March 21, 2003

Dr. Robert C. Mecredy, Vice President
Rochester Gas and Electric Corporation
R. E. Ginna Nuclear Power Plant
89 East Avenue
Rochester, NY 14649

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE R.E. GINNA NUCLEAR POWER PLANT, LICENSE RENEWAL APPLICATION

Dear Dr. Mecredy:

By letter dated August 1, 2002, Rochester Gas and Electric Corporation (RG&E) submitted, for the Nuclear Regulatory Commission's (NRC's) review, an application pursuant to 10 CFR Part 54, to renew the operating license for the R. E. Ginna Nuclear Power Plant (Ginna). The NRC staff is reviewing the information contained in the license renewal application (LRA) and has identified, in the enclosure, areas where additional information is needed to complete its review.

The enclosed request for additional information (F-RAI) are numbered to coincide with the Ginna License Renewal Application.

The staff is willing to meet with RG&E prior to submittal of the responses to provide clarifications of the staff's RAIs.

Sincerely,

/***RA***/

Russell J. Arrighi, Project Manager
License Renewal Section
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-244

Enclosure: As stated

cc w/enclosure: See next page

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R. E. GINNA
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION

F-RAI 2.1 -1

Based on a review of the license renewal application (LRA) and scoping and screening implementation procedures, the structures, system and components (SSC) functions identified in the applicant's safety classification program were used to provide preliminary scoping results. The staff has reviewed the safety classification rules contained in the applicants administrative procedure IP-QAP-1 and requires additional information to determine how the safety classification rules were specifically applied to preliminarily identify in-scope SSCs. For example, Section 2.1.5.3 of the LRA implies that non-safety SSCs credited for internal missiles were identified using the safety classification rules; however, it was not clear which safety classification rule contained in IP-QAP-1 would apply to this equipment. Please provide a mapping of the safety classification program rules as applied to the 10 CFR 54(a)(1), (2), and (3) license renewal (LR) scoping criteria. This information will expedite the staff's review of the LR scoping methodology.

F-RAI 2.1 -2

Title 10 of the Code of Federal Regulations (CFR) 54(a)(1)(iii) requires, in part, that the applicant consider within the scope of LR those SSC that ensure the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11. Although the wording in Section 2.1.2, "Plant Level Scoping," of the LRA is consistent with this requirement, the scoping criteria definition documented in Section 3.2.1 of engineering procedure EP-3-S-0713, Revision 1, differs from the wording in 10 CFR 54(a)(1)(iii). Specifically, the EP-3-S-0713 safety-related scoping definition does not refer to offsite exposures comparable to those referred to in §50.34(a)(1) and §50.67(b)(2). Since the scoping implementation procedure does not directly refer to the offsite exposures limitations contained in §50.34(a)(1) and §50.67(b)(2), as applicable, how were these exposure limitations factored into the license renewal scoping and screening process.

F-RAI 2.1 -3

10 CFR 54.21(a) requires, in part, that the applicant identify and list those SSC subject to an aging management review (AMR). The staff's review of Section 2.1.7.4, "Electrical and I&C Systems," of the LRA indicates that only the commodity group that represents the limiting aging characteristic within a plant area receives an AMR. Based on the information presented in the LRA, the staff questioned if this methodology could result in the failure to subject in-scope commodity groups, that are not the most age limited, to an AMR. Provide additional information regarding the screening methodology treatment of electrical and I&C system commodity groups to demonstrate that all in-scope commodity groups are subject to an AMR.

F-RAI 2.1 -4

By letters dated December 3, 2001, and March 15, 2002, the Nuclear Regulatory Commission (NRC) issued a staff position to the Nuclear Energy Institute (NEI) which described areas to be considered and options it expects licensees to use to determine what SSC meet the 10 CFR 54.4(a)(2) criterion (i.e., All non safety-related SSCs whose failure could prevent satisfactory accomplishment of any safety-related functions identified in paragraphs (a)(1)(i),(ii),(iii) of this section.)

The December 3rd letter provided specific examples of operating experience which identified pipe failure events (summarized in Information Notice (IN) 2001-09, "Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor") and the approaches the NRC considers acceptable to determine which piping systems should be included in scope based on the 54.4(a)(2) criterion.

The March 15th letter, further described the staff's expectations for the evaluation of non-piping SSCs to determine which additional non safety-related SSCs are within scope. The position states that applicants should not consider hypothetical failures, but rather should base their evaluation on the plant's current licensing basis (CLB), engineering judgement and analyses, and relevant operating experience. The paper further describes operating experience as all documented plant-specific and industry-wide experience which can be used to determine the plausibility of a failure. Documentation would include NRC generic communications and event reports, plant-specific condition reports, industry reports such as SOERs, and engineering evaluations.

Based on a review of the LRA, the applicant's scoping and screening implementation procedures, and discussions with the applicant, the staff determined that additional information is required with respect to certain aspects of the applicant's evaluation of the 10 CFR 54.4(a)(2) criteria.

For example, the applicant noted that the auxiliary boiler in proximity to the service water pumps in the screen house was not included in scope because its failure had been analyzed as part of the Systematic Evaluation Program (SEP) and design features had been put in place to mitigate the effects of such a failure. Based on the applicant's evaluation, the design features were considered within scope. However, the SEP evaluations did not specifically consider the potential for age-related degradation and subsequent failure of these non-safety related SSCs affecting safety-related SSCs under conditions when those safety-related SSCs were required to function. Based on the staff's discussions with the applicant, it appears that under certain design basis scenarios where the primary mitigative system is considered affected by the age-related degradation of a non-safety related SSC, the standby system or mitigative feature would potentially not be capable of ensuring appropriate mitigation. Given this additional insight, the staff considers that those non-safety related SSCs such as the auxiliary boiler, meet the 10 CFR 54.4(a)(2) criteria and therefore be included in scope of LR.

a) Based on the aforementioned information and results of the scoping and screening methodology audit interactions with the staff, describe any additional scoping evaluations performed to address the 10 CFR 54.4(a)(2) criteria? As part of your response, list any additional SSCs included within scope as a result of your efforts, and list those SCs for which

AMRs were conducted, and for each SC describe the aging management programs (AMPs), as applicable, to be credited for managing the identified aging effects?

b) Consistent with the staff position described in the March 15 letter, please describe your scoping methodology implemented for the evaluation of the 10 CFR 54.4(a)(2) criteria as it relates to the non-fluid-filled SSC of interest. As part of your response, indicate the non-fluid-filled SSCs evaluated and describe the site and industry operating experience relied on to determine the potential for failures of such non-fluid-filled SSC which could impact safety-related SSC within scope.

