.1, II.A2.2, II.B2.2.1, II.B3.1.2, II.B3.2.1, III.A1.1, III.A2.1, III.A3.1, III.A5.1, III.A6.1, III.A7.1, III.A8.1, III.A9.1.
BWR/ PWR	Concrete elements: Foundation	Reduction in foundation strength from erosion of porous concrete	Containment structure settlement monitoring	Yes. if applicable, proper functioning of de-watering system should be evaluated	II.A1.1, II.A2.2, II.B2.2.1, II.B3.1.2, II.B3.2.1, IIIA1.1,

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
		subfounda- tion			IIIA2.1, IIIA3.1, IIIA5.1, IIIA6.1, IIIA7.1, IIIA8.1, IIIA9.1.
BWR/ PWR	Concrete elements: Basemat, dome, and wall	Loss of strength and modulus from elevated temperature	Plant-specific	Yes, for any portions of concrete containment that exceed specified temperature limits	II.A1.1, II.A2.2, II.B2.2.1, II.B3.1.2, II.B3.2.1, III.A1.1, III.A2.1, III.A3.1, III.A4.1, III.A5.1.
BWR/ PWR	Prestressed containment: Tendons and anchorage components	Loss of prestress from relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	II.A1.3, II.B2.2.3.
BWR/ PWR	Steel elements: Liner plates and steel structures	Aging of inaccessible steel areas: Loss of material from corrosion	Containment inservice inspection and containment leak rate test	Yes, for inaccessible areas	II.A1.2, II.A2.1, II.B1.1.1, II.B2.1.1, II.B2.2.2, II.B3.1.1, II.B3.2.2.
BWR	Steel elements: Vent header, drywell head, torus, downcomers, s. pool shell (designed to a fatigue analysis)	Cumulative fatigue damage	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	II.B1.1, II.B2.1.1, II.B2.2.2.

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Steel elements: protected by coating	Loss of material from corrosion	Protective coating monitoring and maintenance	No	II.A1.2, II.A2.1, II.A3.1, II.A3.2, II.B1.1.1, II.B2.1.1, II.B2.2.2, II.B3.1.1, II.B3.2.2 II.B4.1, II.B4.2.
BWR/ PWR	Prestressed containment: Tendons and anchorage components	Loss of material from corrosion of prestressing tendons, anchorage components	Containment inservice inspection	No	II.A1.3, II.B2.2.3.
BWR/ PWR	Concrete elements Basemat, dome, and wall	Scaling, cracking, and spalling from freeze-thaw; expansion and cracking from reaction with aggregates	Containment inservice inspection	No	II.A1.1 II.A2.2 II B2.2.1 II.B3.1.2 II.B3.2.1
BWR	Steel elements: Vent line bellows	Crack initiation and growth from SCC	Containment inservice inspection	No	II.B1.1.1
BWR	Steel elements: Suppression chamber liner	Crack initiation and growth from SCC	Containment inservice inspection and containment leak rate test	No	II.B2.2.2 II.B3.1.1 II.B3.2.2
BWR	Steel elements: Drywell head, and downcomer pipes	Fretting and lock up from wear of locks, hinges and closures mechanisms	Containment inservice inspection	No	II.B1.1.1 II.B2.1.1 II.B2.2.2

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
CLASS I STRUCTURES					
BWR/ PWR	All Groups except Group 6: Accessible interior/ exterior concrete & steel components.	All types of aging effects	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	III.A1.1 III.A1.2 III.A2.1 III.A2.2 III.A3.1 III.A3.2 III.A4.1 III.A4.2 III.A5.1 III.A5.2 III.A7.1 III.A7.2 III.A8.1 III.A8.2 III.A9.1
BWR/ PWR	All Groups except group 6: Inaccessible concrete & steel components such as exterior walls below grade and foundation	Aging of Inaccessible concrete and steel areas due to corrosion, leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Plant-specific	Yes, for inaccessible area	III.A1.1 III.A1.2 III.A2.1 III.A2.2 III.A3.1 III.A3.2 III.A5.1 III.A5.2 III.A7.1 III.A7.2 III.A8.1 III.A8.2 III.A9.1
BWR/ PWR	Group 6: All accessible/inaccessible concrete & steel components	All types of aging effects including loss of material from Abrasion; cavitation & corrosion	Inspection of water-controlled structures	No	III.A.6.1 III.A.6.2
BWR/ PWR	Group 5: Liners	Crack initiation and growth from SCC and loss of material from	Monitoring of the leak in fuel storage facility	No	III.A5.2

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
		crevice corrosion			
BWR/ PWR	Groups 1-3, 5-6: All masonry block walls	Cracking from restraint, shrinkage, creep, and aggressive environment	Masonry wall	No	III.A1.3 III.A2.3 III.A3.3 III.A5.3 III.A6.3
COMPONENT SUPPORTS:					
BWR/ PWR	All Groups: Support members, anchor bolts, and welds, Concrete surrounding anchor bolts, grout pad, Bolted friction connections etc.	Aging of component supports	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	III.B1.1.4 III.B1.2.3 III.B1.3.3 III.B2.1 III.B2.2 III.B2.3 III.B3.1 III.B3.2 III.B4.1 III.B4.2 III.B4.3 III.B5.1 III.B5.2
BWR/ PWR	Groups B1.1, B1.2, and B1.3: Support members, anchor bolts, and welds	Cumulative fatigue damage	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	III.B1.1.1 III.B1.2.1 III.B1.3.1

Table 5. Summary of Aging Management Programs for Structures and Component Supports Evaluated in Chapters II and III of the GALL Report (cont'd)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	All Groups: Support members, anchor bolts, and welds	Loss of material from boric acid corrosion	Boric acid corrosion	No	III.B1.1.1 III.B1.2.1 III.B2.1 III.B3.1 III.B4.1 III.B5.1
BWR/ PWR	Groups B1.1, B1.2, and B1.3: Support members, anchor bolts, welds, Spring hangers, guides, stops, and vibration isolators	Loss of material from environ- mental corrosion; Loss of mechanical function; and Cracking from cyclic loading	Inservice inspection	No	III.B1.1.1 III.B1.1.3 III.B1.2.1 III.B1.2.2 III.B1.3.1 III.B1.3.2
BWR/ PWR	Group B1.1: High strength low-alloy bolts	Cracking initiation and growth from SCC	Bolting integrity	No	III.B1.1.2

**Table 6. Summary of Aging Management Programs for Electrical Components
Evaluated in Chapter VI of the GALL Report**

Type	Component	Aging Effect/ Mechanisms	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Degradation due to various aging mechanisms	EQ program	Yes, TLAA	VI.B.1.1.
BWR/ PWR	Non-EQ electrical cables and connections	Embrittlement, cracking, melting, discoloration, leading to reduced insulation resistance, electrical failure, caused by thermal/thermooxidative degradation of organics, radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation	Aging management program for Non-EQ electrical cables and connections exposed to an adverse localized environment caused by heat or radiation	No	VI.A.1.1.

**Table 6. Summary of Aging Management Programs for Electrical Components
Evaluated in Chapter VI of the GALL Report (cont'd)**

Type	Component	Aging Effect/ Mechanisms	Aging Management Programs	Further Evaluation Recommended	Item Number in GALL
BWR/ PWR	Non-EQ electrical cables used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR)	Embrittlement, cracking, melting, discoloration, leading to reduced insulation resistance, electrical failure, caused by thermal/thermooxidative degradation of organics, radiation-induced oxidation	Aging management program for Non-EQ electrical cables used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR) exposed to an adverse localized environment caused by heat or radiation	No	VI.A.1.2.
BWR/ PWR	Non-EQ inaccessible medium-voltage (2kV to 15kV) cables (e.g., installed in conduit or direct buried)	Formation of water trees, localized damage, leading to electrical failure (breakdown of insulation), caused by moisture intrusion, water trees	Aging management program for Non-EQ inaccessible medium-voltage cables exposed to an adverse localized environment caused by moisture and voltage exposure	No	VI.A.1.3.
BWR/ PWR	Non-EQ electrical connectors exposed to borated water leakage	Corrosion of connector contact surfaces caused by intrusion of borated water	Borated water leakage surveillance program for Non-EQ electrical connectors	No	VI.A.2.1.