F-RAI 2.1 -5

During the audit of the Ginna scoping and screening methodology, the audit team determined that the procedures reviewed in combination with the review of a sample of scoping and screening products provided adequate evidence that the scoping and screening process was conducted in accordance with the requirements of 10 CFR 54.4, "Scope," and 10 CFR 54.21, "Contents of Application — Technical Information." Additionally, the staff discussed the applicant's position concerning the potential long-term program implementation of the LRA methodology and guidance into the operational phase of the plant during the extended period of operation. As a result, the team concluded that the applicant needs to formally document the process it intends to implement to capture the LRA methodology and guidance upon which the applicant will rely during the period of extended operation at Ginna to satisfy the requirements of 10 CFR 54.35, "Requirements During the Term of Renewed License." The discussion should include, as appropriate, a description of the current configuration and design control processes including references to implementation guidance for those processes which are currently being reviewed for potential impact, and identification of any new process(s) or procedure(s) planned to address the integration of the LRA methodology and guidance into the operational phase of the plant.

F-RAI 2.1 -6

During the audit of the Ginna scoping and screening methodology, the staff reviewed the applicant's programs described in Appendix A, "Updated final Safety Analysis Report (UFSAR) Supplement," and Appendix B, "Aging Management Activities" to assure that the aging management activities were consistent with the staff's guidance described in Section A.2, "Quality Assurance for Aging Management Programs" and Branch Technical Position IQMB-1, regarding quality assurance (QA) of the LR-SRP.

Based on the staff's evaluation, the descriptions and applicability of the AMPs and their associated attributes to all safety-related and non safety-related SCs provided in Appendix A and Appendix B of the LRA are consistent with the staff's position regarding QA for aging management. However, the applicant has not sufficiently described the use of the QA program and its associated attributes (corrective action, confirmation process, and document control) in the discussions provided for the existing AMPs consistent with those descriptions provided for new programs. The staff requests that the applicant revise or supplement the descriptions in the LRA Appendix A and Appendix B, to include a description of the QA program attributes, including references to pertinent implementing guidance as necessary, which are credited for existing programs. This description should be consistent with the level of detail provided for new program descriptions.

F-RAI 2.2 -1

LRA Table 2.2-1, "Plant Level Scoping Results," states that the systems identified below are out-of-scope, but specific components of these systems were evaluated (i.e., scoped and screened) as part of other systems for the purposes of LR:

- Plant Air
- Plant Sampling
- Circulating Water
- Fuel Handling
- Non-essential Ventilation

In addition to the systems listed above, components of the heating steam system were also evaluated as part of other systems. The heating steam system does not perform any nuclear safety function. However, localized pipe segments and equipment of the heating steam system are identified as being in the scope of LR as non safety components whose failure could prevent the satisfactory accomplishment of a safety function in accordance with 10 CFR 54.4(a)(2).

10 CFR 54.21(a)(1) states, in part, that components and their intended functions that meet the scoping criteria of 10 CFR 54.4(a) and are subject to an AMR must be identified and listed, so that their aging effects can be adequately managed consistent with the CLB. In order to confirm that SSCs with intended functions described in the UFSAR using traditional (i.e., CLB) nomenclature have been captured in the LR process, the staff needs to identify components from out-of-scope systems that were evaluated as part of the in-scope systems in the information provided in the LRA and the LR boundary drawings. Identify the components from out-of-scope systems (identified above) in the tables contained in LRA Section 2.3.

F-RAI 2.3 -1

On page 2-30 of the LRA, Table 2.1-1 describes system function code S as “Special Capability Class Function.” The associated notes column for system function code S further explains that “Components within the system are safety significant (augmented quality). For the purposes of LR, components which are special capability class are treated under the Criterion 3 codes Z1 through Z5.” However, in the subsections of LRA Section 2.3 that have components identified as code S, none of the adjacent system codes Z1-Z5 are check marked. Clarify the usage of system function code S. Specifically, are the components indicated as having augmented quality requirements by this system function code in the scope of LR? Identify the components and provide the basis for the augmented quality status for the containment spray system and hydrogen detectors system.

F-RAI 2.3 -2

The Ginna LR boundary drawings show numerous small pipe fittings without equipment identification numbers as being subject to an AMR. However, these components are not listed in many of the tables in LRA Section 2.3. Some tables have a component identified as “pipe” (for example, Table 2.3.2-2 for containment spray), while tables for other sections have components identified as “piping and fittings” (for example, reactor coolant, (class I). Clarify whether the component group “pipe” includes all fittings such as reducers, enlargers, flanges, and end caps, shown as part of a piping run on the LR boundary drawings, or if these components are uniquely identified if subject to an AMR.

F-RAI 2.3 -3

NUREG-1800, Table 2.1-3, states under the heading for consumables, that O-rings are considered consumable items within category (a), which "the applicant would be able to exclude these sub-components using a clear basis." Table 2.1-3 of NUREG-1800 also states that system filters fall within consumables category (d), which "are typically replaced based on performance or condition monitoring that identifies whether these components are at the end of their qualified lives and may be excluded, on a plant-specific basis, from AMR under 10 CFR 54.21(a)(1)(ii). The applicant should identify the standards that are relied on for the replacement as part of the methodology description."

a) LRA Section 2.1.7.7.1 states that O-rings "are considered sub-components of the identified components" (flanges, in this case) "and, therefore, are not subject to their own condition or performance monitoring. Therefore, the AMR for the component has included an evaluation of the sealing materials where it could not be demonstrated that ... the sealing materials are not relied on in the CLB to maintain ... a pressure envelope for a space."

LR drawing 33013-1865-LR depicts the containment purge supply unit. This drawing shows that containment isolation at penetration P204 (location F9) is provided by a blind flange with a double O-ring seal. This flange is closed during Modes 1, 2, 3, and 4 and can only be removed during Mode 6 (refueling). The flange and associated O-ring seal, therefore, serve as a containment boundary for Modes 1 through 4 and perform the intended function of providing a pressure boundary.

Since the subject O-rings are relied upon to provide a pressure boundary, confirm that these O-rings are subject to an AMR, and identify the standards that are relied on for monitoring the performance of this component such that its intended functions are maintained.

b) The LR drawings for the essential ventilation systems show filters within the LR boundary at various locations. LRA Section 2.1.7.1 states that, although certain filters are within the scope of LR, they are periodically replaced and thus are not subject to an AMR as periodic testing and inspection programs are in place to monitor filter performance such that system intended functions are maintained. Describe the plant-specific monitoring program and the specific performance standards and criteria for replacement of filter media for system filters identified below as being within the scope of LR, but not subject to an AMR:

- Charcoal filters shown on LR boundary drawing 33013-1863- LR at locations G3 and D11 and high efficiency particulate air (HEPA) filters shown on the same drawing at locations A2, A5, A8, and I3.

- Moderate efficiency filters shown on LR boundary drawing 33013-1866-LR at locations D2 and D3.

- HEPA and charcoal filters shown on LR boundary drawing 33013-1867- LR at location E3 and a low-efficiency filter shown on the same drawing at location A8.

- Low-efficiency filters shown on LR boundary drawing 33013-1869-LR at locations B3 and D3.

F-RAI 2.3.1 -1

Borated water leakage through the pressure boundary in pressurized water reactors (PWRs), and resulting borated water induced wastage of carbon steel is a potential aging degradation for the components. Reactor vessel head lifting lugs are considered to be such components requiring aging management. However, if the components are currently covered under Boric Acid Wastage Surveillance Program, then it may not require additional aging management. It appears that the subject components were not discussed in the LRA (Table 2.3.1-2), and therefore, the staff requests the applicant to verify whether the components are within the surveillance program; and if not, justify their omission.

F-RAI 2.3.1 -2

The pressurizer surge and spray nozzle thermal sleeves were not identified in the LRA (Table 2.3.1-4) as within the scope of LR. The staff understands that the intended function of the thermal sleeves is to provide thermal shielding to the nozzles (pressure boundary), and that the failure of the sleeves may prevent the nozzles from performing their pressure boundary function during the extended period of operation. As such, thermal sleeves meet the criteria identified in 10 CFR 54.4(a)(2), and therefore, should be within the scope of LR. Furthermore, the Westinghouse Owners Group has committed in topical report WCAP-14574-A, “license Renewal Evaluation: Aging Management Evaluation for Pressurizers,” and the staff has concurred that the pressurizer surge and spray nozzle thermal sleeves are within the scope of LR. However, the staff also understands that an in-scope component may not require an AMR if a time limited aging analysis (TLAA) was performed for the component, and the result was found to be acceptable for the extended period of operation. Based on the above discussion, the staff requests the applicant to provide the following additional information:

a) On the basis of the reason sited above, include the pressurizer surge and spray nozzle thermal sleeves within scope, or justify their omission.

b) Was a TLAA performed for the thermal sleeves as an integral part of the nozzles? If so, are the results of the TLAA also applicable to the sleeves (in addition to the nozzles), and are the results acceptable for the extended period of operation?

c) If the answers to (b) are not affirmative, then the staff requests the applicant to submit an AMR for the thermal sleeves which are in-scope components, or justify why an AMR is not required.

d) Are there other thermal sleeves which perform thermal shielding function for pressure boundary components; such as, the return line from the residual heat removal (RHR) loop, and the charging lines and the alternate charging line connections (refer to Ginna UFSAR Section 5.4.3.1.1), which may have been excluded from the scope of LR? If so, identify those thermal sleeves, and justify their exclusion from the scope.

F-RAI 2.3.2.3 -1

Screen assemblies and vortex suppressors are normally used in the containment sump which provides water for the emergency core cooling system (ECCS) recirculation phase, and one of the intended functions is to protect the ECCS pumps from debris and cavitation due to harmful vortex following a loss-of-coolant-accident (LOCA) (refer to Ginna UFSAR Section 5.4.5.4.3). Explain why the subject components were not identified as within scope in Table 2.3.2-3 of the LRA, which listed component groups for the RHR that require an AMR.

F-RAI 2.3.2.4 -1

License renewal boundary drawing 33013-1278, 2-LR, shows two components identified as "Hot Box" at locations G9 and I9 as subject to an AMR. However, this component is not listed in LRA Table 2.3.2-4, which identifies the components of the containment hydrogen detectors and recombiners system that are subject to an AMR. Clarify where, in the LRA, these components are identified as subject to an AMR or justify their omission.

F-RAI 2.3.2.4 -2

The hydrogen recombiner system piping network branches with one path going to the hydrogen combustor and the other branch going to out-of-scope piping and components leading to the volume control tank. The branch leading to the volume control tank can be isolated at valve 1877, shown on LR boundary drawing 33013-1274-LR at location A9. This valve is shown as normally open; however, it forms the pressure boundary interface with an out-of-scope system. Although note 2 on drawing 33013-2241, "General Notes," states that the valve alignments are typical and the actual valve alignments are controlled by plant operating procedures, the staff is concerned that failure of the downstream, out-of-scope piping may affect the pressure boundary integrity intended function of this piping segment.

Provide additional information to support your determination that it is acceptable to terminate the in-scope portion of the hydrogen recombiner system piping at an open valve boundary. For example, discuss whether plant procedures specify closing this valve to mitigate hydrogen generation following a LOCA event, the amount of time required to complete these procedures, and the effect on system operation if the valves are not closed.