APPENDIX

PLANT SYSTEMS EVALUATED IN THE GALL REPORT (VOLUME 2)

TABLE OF ITEM NUMBERS IN THE GALL REPORT (VOLUME 2)

Plant Systems
Evaluated in the GALL Report (Vol. 2)

Type	System	Section in GALL (Vol. 2)
BWR	Automatic Depressurization System	V D2
BWR	Containment Structures: Common components Mark I steel containments Mark II concrete and steel containments Mark III concrete and steel containments	II B1, II B2, II B3, II B4
BWR	High-pressure Coolant Injection	V D2
BWR	High-pressure Core Spray	V D2
BWR	Low-pressure Coolant Injection and Residual Heat Removal	V D2
BWR	Low-pressure Core Spray	V D2
BWR	Reactor Building	III A1
BWR	Reactor Building with Steel Superstructure	III A2
BWR	Reactor Coolant Pressure Boundary	IV C1
BWR	Reactor Coolant System Connected Systems (Up to and including the Second Isolation Valve): Automatic Depressurization System Feedwater High pressure Core Spray High-pressure Coolant Injection Isolation Condenser Low-pressure Coolant Injection Low-pressure Core Spray Main Steam Reactor Core Isolation Cooling Reactor Water Cleanup Recirculation System Residual Heat Removal Shutdown Cooling Standby Liquid Control	IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1 IV C1
BWR	Reactor Core Isolation Cooling	V D2
BWR	Reactor Vessel	IV A1
BWR	Reactor Vessel Internals	IV B1

Type	System	Section in GALL (Vol. 2)
BWR	Reactor Water Cleanup System	VII E3
BWR	Shutdown Cooling System (older plants)	VII E4
BWR	Standby Gas Treatment System	V B
BWR	Standby Liquid Control System	VII E2
BWR	Suppression Pool Cleanup System	VII A5
BWR	Unit Vent Stack	III A9
BWR/PWR	Auxiliary and Radwaste Area Ventilation System	VII F2
BWR/PWR	Auxiliary Building, Diesel Generator Building, Radwaste Building, Turbine Building, Switchgear Room, Auxiliary Feedwater Pump House, Utility/Piping Tunnels	III A3
BWR/PWR	Carbon Steel Components	V E, VII I, VIII H
BWR/PWR	Closed Cycle Cooling Water system (reactor auxiliary cooling water)	VII C2
BWR/PWR	Component Supports	III B
BWR/PWR	Compressed Air System	VII D
BWR/PWR	Concrete Tanks	III A7
BWR/PWR	Condensate System	VIII E
BWR/PWR	Containment Internal Structures, excluding Refueling Canal	III A4
BWR/PWR	Containment Isolation Components (Containment Isolation Valves for In-Scope Systems are addressed in Chapters IV, VII, and VIII)	V C
BWR/PWR	Control Room Building	III A1
BWR/PWR	Control Room Area Ventilation System	VII F1
BWR/PWR	Demineralized Water Makeup	Not in scope of 10 CFR 50.54
BWR/PWR	Diesel Fuel Oil System	VII H1
BWR/PWR	Diesel Generator Building Ventilation System	VII F4
BWR/PWR	Electrical Components	VI A, B
BWR/PWR	Emergency Diesel Generator System	VII H2

Type	System	Section in GALL (Vol. 2)
BWR/PWR	Extraction Steam System	VIII C
BWR/PWR	Feedwater System	VIII D2, D1
BWR/PWR	Fire Protection	VII G
BWR/PWR	Fuel Storage Facility, Refueling Canal	III A5
BWR/PWR	Heating and Ventilation Systems	VII F1, F2, F3, F4
BWR/PWR	Main Steam System	VIII B2, B1
BWR/PWR	New and Spent Fuel Storage	VII A1, A2
BWR/PWR	Open Cycle Cooling Water System (service water system)	VII C1
BWR/PWR	Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	VII B
BWR/PWR	Potable and Sanitary Water	Not in scope of 10 CFR 50.54
BWR/PWR	Primary Containment Heating and Ventilation System	VII F3
BWR/PWR	Refueling Canal	III A5
BWR/PWR	Spent Fuel Pool Cooling and Cleanup	VII A3, A4
BWR/PWR	Steam Turbine System	VIII A
BWR/PWR	Steel Tanks	III A8
BWR/PWR	Ultimate Heat Sink	VII C3
BWR/PWR	Water-Control Structures (intake structure, cooling tower, and spray pond)	III A6
PWR	Accumulators	V D1
PWR	Auxiliary Feedwater System	VIII G
PWR	Chemical and Volume Control	VII E1
PWR	Combustible Gas Control (containment H ₂ control)	V E1
PWR	Containment Spray System	V A
PWR	Containments:	II A1
	Common Components	II A2
	Concrete Containments	II A3
PWR	Coolant Storage/Refueling Water System	V D1

Type	System	Section in GALL (Vol. 2)
PWR	Core Flood System (see Accumulators or Safety Injection Tanks)	V D1
PWR	High-Pressure Safety Injection	V D1
PWR	Lines to Chemical and Volume Control System	V D1
PWR	Low-Pressure Safety Injection	V D1
PWR	Shield Building	III A1
PWR	Reactor Coolant System and Connected Lines (Up to and including the Second Isolation Valve): Chemical and Volume Control System Core Flood System Drains and Instrumentation Lines High Pressure Injection System Low Pressure Injection Residual Heat Removal or Shutdown Cooling Safety Injection Sampling system	 IV C2 IV C2 IV C2 IV C2 IV C2 IV C2 IV C2 IV C2
PWR	Reactor Coolant System, Pressurizer, Pressurizer Relief Tank (and other Class 1 components)	IV C2
PWR	Reactor Vessel	IV A2
PWR	Reactor Vessel Internals	IV B2, B3, B4
PWR	Residual Heat Removal or Shutdown Cooling	V D1
PWR	Safety Injection Tanks	V D1
PWR	Steam Generator Blowdown System	VIII F
PWR	Steam Generators	IV D1, IV D2

Table of Item Numbers in the GALL Report
Chapter II. Containment Structures

Item Number in GALL	Description
II.A	Pressurized Water Reactor (PWR) Containments
II.A1	Concrete Containments (Reinforced and Prestressed)
II.A1.1	Concrete elements
II.A1.2	Steel elements
II.A1.3	Prestressing system
II.A2	Steel Containments
II.A2.1	Steel elements
II.A2.2	Concrete elements
II.A3	Common Components
II.A3.1	Penetration sleeves, penetration bellows, dissimilar metal welds
II.A3.2	Personnel air lock, equipment hatch
II.A3.3	Seals, gaskets, and moisture barriers
II.B	Boiling Water Reactor (BWR) Containments
II.B1	Mark I Containments
II.B1.1	Steel Containments
II.B1.1.1	Steel elements
II.B2	Mark II Containments
II.B2.1	Steel Containments
II.B2.1.1	Steel elements
II.B2.2	Concrete Containments
II.B2.2.1	Concrete elements
II.B2.2.2	Steel elements
II.B2.2.3	Prestressing system
II.B3	Mark III Containments
II.B3.1	Steel Containments
II.B3.1.1	Steel elements
II.B3.1.2	Concrete elements
II.B3.2	Concrete Containments
II.B3.2.1	Concrete elements
II.B3.2.2	Steel elements
II.B4	Common Components
II.B4.1	Penetration sleeves, penetration bellows, dissimilar metal welds
II.B4.2	Personnel air lock, equipment hatch, CRD hatch
II.B4.3	Seals, gaskets, and moisture barriers

Table of Item Numbers in the GALL Report
Chapter III. Class I Structures and Component Supports

Item Number in GALL	Description
III.A	Class I Structures
III.A1	BWR Reactor Building, PWR Shield Building, Control Room/Building
III.A1.1	Concrete elements
III.A1.2	Steel elements
III.A1.3	Masonry walls
III.A2	BWR Reactor Building with Steel Superstructure
III.A2.1	Concrete elements
III.A2.2	Steel elements
III.A2.3	Masonry walls
III.A3	Auxiliary Building, Diesel Generator Building, Radwaste Building, Turbine building, Switchgear Room, AFW Pumphouse, Utility/Piping Tunnels
III.A3.1	Concrete elements
III.A3.2	Steel elements
III.A3.3	Masonry walls
III.A4	Containment Internal, excluding Refueling Canal
III.A4.1	Concrete elements
III.A4.2	Steel elements
III.A4.3	Prestressing systems
III.A5	Fuel Storage Facility, Refueling Canal
III.A5.1	Concrete elements
III.A5.2	Steel elements
III.A5.3	Masonry walls
III.A6	Water Control Structures (intake structure, cooling tower, spray pond)
III.A6.1	Concrete elements
III.A6.2	Steel elements
III.A6.3	Masonry walls
III.A7	Concrete Tanks
III.A7.1	Concrete elements
III.A7.2	Steel elements
III.A8	Steel Tanks
III.A8.1	Concrete elements
III.A8.2	Steel elements
III.A9	BWR Unit Vent Stack
III.A9.1	Concrete elements

III.B	Component Supports
III.B1.1	Supports for ASME Class I Piping and Components
III.B1.1.1	Support members, anchor bolts, welds
III.B1.1.2	High strength bolts for major NSSS components
III.B1.1.3	Constant/variable load spring hangers, guides, stops, sliding surfaces, design clearances
III.B1.1.4	Building concrete surrounding anchor bolts, grout pads
III.B1.2	Supports for ASME Class 2,3 and MC Piping and Components
III.B1.2.1	Support members, anchor bolts, welds
III.B1.2.2	Constant/variable load spring hangers, guides, stops, sliding surfaces, design clearances
III.B1.2.3	Building concrete surrounding anchor bolts, grout pads
III.B1.3	Class MC (BWR Containment Supports)
III.B1.3.1	Support Members; anchor bolts; welds
III.B1.3.2	Guides; stops; sliding surfaces; design clearances
III.B1.3.3	Building concrete surrounding anchor bolts; grout pads
III.B2	Supports for Cable Tray, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components
III.B2.1	Support members, anchor bolts, welds
III.B2.2	Bolted friction connections (e.g. struts)
III.B2.3	Building concrete surrounding anchor bolts, grout pads
III.B3	Anchorage of Racks, Panels, Cabinets, and Enclosures for Electric Equipment and Instrumentation
III.B3.1	Support members, anchor bolts, welds
III.B3.2	Building concrete surrounding anchor bolts, grout pads
III.B4	Supports for Emergency Diesel Generator (EDG), HVAC System Components, and Other Miscellaneous Equipment
III.B4.1	Support members, anchor bolts, welds
III.B4.2	Vibration isolation elements
III.B4.3	Building concrete surrounding anchor bolts, grout pads
III.B5	Supports for Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Steel Structures
III.B5.1	Support members, anchor bolts, welds
III.B5.2	Building concrete surrounding anchor bolts, grout pads

Table of Item Numbers in the GALL Report
Chapter IV.A1. Reactor Vessel (BWR)

Item Number in GALL	Description
IV.A1.1	Top head enclosure
IV.A1.1.1	Top head
IV.A1.1.2	Nozzles (vent, top head spray or RCIC, and spare)
IV.A1.1.3	Head flange
IV.A1.1.4	Closure studs and nuts
IV.A1.1.5	Vessel flange leak detection line
IV.A1.2	Vessel shell
IV.A1.2.1	Vessel flange
IV.A1.2.2	Upper shell
IV.A1.2.3	Intermediate nozzle shell
IV.A1.2.4	Intermediate beltline shell
IV.A1.2.5	Lower shell
IV.A1.2.6	Beltline welds
IV.A1.2.7	Attachment welds
IV.A1.3	Nozzles
IV.A1.3.1	Main steam
IV.A1.3.2	Feedwater
IV.A1.3.3	CRD return line
IV.A1.3.4	Low-pressure coolant injection (LPCI) or RHR injection mode
IV.A1.4	Nozzles safe ends
IV.A1.4.1	High-pressure core spray (HPCS)
IV.A1.4.2	Low-pressure core spray (LPCS)
IV.A1.4.3	CRD return line
IV.A1.4.4	Recirculating water (inlet and outlet)
IV.A1.4.5	Low-pressure coolant injection (LPCI) or RHR injection mode
IV.A1.5	Penetrations
IV.A1.5.1	CRD stub tubes
IV.A1.5.2	Instrumentation
IV.A1.5.3	Jet pump instrument
IV.A1.5.4	Standby liquid control
IV.A1.5.5	Flux monitor
IV.A1.5.6	Drain line
IV.A1.6	Bottom head
IV.A1.7	Support skirt and attachment welds

Table of Item Numbers in the GALL Report
Chapter IV.A2. Reactor Vessel (PWR)

Item Number in GALL	Description
IV.A2.1	Closure head
IV.A2.1.1	Dome
IV.A2.1.2	Head flange
IV.A2.1.3	Stud assembly
IV.A2.1.4	Vessel flange leak detection line
IV.A2.2	Control rod drive (CRD) mechanism
IV.A2.2.1	Nozzle
IV.A2.2.2	Pressure housing
IV.A2.3	Nozzles
IV.A2.3.1	Inlet
IV.A2.3.2	Outlet
IV.A2.3.3	Safety injection (on some)
IV.A2.4	Nozzle safe ends
IV.A2.4.1	Inlet
IV.A2.4.2	Outlet
IV.A2.4.3	Safety injection (on some)
IV.A2.5	Shell
IV.A2.5.1	Upper (nozzle) shell
IV.A2.5.2	Intermediate and lower shell
IV.A2.5.3	Vessel flange
IV.A2.6	Core support pads
IV.A2.7	Penetrations
IV.A2.7.1	Instrumentation tubes (bottom head)
IV.A2.7.2	Head vent pipe (top head)
IV.A2.8	Pressure vessel support
IV.A2.8.1	Skirt support
IV.A2.8.2	Cantilever/column support
IV.A2.8.3	Neutron shield tank

**Table of Item Numbers in the GALL Report
Chapter IV.B1. Reactor Vessel Internals (BWR)**

Item Number in GALL	Description
IV.B1.1	Core shroud, shroud head, and core plate
IV.B1.1.1	Core shroud (upper, central, lower)
IV.B1.1.2	Core plate
IV.B1.1.3	Core plate bolts
IV.B1.1.4	Access hole cover
IV.B1.1.5	Shroud support structure
IV.B1.1.6	Standby liquid control line
IV.B1.1.7	LPCI coupling
IV.B1.2	Top guide
IV.B1.3	Core spray lines and spargers
IV.B1.3.1	Core spray lines (headers)
IV.B1.3.2	Spray ring
IV.B1.3.3	Spray nozzles
IV.B1.3.4	Thermal sleeve
IV.B1.4	Jet pump assemblies
IV.B1.4.1	Thermal sleeve
IV.B1.4.2	Inlet header
IV.B1.4.3	Riser brace arm
IV.B1.4.4	Holddown beams
IV.B1.4.5	Inlet elbow
IV.B1.4.6	Mixing assembly
IV.B1.4.7	Diffuser
IV.B1.4.8	Castings
IV.B1.4.9	Jet pump sensing line
IV.B1.5	Fuel support and control rod drive (CRD) assemblies
IV.B1.5.1	Orificed fuel support
IV.B1.5.2	CRD housing
IV.B1.6	Instrument housings
IV.B1.6.1	Intermediate range monitor (IRM) dry tubes
IV.B1.6.2	Low power range monitor (LPRM) dry tubes
IV.B1.6.3	Source range monitor (SRM) dry tubes
IV.B1.7	Separator support ring

Table of Item Numbers in the GALL Report
Chapter IV.B2. Reactor Vessel Internals (PWR) - Westinghouse