F-RAI 2.3.2.4 -3

Pipe segments, connectors, and flexible hoses downstream of isolation valves 1868 A-D and 1867A-D, which connect to the mobile hydrogen tanks are not shown as subject to an AMR on LR boundary drawing 33013-1274-LR at locations E6, E7, E10, and E11. However, operability of these piping segments and connectors is necessary for the hydrogen recombiner system to preform its intended function. Justify the omission of these components from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI 2.3.2.5 -1

Containment penetrations are shown on the LR boundary drawings of multiple systems and discussed in several LRA sections (including containment spray, safety injection, chemical volume and control system (CVCS), ventilation, main steam, feedwater, auxiliary feedwater (AFW), and spent fuel pool cooling as well as containment isolation). Because of the large number of LR drawings and LRA sections that discuss penetrations, the staff are unable to determine with a reasonable assurance that all mechanical components of the containment penetrations shown in UFSAR Table 6.2-15a are within the scope of LR and subject to an AMR. Confirm that the mechanical portions of all containment penetrations are within the scope of LR and subject to an AMR, or identify and justify the exclusions.

<u>F-RAI 2.3.2.5 -2</u>

Unlike plants built after the introduction of the General Design Criteria, Appendix A to 10 CFR 50, some of the piping passing through containment penetrations at Ginna have both isolation valves outside the containment, and do not have inboard isolation valves. This situation was discussed as part of Topic VI-4, "Containment Isolation System," in the Ginna SEP (see page 4-19 of NUREG-0821). The LR boundary drawings show the boundary of some of the piping segments subject to an AMR immediately at the inside of the containment wall (for example, the piping runs through penetrations P123, P129, and P143 on LR boundary drawing 33013-1272, 1-LR at locations A11, B11, C11).

In such situations, piping and pipe restraints in close proximity to the containment structure adjacent to penetrations will not be subject to an AMR. In the event of a pipe break, dynamic effects, such as pipe whip and jet impingement from rupture of the out-of-scope piping segments could damage the containment structure or adjacent, in-scope piping and penetrations. This case is similar to non safety-related piping systems which are not connected to safety-related piping, but have a spatial relationship such that their failure could adversely impact the performance of piping and components with an intended safety function (Criteria A2 of 10 CFR 54.4). However, in this case, the concern is that the non safety-related piping has the potential for causing damage to the containment pressure boundary. Provide justification for locating out-of-scope pipe segments in close proximity to containment penetrations instead of at some minimum distance.

<u>F-RAI 2.3.3.2 -1</u>

A portion of the component cooling water (CCW) system that is subject to an AMR ends at valves 747A and 747B, which are normally shown as open (see LR boundary drawing 33013-1245-LR at locations E8 and F8). There are also numerous portions of the CCW system that are subject to an AMR that end at valves that are normally open to 3/4 inch or less diameter tubing. Failure of the downstream piping may affect the pressure boundary intended function. Section 2.3.3.2 of the LRA does not discuss why this approach is acceptable. Provide additional information to support the basis for this determination. For example, discuss the steps in the procedures for identifying the locations of breaks, for closing the valves, the amount of time required to complete these steps, and the consequences on system inventory if the valves are not closed.

<u>F-RAI 2.3.3.2 -2</u>

Section 9.2.2.4 of the Ginna UFSAR describes that the CCW system makeup capability is adequate to accommodate normal system leakage during normal and post-accident operation. This section of the UFSAR also states that the CCW lines supplying cooling to the reactor

coolant pumps are not protected from dynamic effects associated with accidents and that, if a cooling line is severed, the water stored in the surge tank after a low-level alarm, together with makeup flow, provides the operator with time to close the valves external to the containment in order to isolate the leak. The UFSAR also identifies that the CCW system functions, of cooling the residual heat removal heat exchanger and the emergency core cooling system pumps, are essential. Therefore, the staff concludes that the SSCs necessary to supply makeup water from the reactor water makeup tank to the CCW system surge tank are within LR scope pursuant to 10 CFR 54.4. However, neither Section 2.3.3.2 nor Section 2.3.3.12 of the LRA identifies these SSCs as subject to an AMR. The CCW system LR flow diagram, 33013-1245-LR, indicates that only the safety-related section of piping from valves 823 and 729 (drawing location D2) to the component cooling surge tank header is within the scope of LR. Clarify whether the non safety-related piping, valve bodies, and pump casings that are necessary to provide a pressure retaining boundary, so that sufficient flow at adequate pressure is delivered from the reactor makeup water tank to the component cooling surge tank, are included within the scope of LR and subject to an AMR or justify their exclusion.

F-RAI 2.3.3.3 -1

Spent fuel pool (SFP) heat exchanger “B” process monitor skid is shown on LR boundary drawing 33013-1250, 2-LR, as having radiation element RE-20B subject to an AMR. Clarify why the components of the SFP heat exchanger “A” process monitor skid and the associated piping and valves leading to radiation element RE-20A shown on LR boundary drawing 33013-1250, 2-LR, at location J6 are not within the scope of LR and subject to an AMR.

F-RAI 2.3.3.3 -2

Section 9.1.2.1.1 of the Ginna UFSAR states that the current criteria for the spent fuel storage system is defined, in part, by Regulatory Guide 1.13. Section C.8 of Regulatory Guide 1.13 states:

A seismic Category 1 makeup system should be provided to add coolant to the pool. Appropriate redundancy or a backup system for filling the pool from a reliable source, such as a lake, river, or onsite seismic Category 1 water-storage facility, should be provided.

Section 9.1.2.2.1 of the Ginna UFSAR states that water is supplied to the SFP from the refueling water storage tank (RWST) by the refueling water purification pump. Alternative sources of makeup water are available from the primary water treatment plant and the reactor makeup water tank or the monitor tanks. However, the refueling water purification pump and associated valves and piping to the RWST are shown as not subject to an AMR on LR boundary drawing 33013-1248-LR at location F5. The flow paths to the alternate makeup sources, the primary water treatment plant (location H1), the reactor makeup water tank (location H10) and the monitor tanks are also identified as not subject to an AMR. Justify the exclusion of these piping runs and associated valves which provide the makeup water sources for the SFP from the scope of LR and being subject to an AMR.