Item Number in GALL	Description
IV.B2.1	Upper internals assembly
IV.B2.1.1	Upper support plate
IV.B2.1.2	Upper support column
IV.B2.1.3	Upper support column bolts
IV.B2.1.4	Upper core plate
IV.B2.1.5	Upper core plate alignment pins
IV.B2.1.6	Fuel alignment pins
IV.B2.1.7	Hold-down spring
IV.B2.2	RCCA guide tube assemblies
IV.B2.2.1	RCCA guide tubes
IV.B2.2.2	RCCA guide tube bolts
IV.B2.2.3	RCCA guide tube support pins
IV.B2.3	Core barrel
IV.B2.3.1	Core barrel
IV.B2.3.2	Core barrel flange
IV.B2.3.3	Core barrel outlet nozzles
IV.B2.3.4	Thermal shield
IV.B2.4	Baffle/former assembly
IV.B2.4.1	Baffle/former plates
IV.B2.4.2	Baffle/former bolts
IV.B2.5	Lower internal assembly
IV.B2.5.1	Lower core plate
IV.B2.5.2	Fuel alignment pins
IV.B2.5.3	Lower support forging or casting
IV.B2.5.4	Lower support plate columns
IV.B2.5.5	Lower support plate column bolts
IV.B2.5.6	Radial support keys and clevis inserts
IV.B2.5.7	Clevis insert bolts
IV.B2.6	Instrumentation support structure
IV.B2.6.1	Flux thimble guide tubes
IV.B2.6.2	Flux thimbles

Table of Item Numbers in the GALL Report
Chapter IV.B3. Reactor Vessel Internals (PWR) - Combustion Engineering

Item Number in GALL	Description
IV.B3.1	Upper internals assembly
IV.B3.1.1	Upper guide structure support plate
IV.B3.1.2	Fuel alignment plate
IV.B3.1.3	Fuel alignment plate guide lugs and guide lug inserts
IV.B3.1.4	Hold-down ring
IV.B3.2	CEA shroud assemblies
IV.B3.2.1	CEA shrouds
IV.B3.2.2	CEA shrouds bolts
IV.B3.2.3	CEA shrouds extension shaft guides
IV.B3.3	Core support barrel
IV.B3.3.1	Core support barrel
IV.B3.3.2	Core support barrel upper flange
IV.B3.3.3	Core support barrel alignment keys
IV.B3.4	Core shroud assembly
IV.B3.4.1	Core shroud assembly
IV.B3.4.2	Core shroud assembly bolts
IV.B3.4.3	Core shroud tie rods
IV.B3.5	Lower internal assembly
IV.B3.5.1	Core support plate
IV.B3.5.2	Fuel alignment pins
IV.B3.5.3	Lower support structure beam assemblies
IV.B3.5.4	Core support column
IV.B3.5.5	Core support column bolts
IV.B3.5.6	Core support barrel snubber assemblies

Table of Item Numbers in the GALL Report
Chapter IV.B4. Reactor Vessel Internals (PWR) - Babcock & Wilcox

Item Number in GALL	Description
IV.B4.1	Plenum cover and plenum cylinder
IV.B4.1.1	Plenum cover assembly
IV.B4.1.2	Plenum cylinder
IV.B4.1.3	Reinforcing plates
IV.B4.1.4	Top flange-to-cover bolts
IV.B4.1.5	Bottom flange-to-upper grid screws
IV.B4.2	Upper grid assembly
IV.B4.2.1	Upper grid rib section
IV.B4.2.2	Upper grid ring forging
IV.B4.2.3	Fuel assembly support pads
IV.B4.2.4	Plenum rib pads
IV.B4.2.5	Rib-to-ring screws
IV.B4.3	Control rod guide tube (CRGT) assembly
IV.B4.3.1	CRGT pipe and flange
IV.B4.3.2	CRGT spacer casting
IV.B4.3.3	CRGT spacer screws
IV.B4.3.4	Flange-to-upper grid screws
IV.B4.3.5	CRGT rod guide tubes
IV.B4.3.6	CRGT rod guide sectors
IV.B4.4	Core support shield assembly
IV.B4.4.1	Core support shield cylinder (top and bottom flange)
IV.B4.4.2	Core support shield-to-core barrel bolts
IV.B4.4.3	Outlet and vent valve nozzles
IV.B4.4.4	Vent valve body and retaining ring
IV.B4.4.5	Vent valve assembly locking device
IV.B4.5	Core barrel assembly
IV.B4.5.1	Core barrel cylinder (top and bottom flange)
IV.B4.5.2	Lower internals assembly-to-core barrel bolts
IV.B4.5.3	Core barrel-to-thermal shield bolts
IV.B4.5.4	Baffle plates and formers
IV.B4.5.5	Baffle/former bolts and screws
IV.B4.6	Lower grid (LG) assembly
IV.B4.6.1	Lower grid rib section
IV.B4.6.2	Fuel assembly support pads
IV.B4.6.3	Lower grid rib-to-shell forging screws

IV.B4.6.4	Lower grid flow distributor plate
IV.B4.6.5	Orifice plugs
IV.B4.6.6	Lower grid and shell forgings
IV.B4.6.7	Lower internals assembly-to-thermal shield bolts
IV.B4.6.8	Guide blocks and bolts
IV.B4.6.9	Shock pads and bolts
IV.B4.6.10	Support post pipes
IV.B4.7	Flow distributor
IV.B4.7.1	Flow distributor head and flange
IV.B4.7.2	Shell forging-to-flow distributor bolts
IV.B4.7.3	Incore guide support plate
IV.B4.7.4	Clamping ring
IV.B4.8	Thermal Shield

Table of Item Numbers in the GALL Report
Chapter IV.C1. Reactor Coolant Pressure Boundary (BWR)

Item Number in GALL	Description
IV.C1.1	Piping and fittings
IV.C1.1.1	Main steam
IV.C1.1.2	Feedwater
IV.C1.1.3	High-pressure coolant injection (HPCI) system
IV.C1.1.4	Reactor core isolation cooling (RCIC) system
IV.C1.1.5	Recirculation
IV.C1.1.6	Residual heat removal (RHR) system
IV.C1.1.7	Low-pressure coolant injection (LPCI) system
IV.C1.1.8	Low-pressure core spray (LPCS) system
IV.C1.1.9	High-pressure core spray (HPCS) system
IV.C1.1.10	Lines to isolation condenser
IV.C1.1.11	Lines to reactor water cleanup (RWC) and standby liquid control (SLC) systems
IV.C1.1.12	Steam line to HPCI and RCIC pump turbine
IV.C1.1.13	Small bore piping
IV.C1.2	Recirculation pump
IV.C1.2.1	Casing
IV.C1.2.2	Cover
IV.C1.2.3	Seal flange
IV.C1.2.4	Closure bolting

IV.C1.3	Valves
IV.C1.3.1	Body
IV.C1.3.2	Bonnet
IV.C1.3.3	Seal flange
IV.C1.3.4	Closure bolting
IV.C1.4	Isolation condenser
IV.C1.4.1	Tubing
IV.C1.4.2	Tubesheet
IV.C1.4.3	Channel head
IV.C1.4.4	Shell

Table of Item Numbers in the GALL Report
Chapter IV.C2. Reactor Coolant System and Connected Lines (PWR)

Item Number in GALL	Description
IV.C2.1	Reactor coolant system piping and fittings
IV.C2.1.1	Cold-leg
IV.C2.1.2	Hot-leg
IV.C2.1.3	Surge line
IV.C2.1.4	Spray line
IV.C2.1.5	Small-bore RCS piping, fittings and branch connections NPS 4 or smaller
IV.C2.2	Connected systems piping and fittings
IV.C2.2.1	Residual heat removal (RHR) or low-pressure injection system [Decay heat removal (DHR)/shutdown system]
IV.C2.2.2	Core flood system (CFS)
IV.C2.2.3	High-pressure injection system (makeup and letdown functions)
IV.C2.2.4	Chemical and volume control system
IV.C2.2.5	Sampling system
IV.C2.2.6	Drains and instrument lines
IV.C2.2.7	Nozzles and safe ends
IV.C2.2.8	Small-bore piping, fittings and branch connections NPS 4 or smaller in connected systems
IV.C2.3	Reactor coolant pump
IV.C2.3.1	Casing
IV.C2.3.2	Cover
IV.C2.3.3	Closure bolting
IV.C2.4	Safety and relief valves
IV.C2.4.1	Body

IV.C2.4.2	Bonnet
IV.C2.4.3	Closure bolting
IV.C2.5	Pressurizer
IV.C2.5.1	Shell/heads
IV.C2.5.2	Spray line nozzle
IV.C2.5.3	Surge line nozzle
IV.C2.5.4	Spray head
IV.C2.5.5	Thermal sleeves
IV.C2.5.6	Instrument penetrations
IV.C2.5.7	Safe ends
IV.C2.5.8	Manway and flanges
IV.C2.5.9	Manway and flange bolting
IV.C2.5.10	Heater sheaths and sleeves
IV.C2.5.11	Support keys, skirt, and shear lugs
IV.C2.5.12	Integral support
IV.C2.6	Pressurizer relief tank
IV.C2.6.1	Tank shell and heads
IV.C2.6.2	Flanges and nozzles

Table of Item Numbers in the GALL Report
Chapter IV.D1. Steam Generator (Recirculating)

Item Number in GALL	Description
IV.D1.1	Pressure boundary and structural
IV.D1.1.1	Top head
IV.D1.1.2	Steam Nozzle and safe end
IV.D1.1.3	Upper and lower shell
IV.D1.1.4	Transition cone
IV.D1.1.5	Feedwater nozzle and safe end
IV.D1.1.6	Feedwater impingement plate and support
IV.D1.1.7	Secondary manway and handhole bolting
IV.D1.1.8	Lower head
IV.D1.1.9	Primary nozzles and safe ends
IV.D1.1.10	Instrument nozzles
IV.D1.1.11	Primary manway bolting
IV.D1.2	Tube bundle
IV.D1.2.1	Tubes and sleeves
IV.D1.2.2	Tube support lattice bars (Combustion Engineering)
IV.D1.2.3	Tube plugs
IV.D1.3	Upper assembly and separators
IV.D1.3.1	Feedwater inlet ring and support

**Table of Item Numbers in the GALL Report
Chapter IV.D2. Steam Generator (Once-Through)**

Item Number in GALL	Description
IV.D2.1	Pressure boundary and structural
IV.D2.1.1	Upper and lower heads
IV.D2.1.2	Tube sheets
IV.D2.1.3	Primary nozzles and safe ends
IV.D2.1.4	Shell assembly
IV.D2.1.5	Feedwater and auxiliary feedwater nozzles and safe ends
IV.D2.1.6	Steam nozzles and safe ends
IV.D2.1.7	Primary side drain nozzles
IV.D2.1.8	Secondary side nozzles (vent, drain, and instrumentation)
IV.D2.1.9	Primary manways bolting
IV.D2.1.10	Secondary manways handhole bolting
IV.D2.2	Tube bundle
IV.D2.2.1	Tubes and sleeves
IV.D2.2.2	Tube plugs

**Table of Item Numbers in the GALL Report
Chapter V.A. Containment Spray System (PWR)**

Item Number in GALL	Description
V.A.1	Containment Spray System
V.A.1.1	Piping and fittings up to isolation valve
V.A.1.2	Flow orifice/elements
V.A.1.3	Temperature elements/indicators
V.A.1.4	Bolting
V.A.1.5	Eductors
V.A.2	Header and Spray Nozzles System
V.A.2.1	Piping and fittings
V.A.2.2	Flow orifice
V.A.2.3	Headers
V.A.2.4	Spray Nozzles
V.A.3	Pumps
V.A.3.1	Bowl/casing
V.A.3.2	Bolting

V.A.4	Valves (hand, control, check, motor-operated) in containment spray system
V.A.4.1	Body and bonnet
V.A.4.2	Bolting
V.A.5	Valves (hand, control) in header and spray nozzle system
V.A.5.1	Body and bonnet
V.A.5.2	Bolting
V.A.6	Containment Spray Heat Exchanger
V.A.6.1	Bonnet/cover
V.A.6.2	Tubing
V.A.6.3	Shell
V.A.6.4	Case/cover
V.A.6.5	Bolting

**Table of Item Numbers in the GALL Report
Chapter V.B. Standby Gas Treatment System (BWR)**

Item Number in GALL	Description
V.B1	Ductwork
V.B.1.1	Duct, fittings, access doors, and closure bolts
V.B.1.2	Equipment frames and housing
V.B.1.3	Seals between ducts and fan
V.B.1.4	Seals in dampers and doors
V.B.2	Filters
V.B.2.1	Housing and supports
V.B.2.2	Charcoal absorber filter
V.B.2.3	Elastomer seals

Table of Item Numbers in the GALL Report
Chapter V.C. Containment Isolation Components

Item Number in GALL	Description
V.C.1	Purge/Vent Valve
V.C.1.1	Valve disc seal
V.C.2	Isolation Barriers
V.C.2.1	Valve body and bonnet
V.C.2.2	Pipe penetrations

Table of Item Numbers in the GALL Report
Chapter V.D1. Emergency Core Cooling System (PWR)

Item Number in GALL	Description
V.D1.1	Piping & Fittings
V.D1.1.1	Core flood system (CFS)
V.D1.1.2	Residual heat removal (RHR) or shutdown cooling (SDC)
V.D1.1.3	High pressure safety injection (HPSI)
V.D1.1.4	Low pressure safety injection (LPSI)
V.D1.1.5	Connecting lines to chemical and volume control (CVCS) & spent fuel pool (SFP) cooling
V.D1.1.6	Lines to emergency sump
V.D1.1.7	Bolting for flange connections
V.D1.2	HPSI & LPSI Pumps
V.D1.2.1	Bowl/casing
V.D1.2.2	Bolting
V.D1.2.3	Orifice
V.D1.3	RWT Circulation Pump
V.D1.3.1	Bolting
V.D1.4	Valves
V.D1.4.1	Body and bonnet
V.D1.4.2	Bolting
V.D1.5	Heat Exchangers (RCP, HPSI & LPSI Pump Seals, & RHR)
V.D1.5.1	Bonnet/cover
V.D1.5.2	Tubing
V.D1.5.3	Shell

V.D1.5.4	Case/cover
V.D1.5.5	Bolting
V.D1.6	Heat Exchangers (RWT Heating)
V.D1.6.1	Bonnet/cover
V.D1.6.2	Tubing
V.D1.6.3	Shell
V.D1.6.4	Bolting
V.D1.7	Safety Injection Tank (Accumulator)
V.D1.7.1	Shell
V.D1.7.2	Manway
V.D1.7.3	Penetrations/nozzles
V.D1.8	Refueling Water Tank (RWT)
V.D1.8.1	Shell
V.D1.8.2	Manhole
V.D1.8.3	Penetrations/nozzles
V.D1.8.4	Bolting
V.D1.8.5	Buried portion of tank

**Table of Item Numbers in the GALL Report
Chapter V.D2. Emergency Core Cooling System (BWR)**

Item Number in GALL	Description
V.D2.1	Piping & Fittings
V.D2.1.1	High pressure coolant injection (HPCI)
V.D2.1.2	Reactor core isolation cooling (RCIC)
V.D2.1.3	High pressure core spray (HPCS)
V.D2.1.4	Low pressure core spray (LPCS)
V.D2.1.5	Low pressure coolant injection (LPCI) and residual heat removal (RHR)
V.D2.1.6	Lines to suppression chamber (SC)
V.D2.1.7	Lines to drywell and suppression chamber spray system (DSCSS)
V.D2.1.8	Automatic depressurization system (ADS)
V.D2.1.9	Lines to HPCI and RCIC pump turbine
V.D2.1.10	Lines from HPCI and RCIC pump turbines to condenser
V.D2.2	Pumps (HPCS or HPCI Main & Booster, LPCS, LPCI or RHR, & RCIC)
V.D2.2.1	Bowl/casing
V.D2.2.2	Suction head
V.D2.2.3	Discharge head