F-RAI 2.3.3.3 -3

Section 2.3.3.3 of the LRA indicates that the stainless steel liner of the SFP and the transfer canal is included as a component within the spent fuel cooling and fuel storage system. However, on the basis of its review of Table 2.3.3-3 of the LRA, the staff is unable to locate a table entry for the stainless steel liner. Section 9.1.2.1.10 of the Ginna UFSAR states that the "SFP and refueling canal shall have provisions, such as a watertight liner, to prevent leakage of pool water," which appears to indicate that the liner serves a passive, pressure boundary intended function for LR. The staff notes that, although line number (19) of Table 3.6.1 of the LRA includes a description of an AMP that appears to apply to the stainless steel liner of the spent fuel pool and transfer canal, there is no traceable link between this entry and Table 2.3.3-3 of the LRA. Clarify the LRA's scoping and screening findings concerning the SFP and transfer canal liner, so that the staff may verify compliance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI 2.3.3.3 -4

In Table 2.3.3-3 of the LRA, the spent fuel racks appear to be included in the "Structure" component group. The intended functions listed for this component group are (1) providing radiation shielding and (2) providing structural support for safety-related equipment. On the basis of the system description provided in Section 2.3.3.3 of the LRA, the staff questions whether the borated stainless steel spent fuel racks also serve an intended function of reactivity control for LR. Justify not identifying reactivity control as an intended function of the borated stainless steel spent fuel racks, so that the staff may verify compliance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI 2.3.3.4 -1

Vertical ball valve 1020C, from the auxiliary building sump basement piping to the auxiliary building sump, is not shown as subject to an AMR on LR boundary drawing 33013-1272, 2-LR, at location J4. However, it is relied upon to contain radiological releases in the event of an accident. Confirm if this component is subject to an AMR. If not, justify its exclusion.

F-RAI 2.3.3.5 -1

LRA Section 2.4.2.11, "Essential Yard Structures," states that the redundant service water (SW) discharge line is occasionally placed in service for such activities as surveillance testing or maintenance work. License renewal boundary drawing 33013-1250, 2-LR, at location F11 shows a portion of the redundant service water discharge line as a corrugated metal pipe to Deer Creek. This corrugated metal pipe is not shown as being subject to an AMR on that drawing, nor could this pipe be identified in LRA Table 2.3.3-5 under either the pipe or the structure component groups. Obstruction of this flow path could prevent the SW system from performing its intended function when the primary flow path is not in service or unavailable. Justify the exclusion of this corrugated metal pipe from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

In addition, an inspection program was recommended for the Deer Creek culvert in the Ginna SEP (see page 4-7 of NUREG-0821) to minimize the potential for flooding of Deer Creek. Clarify if the corrugated metal SW discharge pipe empties into Deer Creek above or below the culvert identified by the SEP program report. Discuss the measures taken to prevent flooding of the alternate SW discharge, discussed above, if Deer Creek is flooded.

F-RAI 2.3.3.5 -2

A portion of the SW system piping that is not subject to an AMR connects two parallel portions of the SW system piping that are subject to an AMR at valves 4733, 4651B, and 4562B that are shown as normally open (see LR boundary drawing 33013-1250, 3-LR, at locations I2, I7, and J7).

a) This piping run has two parallel trains containing air conditioning (AC) water chiller units SCI03A and SCI03B which cool the chilled water system. Drawing 33013-1920 for the chilled water system indicates that the chilled water system cools the control room ventilation system. These components are all identified as augmented quality on the drawings. Section 9.4.3 of the Ginna UFSAR states that the function of the control room ventilation system is, in part, to ensure the operability of control room components during normal operating, anticipated operational transient, and design-basis accident conditions. This statement apparently applies to the cooling function of the system because the filtration and boundary integrity functions do not support control room equipment operability. Section 6.4 of the UFSAR states that the control room ventilation system cools the recirculated air as required using chilled water coils. Neither Section 2.3.3.5, Section 2.3.3.10, nor Section 2.3.3.15 of the LRA provide an adequate basis for excluding the associated systems and components from an AMR. Provide information identifying important-to-safety portions of the SW, chilled water, and control room ventilation systems as SCs subject to an AMR, or justify their exclusion from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

b) Failure of the piping not subject to an AMR may affect the pressure boundary intended function of the piping that is subject to an AMR. Section 2.3.3.5 of the LRA does not discuss why this approach is acceptable. Provide additional information to support the basis for this determination. For example, discuss the steps in the procedures for identifying the locations of breaks, for closing the valves, the amount of time required to complete these steps, and the consequences if the valves are not closed following a break of the piping that is not subject to an AMR.

F-RAI 2.3.3.5 -3

License renewal boundary drawing location listed below shows an isolated pipe section as not subject to an AMR, although the pipe connects to a piping section that is subject to an AMR. Clarify if the exclusion of this pipe section from the scope of LR was intentional, or the result of a drafting error. If the exclusion of this section is intentional, justify the exclusion from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

- A section of 14-inch piping connecting to line 16-SW-125-1 shown on drawing 33013-1250, 1-LR at location C8.

F-RAI 2.3.3.5 -4

Major portions of the SW system discharge lines, shown on drawings 33013-1250, 1-LR, (downstream of expander at the end of pipe section 6-SW-125-1 at location I2), 33013-1250, 3-LR, (downstream of valve 4614 at location H2), 33013-1885, 1-LR, (beginning with pipe 14-SW-125-1 at location E12 and beginning with pipe section with identifier 125-9 at location J9), 33013-1885, 2-LR are identified as not being subject to an AMR. The drawings indicate that the discharge lines include sections of underground piping. Should these sections of piping fail to remove water from the SW system, the intended functions of the SW system will be impaired. Provide information identifying these sections of piping as components subject to an AMR or provide the basis for the determination that these piping sections should not be subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

For the cases cited above referencing LR drawings 33013-1885, 1-LR and 33013-1885, 2-LR, the transitions from piping sections requiring an AMR to those not subject to an AMR occur at boundaries between drawings. If the boundaries are not changed, provide information to precisely locate these boundaries between piping sections subject to an AMR and piping sections not subject to an AMR.