V.D2.3	Valves (check, control, hand, motor operated, & relief valves)
V.D2.3.1	Body and bonnet
V.D2.4	Heat exchangers (RHR & LPCI)
V.D2.4.1	Tubes
V.D2.4.2	Tubesheet
V.D2.4.3	Channel head
V.D2.4.4	Shell
V.D2.5	Drywell and suppression chamber spray system (DSCSS)
V.D2.5.1	Piping and fittings
V.D2.5.2	Flow orifice
V.D2.5.3	Headers
V.D2.5.4	Spray nozzles

**Table of Item Numbers in the GALL Report
Chapter V.E. Carbon Steel Components**

Item Number in GALL	Description
V.E.1	Carbon steel components
V.E.1.1	External surfaces
V.E.2	Closure bolting
V.E.2.1	In high-pressure or high-temperature systems

**Table of Item Numbers in the GALL Report
Chapter VI.A. Non-Environmentally Qualified (Non-EQ) Electrical Cables
and Connections**

Item Number in GALL	Description
VI.A.1	Conductor Insulation
VI.A.1.1	Electrical Cables and Connections Exposed to an Adverse Localized environment Caused by Heat or Radiation
VI.A.1.2	Electrical Cables Used in Instrumentation Circuits that Are Sensitive to Reduction in Conductor Insulation Resistance (IR) Exposed to an Adverse Localized environment Caused by Heat or Radiation
VI.A.1.3	Inaccessible Medium-Voltage (2 kV to 15 kV) Cables (e.g., Installed in Conduit or Direct Buried) Exposed to an Adverse Localized environment Caused by Exposure to Moisture and Voltage

VI.A.2	Connector Contacts
VI.A.2.1	Electrical Connectors Exposed to Borated Water Leakage

**Table of Item Numbers in the GALL Report
Chapter VI.B. Environmentally Qualified (EQ) Equipment**

Item Number in GALL	Description
VI.B.1.1	Electrical Equipment Subject to 10 CFR 50.49 EQ Requirements

**Table of Item Numbers in the GALL Report
Chapter VII.A1. New Fuel Storage**

Item Number in GALL	Description
VII.A1.1	New Fuel Rack
VIII.A1.1.1	New Fuel Rack Assembly

**Table of Item Numbers in the GALL Report
Chapter VII.A2 Spent Fuel Storage**

Item Number in GALL	Description
VII.A2.1	Spent Fuel Storage Rack
VII.A2.1.1	Neutron-Absorbing Sheets

**Table of Item Numbers in the GALL Report
Chapter VII.A3. Spent Fuel Pool Cooling and Cleanup (PWR)**

Item Number in GALL	Description
VII.A3.1	Piping
VII.A3.1.1	Closure Bolting
VII.A3.2	Filter
VII.A3.2.1	Housing
VII.A3.2.2	Closure Bolting
VII.A3.3	Valves (Check and Hand Valves)
VII.A3.3.1	Body and Bonnet

VII.A3.3.2	Closure Bolting
VII.A3.3.3	Lining (Hand Valves Only)
VII.A3.4	Heat Exchanger
VII.A3.4.1	Shell and Access Cover
VII.A3.4.2	Channel Head and Access Cover
VII.A3.4.3	Closure Bolting
VII.A3.5	Ion Exchanger
VII.A3.5.1	Shell
VII.A3.5.2	Nozzles
VII.A3.5.3	Closure Bolting
VII.A3.6	Pump
VII.A3.6.1	Closure Bolting

**Table of Item Numbers in the GALL Report
Chapter VII.A4. Spent Fuel Pool Cooling and Cleanup (BWR)**

Item Number in GALL	Description
VII.A4.1	Piping
VII.A4.1.1	Piping, Fittings and Flanges
VII.A4.2	Filter
VII.A4.2.1	Housing
VII.A4.3	Valves (Check and Hand Valves)
VII.A4.3.1	Body and Bonnet
VII.A4.3.2	Lining (Hand Valves Only)
VII.A4.4	Heat Exchanger
VII.A4.4.1	Shell and Access Cover
VII.A4.4.2	Channel Head and Access Cover
VII.A4.4.3	Tubes
VII.A4.4.4	Tubesheet
VII.A4.5	Ion Exchanger
VII.A4.5.1	Shell
VII.A4.5.2	Nozzles
VII.A4.6	Pump
VII.A4.6.1	Casing

**Table of Item Numbers in the GALL Report
VII.A5. Suppression Pool Cleanup System (BWR)**

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**Table of Item Numbers in the GALL Report
Chapter VII.B. Overhead Heavy Load and
Light Load (Related to Refueling) Handling Systems**

Item Number in GALL	Description
VII.B.1	Bridge and Trolley (for cranes that fall within the scope of 10 CFR 54)
VII.B.1.1	Structural Girders
VII.B.2	Rail System
VII.B.2.1	Rail

**Table of Item Numbers in the GALL Report
Chapter VII.C1. Open Cycle Cooling Water System (Service Water System)**

VII.C1.1	Piping
VII.C1.1.1	Piping and Fittings
VII.C1.1.2	Underground Piping and Fittings
VII.C1.2	Valves
VII.C1.2.1	Body and Bonnet
VII.C1.3	Heat Exchanger
VII.C1.3.1	Shell and Access Cover
VII.C1.3.2	Channel
VII.C1.3.3	Channel Head and Access Cover
VII.C1.3.4	Tubesheet
VII.C1.3.5	Tubes
VII.C1.4	Flow Orifice
VII.C1.4.1	Body
VII.C1.5	Pump
VII.C1.5.1	Casing
VII.C1.6	Basket Strainer
VII.C1.6.1	Body

**Table of Item Numbers in the GALL Report
Chapter VII.C2. Closed Cycle Cooling Water System**

Item Number in GALL	Description
VII.C2.1	Piping
VII.C2.1.1	Pipe, Fittings, and Flanges
VII.C2.2	Valves (Check, Hand, Control, Relief, and Solenoid Valves)
VII.C2.3.1	Body and Bonnet
VII.C2.3	Pump
VII.C2.3.1	Casing
VII.C2.4	Tank
VII.C2.4.1	Shell
VII.C2.5	Flow Orifice
VII.C2.5.1	Body

**Table of Item Numbers in the GALL Report
Chapter VII.C3. Ultimate Heat Sink**

Item Number in GALL	Description
VII.C3.1	Piping
VII.C3.1.1	Piping and Fittings
VII.C3.2	Valves (Check, Hand, and Control Valves)
VII.C3.2.1	Body and Bonnet
VII.C3.3	Pump
VII.C3.3.1	Casing

**Table of Item Numbers in the GALL Report
Chapter VII.D. Compressed Air System**

Item Number in GALL	Description
VII.D.1	Piping
VII.D.1.1	Piping and Fittings
VII.D.1.2	Closure Bolting
VII.D.2	Air Accumulator
VII.D.2.1	Shell and Access Cover
VII.D.2.2	Closure Bolting
VII.D.3	Valves (including check valves and containment isolation valves)
VII.D.3.1	Body and Bonnet
VII.D.3.2	Closure Bolting
VII.D.4	Filter
VII.D.4.1	Shell and Access Cover

VII.D.4.2	Closure Bolting
VII.D.5	Dryer
VII.D.5.1	Shell and Access Cover
VII.D.5.2	Closure Bolting
VII.D.6	Pressure Regulators
VII.D.6.1	Body and Bonnet

**Table of Item Numbers in the GALL Report
Chapter VII.E1. Chemical and Volume Control System (PWR)**

Item Number in GALL	Description
VII.E1.1	Piping (1500 psig rating)
VII.E1.1.1	Pipe, Fittings and Flanges
VII.E1.1.2	Closure Bolting
VII.E1.2	Piping (150 psig rating)
VII.E1.2.1	Pipe, Fittings and Flanges
VII.E1.2.2	Closure Bolting
VII.E1.3	High-Pressure Valve
VII.E1.3.1	Body and Bonnet
VII.E1.3.2	Closure Bolting
VII.E1.4	Low-Pressure Valve
VII.E1.4.1	Body and Bonnet
VII.E1.4.2	Closure Bolting
VII.E1.5	High-Pressure Pump
VII.E1.5.1	Casing
VII.E1.5.2	Closure Bolting
VII.E1.6	Low-Pressure Pump
VII.E1.6.1	Casing
VII.E1.6.2	Closure Bolting
VII.E1.7	Regenerative Heat Exchanger
VII.E1.7.1	Channel Head and Access Cover
VII.E1.7.2	Tubesheet
VII.E1.7.3	Tubes
VII.E1.7.4	Shell and Access Cover
VII.E1.7.5	Closure Bolting
VII.E1.8	Letdown Heat Exchanger
VII.E1.8.1	Channel Head and Access Cover
VII.E1.8.2	Tubesheet
VII.E1.8.3	Tubes
VII.E1.8.4	Shell and Access Cover
VII.E1.8.5	Closure Bolting
VII.E1.9	Basket Strainers

VII.E1.9.1	Closure Bolting
VII.E1.10	Volume Control Tank
VII.E1.10.1	Closure Bolting
VII.E1.10.2	Shell and Access Cover
VII.E1.10.3	Nozzle
VII.E1.10.4	Penetration

**Table of Item Numbers in the GALL Report
Chapter VII.E2. Standby Liquid Control System (BWR)**

Item Number in GALL	Description
VII.E2.1	Piping
VII.E2.1.1	Piping and Fittings
VII.E2.2	Solution Storage
VII.E2.2.1	Tank
VII.E2.2.2	Tank Heaters
VII.E2.3	Valves (Pump Suction, Relief, Injection, Containment Isolation, and Explosive Actuated Discharge Valves)
VII.E2.3.1	Body and Bonnet
VII.E2.4	Injection Pumps
VII.E2.4.1	Casing

**Table of Item Numbers in the GALL Report
Chapter VII.E3. Reactor Water Cleanup System**

Item Number in GALL	Description
VII.E3.1	Piping
VII.E3.1.1	Piping and Fittings (Beyond Second Isolation Valves)
VII.E3.2	Reactor Water Cleanup (RWCU) Pump
VII.E3.2.1	Casing
VII.E3.2.4	Closure Bolting
VII.E3.3	Regenerative Heat Exchanger
VII.E3.3.1	Channel Head and Access Cover
VII.E3.3.2	Tubesheet
VII.E3.3.3	Tubes
VII.E3.3.4	Shell and Access Cover
VII.E3.4	Non-Regenerative Heat Exchanger
VII.E3.4.1	Channel Head and Access Cover
VII.E3.4.2	Tubesheet

VII.E3.4.3	Tubes
VII.E3.4.4	Shell and Access Cover

**Table of Item Numbers in the GALL Report
Chapter VII.E4. Shutdown Cooling System (Older BWR)**

Item Number in GALL	Description
VII.E4.1	Piping
VII.E4.1.1	Piping and Fittings
VII.E4.2	Pump
VII.E4.2.1	Casing
VII.E4.3	Valves
VII.E4.3.1	Body and Bonnet
VII.E4.4	Heat Exchanger
VII.E4.4.1	Channel Head and Access Cover
VII.E4.4.2	Tubesheet
VII.E4.4.3	Tubes
VII.E4.4.4	Shell and Access Cover

**Table of Item Numbers in the GALL Report
Chapter VII.F1. Control Room Area Ventilation System**

Item Number in GALL	Description
VII.F1.1	Duct
VII.F1.1.1	Duct, Fittings, Access Doors, and Closure Bolts
VII.F1.1.2	Equipment Frames and Housing
VII.F1.1.3	Flexible Collars between Ducts and Fans
VII.F1.1.4	Seals in Dampers and Doors
VII.F1.2	Air Handler Heating/Cooling
VII.F1.2.1	Heating/Cooling Coils
VII.F1.3	Piping
VII.F1.3.1	Piping and Fittings
VII.F1.4	Filters
VII.F1.4.1	Housing and Supports
VII.F1.4.2	Charcoal Absorber Filter
VII.F1.4.3	Elastomer Seals

**Table of Item Numbers in the GALL Report
Chapter VII.F2. Auxiliary and Radwaste Area Ventilation System**

Item Number in	
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GALL	Description
VII.F2.1	Duct
VII.F2.1.1	Duct, Fittings, Access Doors, and Closure Bolts
VII.F2.1.2	Equipment Frames and Housing
VII.F2.1.3	Flexible Collars between Ducts and Fans
VII.F2.1.4	Seals in Dampers and Doors
VII.F2.2	Air Handler Heating/Cooling
VII.F2.2.1	Heating/Cooling Coils
VII.F2.3	Piping
VII.F2.3.1	Piping and Fittings
VII.F2.4	Filters
VII.F2.4.1	Housing and Supports
VII.F2.4.2	Charcoal Absorber Filter
VII.F2.4.3	Elastomer Seals

Table of Item Numbers in the GALL Report
Chapter VII. F3. Primary Containment Area Ventilation System

Item Number in GALL	Description
VII.F3.1	Duct
VII.F3.1.1	Duct, Fittings, Access Doors, and Closure Bolts
VII.F3.1.2	Equipment Frames and Housing
VII.F3.1.3	Flexible Collars between Ducts and Fans
VII.F3.1.4	Seals in Dampers and Doors
VII.F3.2	Air Handler Heating/Cooling
VII.F3.2.1	Heating/Cooling Coils
VII.F3.3	Piping
VII.F3.3.1	Piping and Fittings
VII.F3.4	Filters
VII.F3.4.1	Housing and Supports
VII.F3.4.2	Charcoal Absorber Filter
VII.F3.4.3	Elastomer Seals

Table of Item Numbers in the GALL Report
Chapter VII.F4. Diesel Generator Building Ventilation System

Item Number in GALL	Description
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VII.F4.1	Duct
VII.F4.1.1	Duct, Fittings, Access Doors, and Closure Bolts
VII.F4.1.2	Equipment Frames and Housing
VII.F4.1.3	Flexible Collars between Ducts and Fans
VII.F4.1.4	Seals in Dampers and Doors
VII.F4.2	Air Handler Heating/Cooling
VII.F4.2.1	Heating/Cooling Coils
VII.F4.3	Piping
VII.F4.3.1	Piping and Fittings

**Table of Item Numbers in the GALL Report
Chapter VII.G. Fire Protection**

Item Number in GALL	Description
VII.G.1	Intake Structure
VII.G.1.1	Fire Barrier Penetration Seals
VII.G.1.2	Fire Barrier Walls, Ceiling, and Floors
VII.G.1.3	Fire Rated Doors
VII.G.2	Turbine Building
VII.G.2.1	Fire Barrier Penetration Seals
VII.G.2.2	Fire Barrier Walls, Ceiling, and Floors
VII.G.2.3	Fire Rated Doors
VII.G.3	Auxiliary Building
VII.G.3.1	Fire Barrier Penetration Seals
VII.G.3.2	Fire Barrier Walls, Ceiling, and Floors
VII.G.3.3	Fire Rated Doors
VII.G.4	Diesel Generator Building
VII.G.4.1	Fire Barrier Penetration Seals
VII.G.4.2	Fire Barrier Walls, Ceiling, and Floors
VII.G.4.3	Fire Rated Doors
VII.G.5	Primary Containment
VII.G.5.1	Fire Barrier Walls, Ceiling, and Floors
VII.G.5.2	Fire Rated Doors
VII.G.6	Water-based Fire Protection System
VII.G.6.1	Piping and Fittings
VII.G.6.2	Filter, Fire Hydrants, Mulsifier, Pump Casing, Sprinkler, Strainer, and Valve Bodies (including containment isolation valves)
VII.G.7	Reactor Coolant Pump Oil Collect System
VII.G.7.1	Tank
VII.G.7.2	Piping, Tubing, Valve Bodies
VII.G.8	Diesel Fire System
VII.G.8.1	Diesel-Driven Fire Pump and Fuel Supply Line