F-RAI 2.3.3.5 -5

Drawing 33013-1250, 1-LR, at locations A1-A4 shows that the traveling screens as not being subject to an AMR. The traveling screens perform a coarse filtration function, which protects the SW pumps and other components receiving unfiltered raw water from blockage, and are typically included within the scope of LR due to that intended function. Justify the exclusion of these components from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI 2.3.3.6 -1

On LR boundary drawing 33013-1990, 1-LR, the fire water storage tank is shown as subject to an AMR. However, the fire service water booster pumps and piping and valves back to the SW system are excluded. Justify the exclusion of the fire service water pumps, associated piping components, and valve bodies from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI 2.3.3.6 -2

LRA Table 2.3.3-6 references portions of Tables 3.4-1 and 3.4-2 of the LRA for aging management of the piping component group. However, none of the references in Tables 3.4-1 or 3.4-2 address internal corrosion of buried (underground) ductile iron piping. LRA Section 2.1.6, “Fire Protection Component Aging Management,” states the licensee will continue to conduct flow tests as part of the fire water system program described in LRA Appendix B Section B2.1.14. Describe the aspects of this program that address aging management of buried (underground) ductile iron piping. Clarify how flow tests are intended to adequately manage the internal corrosion of the underground fire service water piping.

<u>F-RAI 2.3.3.6 -3</u>

LRA Section 2.3.3.6 lists “fire proofing - a passive cementitious coating applied to steel to provide fire resistance.” LRA Table 2.3.3-6 includes a component group, “structure,” that references Tables 3.4-1 and 3.4-2 for aging management. None of these references address fire proofing of structural steel. No reference was found to the fire proofing of structural steel in Section 2.4, “Scoping and Screening Results Structures,” or in Section 3.6, “Aging Management of Structures and Components Supports.” Verify that fire proofing is used in the plant as part of fire barriers. If so, identify where the LRA addresses the aging management of these components, or justify their exclusion.

<u>F-RAI 2.3.3.6 -4</u>

LRA Section 2.1.5.6 includes fire detection as part of the fire protection program necessary to meet the requirements of 10 CFR 50.48. LRA Section 2.3.3.6 includes the fire detection and alarm systems as in scope. Neither LRA Table 2.3.3-6 nor LRA Section 2.5, “Screening Results of Electrical and I&C Systems,” includes any reference to the aging management of these systems. LRA Section 3.7, “Aging Management of Electrical and I&C Systems,” contains no specific reference to the components of the fire detection and alarm systems. Confirm that these systems are in-scope and identify where the LRA addressed the AMR of these components.

<u>F-RAI 2.3.3.7 -1</u>

In Section 2.3.3.7 of the LRA, the applicant states that portions of the heating steam system are considered within the scope of LR because they contain non safety components whose failure could prevent the accomplishment of a safety function. Those portions of the heating steam system are contained in the diesel generator rooms and the auxiliary building. In Table 2.3.3-7 of the LRA, the applicant identifies component groups that are subject to an AMR; however, the staff could not locate any of these components on the five drawings highlighted by the applicant as containing SCs subject to an AMR. The staff has identified some of the components as appearing on LR boundary drawing 33013-1914, 1-LR, but is uncertain of the exact LR boundary. Provide the drawing numbers and equipment identification numbers for the components which comprise the component groups listed in Table 2.3.3-7.

<u>F-RAI 2.3.3.8 -1</u>

Manways associated with the diesel generator fuel oil storage tanks are shown to be subject to an AMR on LR boundary drawings 33013-1239-LR, sheets 1 and 2, at locations J2 and J10, respectively. A similar bolted access cover associated with the diesel generator cooling water expansion tanks are shown to be subject to an AMR on LR boundary drawings 33013-1239-LR, sheets 1 and 2, at locations A5 and A7, respectively. However, the manways and access covers have not been included in Table 2.3.3-8 or Tables 3.4-1 and 3.4-2. Furthermore, in Section 9.5.4 of the Ginna UFSAR, it states that watertight doors have been installed on the concrete manways of the underground diesel-oil storage tanks. The purpose of the doors is to prevent the accumulation of water in the manways. Water might seep into the oil through the flanged manhole on the top of each storage tank. Justify the exclusion of the manways, access covers, watertight doors, and bolting mechanisms from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI 2.3.3.8 -2

Foot valves 5919 on LR boundary drawing 33013-1239, 1-LR, and 5920 on LR boundary drawing 33013-1239, 2-LR, are shown to be subject to an AMR. Note 4 on these drawings indicate that the valve contains a screen. However, Table 2.3.3-8 does not list any screens as a component group subject to an AMR. Clarify if the screens associated with these valves are subject to an AMR. If not, justify the exclusion of these screen from being subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

F-RAI Generic HVAC -1

The symbol for “air opening” (see “Symbol Legend”, LR boundary drawing 33013-2242, 3-LR, location H4) appears at various air intakes and exhausts on the LR boundary drawings for the containment ventilation system. At many locations, these openings are highlighted to identify them as being subject to an AMR (for example; LR boundary drawing 33013-1864-LR, location F8). Since a different symbol has been used for air openings than for louvers, the nature of these air openings (e.g., screens, grillwork) is not clear to the staff. These components are not listed as a component group in LRA Tables 2.3.3-9 and 2.3.3.10. The staff requests that the applicant describe these air openings, through diagrams, textual description, or both, and justify the exclusion of these air openings from LRA Tables 2.3.3-9 and 2.3.3-10.

F-RAI Generic HVAC -2

Cooling coils are shown on LR boundary drawings at the following locations for the containment ventilation system: 33013-1863-LR (locations A1, A4, A7, and I3), 33013-1864-LR (locations E5 and F5), and 33013-1866-LR (location D5). Similarly, cooling coils are shown on LR boundary drawings at the following locations for the essential ventilation systems: 33013-1867-LR (location A9) and 33013-1969-LR (locations B3, D3). In addition, an electric heating coil is shown on LR boundary drawing 33013-1867-LR (location A9).

Cooling coils have the intended function of transferring heat from return air or outside air to the cooling medium for the coil. Heating coils have the intended function of transferring heat to return air or outside air. In addition, both cooling and heating coils have the intended function of providing a pressure boundary.

Cooling coils are included as a component group in LRA Tables 2.3.3-9 and 2.3.3-10, with the listed passive function of providing a pressure boundary. Heating coils are considered as a separate component group in Table 2.3.3-10 with the listed passive function of providing a pressure boundary. Heat transfer; however, is not specified as an intended function for either cooling coils or heating coils in these tables. However, “heat exchangers” are listed as a separate component group in LRA Tables 2.3.3-9 and 2.3.3-10 with the listed passive functions of both heat transfer and pressure boundary. The staff considers both cooling coils and heating coils to be heat exchangers. The above-cited cooling and heating coils appear to be the only heat exchangers shown within the LR boundary on the LR boundary drawings for the containment ventilation and essential ventilation systems. Therefore, it is not clear to the staff what differentiates the “heat exchangers” from the “cooling coils” and ”heating coils” component groups in LRA Tables 2.3.3-9 and 2.3.3-10.

Identify any heat exchangers for all heating ventilation and air conditioning (HVAC) systems (other than the cooling coils and heating coils) that are within the scope of LR and have not been identified on the LR boundary drawings.

F-RAI 2.3.3.9 -1

LR boundary drawing 33013-1866-LR shows flanged flexible hoses upstream of each of the fifteen containment penetrations indicated for the containment penetration cooling system. The drawing identifies these components as being subject to an AMR. However, flanged flexible hoses are not listed as a component group in LRA Table 2.3.3-9. Justify the exclusion of flexible hoses from LRA Table 2.3.3-9.

F-RAI 2.3.3.10 -1

LR boundary drawing 33013-1256-LR depicts the ventilation systems and components that serve the technical support center (TSC) diesel-generator room, the TSC un-interruptible power supply, and the TSC battery room as being in the scope of LR and subject to an AMR (see locations H1,2,3,4; I1,2,3,4,5; J1,2,3,4.). In order for the staff to confirm that all SCs that serve an intended function meeting the scoping criteria of 10 CFR 54.4(a) have been considered, identify the equipment (and the intended functions they perform) which rely on the functioning of these power supply components with justification of the omission of the ventilation components for the equipment from the scope of LR.

F-RAI 2.3.3.10 -2

Section 7.4 of the UFSAR addresses the alternative shutdown system. The UFSAR states that in case of fire within the control room fire zone, the control room may be evacuated and the plant shut down from alternative shutdown stations located in other areas of the plant. However, systems employed to provide ventilation to the alternative shutdown stations and controls have not been addressed in either the LRA or the UFSAR.

Identify and describe the systems and their components used to provide ventilation to the alternative shutdown stations, and identify which components are within the scope of LR and subject to an AMR in accordance with 10CFR54.4(a)(1) and (a)(2). Provide textual information as well as diagrams which illustrate the LR boundaries for these systems. If any component considered to be within scope is not already included in one of the component groups in LRA Table 2.3.3-10, the appropriate modifications should be made to the table. If the ventilation systems used to service the alternative shutdown stations are not considered to be within the scope of LR, justify their exclusion.

F-RAI 2.3.3.10 -3

LR boundary drawing 33013-1869-LR depicts the ventilation systems that service the RHR, containment spray, charging, safety injection, and standby AFW pumps. In this drawing, only the ventilation system for the standby AFW pumps is shown to be within the LR boundary.

Two redundant cooling units each are provided for both the RHR pump pit and the charging pump room. Three cooling units, headered into common ductwork, are provided for the safety injection and containment spray pumps. A separate cooling unit is provided for each of the two standby AFW pump rooms. LRA Section 2.3.3.10 states that the fans for these cooling units are supplied by emergency diesel power.

The primary function of the safety injection system is to supply borated water to the reactor coolant system (RCS) to limit fuel rod cladding temperatures in the event of a LOCA. Safety injection is handled by two systems; a low-head system and a high-head system. The low-head system, which is activated for large breaks where there is rapid blowdown and depressurization, utilizes the RHR pumps for borated water injection. The high-head system, which is activated for small breaks, consists of two subsystems, one utilizing the chemical and volume control system charging pumps and the other utilizing the safety injection pumps for borated water injection.

Regarding the containment spray pumps, LRA Section 2.3.3.9 states that two of the containment recirculation fan coolers, plus one containment spray pump, are required to provide sufficient capacity to maintain the containment pressure within design limits after a LOCA or steam line break accident.

All of the pumps listed above are safety-related and are within the scope of LR, in accordance with 10 CFR 54(1), items (i) and (ii). The systems providing ventilation to the area’s housing these pumps and associated pump motors have the function of maintaining an acceptable environment for operation of these components under accident conditions. Therefore, the staff considers these ventilation systems to be within the LR boundary.

Section 9.4.2.4.2 of the UFSAR states that the Reference 2 analysis, noted in Section 9.4.2.2.3, had errors that were correction in Reference 8, ALTRAN Technical Report 99124TR001. The assumption for the fans/coolers used in the Reference 8 analysis is unspecified.

Justify the exclusion of the ventilation systems servicing the RHR, containment spray, charging, and safety injection pumps from the scope of LR. If the justification is based on analysis, summarize the assumptions made and the resulting conclusions for each of these pumps.

<u>F-RAI 2.3.3.10 -4</u>

Section 9.4.9 of the UFSAR states that the engineered safety feature’s ventilation and cooling systems include those systems that service equipment required either following an accident or to ensure safe plant shutdown. Included on the provided list of equipment and/or areas serviced by these systems are the relay room and battery rooms, located in the control building. LR boundary drawing 33013-1868-LR, however, shows that the air conditioning systems servicing the relay room and the two battery rooms are not within the LR boundary.