**Table of Item Numbers in the GALL Report
Chapter VII.H1 Diesel Fuel Oil System**

Item Number in GALL	Description
VII.H1.1	Piping
VII.H1.1.1	Aboveground Pipe and Fittings
VII.H1.1.2	Underground Pipe and Fittings
VII.H1.2	Valves
VII.H1.2.1	Body and Bonnet
VII.H1.2.2	Closure Bolting
VII.H1.3	Pump
VII.H1.3.1	Casing
VII.H1.3.2	Closure Bolting
VII.H1.4	Tank
VII.H1.4.1	Internal Surfaces
VII.H1.4.2	External Surfaces

**Table of Item Numbers in the GALL Report
Chapter VII.H2. Emergency Diesel Generator System**

Item Number in GALL	Description
VII.H2.1	Diesel Engine Cooling Water Subsystem
VII.H2.1.1	Pipe and Fittings
VII.H2.1.2	Jacket
VII.H2.2	Diesel Generator Air Starting Subsystem
VII.H2.2.1	Pipe and Fittings
VII.H2.2.2	Valves (Hand and Check Valves)
VII.H2.2.3	Drain Trap
VII.H2.2.4	Air Accumulator Vessel
VII.H2.3	Diesel Generator Combustion Air Intake Subsystem
VII.H2.3.1	Piping and Fittings
VII.H2.3.2	Filter
VII.H2.3.3	Muffler
VII.H2.4	Diesel Generator Combustion Exhaust Air Subsystem
VII.H2.4.1	Piping and Fittings
VII.H2.4.2	Muffler
VII.H2.5	Diesel Generator Fuel Oil Subsystem
VII.H2.5.1	Tanks (Day and Dip Tanks)

VII.H2.5.2	Strainer
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**Table of Item Numbers in the GALL Report
Chapter VII.I. Carbon Steel Components**

Item Number in GALL	Description
VII.I.1	Carbon Steel Components
VII.I.1.1	External Surfaces
VII.I.2	Closure Bolting
VII.I.2.1	In High-Pressure or High-Temperature Systems

**Table of Item Numbers in the GALL Report
Chapter VIII.A. Steam Turbine System**

Item Number in GALL	Description
VIII.A.1	Piping and Fittings
VIII.A.1.1	High Pressure (HP) Turbine to Moisture Separator/Reheater (MSR)
VIII.A.1.2	MSR to Low Pressure (LP) Turbine
VIII.A.2	Valves
VIII.A.2.1	Body and Bonnet

**Table of Item Numbers in the GALL Report
Chapter VIII.B1. Main Steam System (PWR)**

Item Number in GALL	Description
VIII.B1.1	Piping and Fittings
VIII.B1.1.1	Steam Lines from Steam Generator to Isolation Valves (Group B or C)
VIII.B1.1.2	Steam Lines from Isolation Valves to Main Turbine (Group D)
VIII.B1.1.3	Lines to Feedwater (FW) and Auxiliary Feedwater (AFW) Pump Turbines
VIII.B1.1.4	Lines to Moisture Separator/Reheater (MSR)
VIII.B1.1.5	Turbine Bypass
VIII.B1.1.6	Steam Drains
VIII.B1.2	Valves (Check, Control, Hand, Motor Operated, Safety, and Containment Isolation Valves)
VIII.B1.2.1	Body and Bonnet

**Table of Item Numbers in the GALL Report
Chapter VIII.B2. Main Steam System (BWR)**

Item Number in GALL	Description
VIII.B2.1	Piping and Fittings
VIII.B2.1.1	Steam Lines to Main Turbine (Group B)
VIII.B2.1.2	Steam Lines to Main Turbine (Group D)
VIII.B2.1.3	Lines to FW Pump Turbines
VIII.B2.1.4	Turbine Bypass
VIII.B2.1.5	Steam Drains
VIII.B2.1.6	Steam Line to HPCI Turbine
VIII.B2.1.7	Steam Line to RCIC Turbine
VIII.B2.2	Valves (Check, Control, Hand, Motor-Operated, Safety Valves)
VIII.B2.2.1	Body and Bonnet

**Table of Item Numbers in the GALL Report
Chapter VIII.C. Extraction Steam System**

Item Number in GALL	Description
VIII.C.1	Piping and Fittings
VIII.C.1.1	Lines to Feedwater Heaters
VIII.C.1.2	Steam Drains
VIII.C.2	Valves
VIII.C.2.1	Body and Bonnet

**Table of Item Numbers in the GALL Report
Chapter VIII.D1. Feedwater Systems (PWR)**

Item Number in GALL	Description
VIII.D1.1	Main Feedwater Line
VIII.D1.1.1	Pipe and Fittings
VIII.D1.2	Valves (Control, Check, Hand, Safety, and Containment Isolation Valves)

VIII.D1.2.1	Body and Bonnet
VIII.D1.3	Feedwater Pump (Steam Turbine- and Motor-Driven)
VIII.D1.3.1	Casing
VIII.D1.3.2	Suction and Discharge Lines

**Table of Item Numbers in the GALL Report
Chapter VIII.D2. Feedwater Systems (BWR)**

Item Number in GALL	Description
VIII.D2.1	Main Feedwater Line
VIII.D2.1.1	Pipe and Fittings
VIII.D2.2	Valves (Control, Check, and Hand Valves)
VIII.D2.2.1	Body and Bonnet
VIII.D2.3	Feedwater Pump (Steam Turbine- and Motor-Driven)
VIII.D2.3.1	Casing
VIII.D2.3.2	Suction and Discharge Lines

**Table of Item Numbers in the GALL Report
Chapter VIII.E. Condensate System**

Item Number in GALL	Description
VIII.E.1	Condensate Lines
VIII.E.1.1	Piping and Fittings
VIII.E.2	Valves
VIII.E.2.1	Body and Bonnet
VIII.E.3	Condensate Pumps (Main and Booster Pumps)
VIII.E.3.1	Casing
VIII.E.4	Condensate Coolers/Condensers
VIII.E.4.1	Tubes
VIII.E.4.2	Tubesheet
VIII.E.4.3	Channel Head
VIII.E.4.4	Shell
VIII.E.5	Condensate Storage
VIII.E.5.1	Tank
VIII.E.6	Condensate Cleanup System
VIII.E.6.1	Piping and Fittings
VIII.E.6.2	Demineralizer
VIII.E.6.3	Strainer

VIII.E.6.4	Filter
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**Table of Item Numbers in the GALL Report
Chapter VIII.F. Steam Generator Blowdown System (PWR)**

Item Number in GALL	Description
VIII.F.1	Blowdown Lines
VIII.F.1.1	Pipe and Fittings (Group B)
VIII.F.1.2	Pipe and Fittings (Group D)
VIII.F.2	Valves (including Containment Isolation Valves)
VIII.F.2.1	Body and Bonnet
VIII.F.3	Blowdown Pump
VIII.F.3.1	Casing
VIII.F.4	Blowdown Heat Exchanger
VIII.F.4.1	Tubes
VIII.F.4.2	Tubesheet
VIII.F.4.3	Channel Head and Access Cover
VIII.F.4.4	Shell and Access Cover

**Table of Item Numbers in the GALL Report
Chapter VIII.G. Auxiliary Feedwater (AFW) System (PWR)**

Item Number in GALL	Description
VIII.G.1	Auxiliary Feedwater Piping
VIII.G.1.1	Pipe and Fittings (Above Ground)
VIII.G.1.2	Pipe and Fittings (Buried)
VIII.G.2	AFW Pumps (Steam Turbine- and Motor-Driven)
VIII.G.2.1	Casing
VIII.G.2.2	Suction and Discharge Lines
VIII.G.3	Valves (Control, Check, Hand, Containment Isolation Valves)
VIII.G.3.1	Body and Bonnet
VIII.G.4	Condensate Storage (Emergency)
VIII.G.4.1	Tank
VIII.G.5	Bearing Oil Coolers
VIII.G.5.1	Shell
VIII.G.5.2	Tubes
VIII.G.5.3	Tubesheet

**Table of Item Numbers in the GALL Report
Chapter VIII.H. Carbon Steel Components**

Item Number in GALL	Description
VIII.H.1	Carbon Steel Components
VIII.H.1.1	External Surfaces
VIII.H.2	Closure Bolting
VIII.H.2.1	In High-Pressure or High-Temperature Systems