Justify the exclusion of the air conditioning systems servicing the relay room and the battery rooms from the scope of LR and not subject to an AMR.

<u>F-RAI 2.3.3.11 -1</u>

Section 2.3.3.11 of the LRA states the following:

“The principal components of the Cranes, Hoists and Lifting Devices equipment group include the Reactor Head Lifting Device, the Reactor Internals Lifting Device, and the load carrying elements of the Containment Main Crane, the Auxiliary Building Main Crane, and the Spent Fuel and Containment Refueling Bridge Cranes as well as selected jib and monorail hoists. Included are cables, hooks and the moving load bearing elements.”

Supply the following information to support the staff review of the LRA:

a) Are all the "principal components of the Cranes, Hoists and Lifting Devices equipment group" within the scope of LR? If not, identify the components that are within the scope of LR, as delineated in 10 CFR 54.4.

b) Explain which jib and monorail hoists are within the scope of LR.

c) Identify the location (building or structure) for each component (i.e., crane, hoist, jib, monorail hoist, or other lifting device), that is in the “crane” category.

F-RAI 2.3.3.11 -2

Table 2.3.3-11 of the LRA lists "crane" as a component group within the scope of LR and subject to an AMR. The LRA does not define the component group crane. Listing "crane" as the structures and components subject to an AMR does not satisfy the requirement of 10 CFR 54.21(a)(1) because an entire crane is not subject to an AMR. List the structures and/or sub-components of the cranes, hoists, lifting devices, etc. that are within the scope of LR and subject to an AMR.

F-RAI 2.3.3.12 -1

LR boundary drawing 33013-2681-LR shows six sump pumps and connecting piping and valves as being subject to an AMR. The six pumps are in diesel generator (DG) room “A” (location A6), DG room “B” (location A8), the control building ventilation room (location F6), and battery room “A” (location F7). The DG room vault sump pumps discharge to piping that is subject to an AMR. The piping subject to an AMR; however, does not extend to the discharge canal, the final depository for the discharge flow. The sumps containing the DG “B” floor drain sump pump and the battery room “A” floor drain sump pump gravity drain through ball check valves. The discharge piping subject to an AMR extends only to the floor drain outside of the subject room.

It is not clear from the information provided in LR boundary drawing 33013-2681 where the three sump pumps PWT28, PWT29, and PWT30 (at locations B7, E7, and E6, respectively) discharge to, as the sumps all appear to be gravity drained. Clarify where these sump pumps discharge their respective flows.

In each of these cases, the intended system function of preventing flooding would appear to require that the complete discharge piping flow path, up to the final discharge point, be subject to an AMR. An exception could occur where the capacity of an interim storage location is sufficient to hold the maximum flood inventory. Explain why the entire treated water system discharge piping flow paths to a retention tank or the discharge canal is not subject to an AMR, or describe how the maximum flood inventory is accommodated.

F-RAI-2.3.3.12 -2

Location E8 of LR boundary drawing 33013-2681, 3-LR, shows the floor drain line for battery room "B" as not being within the scope of LR. However, at location E7 of this same drawing, the drainage line from battery room "A" is shown as being within scope. Document the basis for concluding that the floor drain line for battery room "B" is not within the scope of LR, so that the staff may verify compliance with 10 CFR 54.4(a).

F-RAI 2.3.3.13 -1

LR boundary drawing 33013-1866-LR, shows piping, pumps, valves, flow elements, fittings, and radiation detectors in the containment ventilation process radiation monitor skid as being subject to an AMR. These components are necessary for the radiation monitoring system to perform the system function of providing process conditions and generating signals for reactor trip and engineered safety features actuation. Monitors included on the skid are the containment gas monitor, containment iodine monitor, and the containment particulate monitor. Piping and associated fittings and valves that transport the material to be monitored from the containment are subject to an AMR only up to the containment boundary. The piping which continues inside containment also appears to be needed for the system to perform its intended function. Discuss why those portions of the piping continuing inside containment (LR boundary drawing 33013-1866-LR, location G11) are not subject to an AMR.

F-RAI 2.3.3.13 -2

LR boundary drawing 33013-1867-LR shows the control room radiation monitor skid. The only components shown on this skid are radiation monitors. Confirm that the only components on these skids are the radiation monitors. If not, identify the other components and justify the exclusion of these components from the scope of LR and being subject to an AMR.

F-RAI 2.3.3.13 -3

Clarify the following:

a) LR boundary drawing 33013-1866-LR, location H9, shows the following components as requiring an AMR: FT-112, PT-111 and DPS-110. On page 2-169 of the LRA, footnote 1 of Table 2.3.3-13 states: Selected instruments were conservatively included within the scope of LR. Consideration was given to the consequences of an instrument housing pressure boundary failure. Where an instrument was unisolable from a pressure source and is of sufficient size that a system function would be degraded should the pressure boundary fail, that instrument is included for LR review.

Is this an instance where footnote 1 of Table 2.3.3-13 applies, or is this a typographical error?

b) LRA Section 2.3.3.13, page 2-168, lists 13 drawings for the radiation monitoring system. Nine of these drawings show components of the radiation monitoring system that are subject to an AMR, and four of the drawings show components of the radiation monitoring system that are not subject to an AMR. There are six drawings: 33013-1231, 33013-1245, 33013-1250, 3-LR, 33013-1278, 2, 33013-1893, and 33013-2287 that the list on page 2-168 identifies as having components subject to an AMR. However, none of the drawings shows radiation monitoring system components requiring an AMR. The list on page 2-168 appears to be correct. For example, according to the list, the radiation monitors on the main steam lines, RE-31 and RE-32, shown on LR drawing 33013-1231 are subject to an AMR, while radiation monitor RE-18 on the liquid waste processing monitor skid shown in LR drawing 33013-1271 is not subject to an AMR. In some cases, the drawings themselves indicate that the radiation monitors perform safety significant functions. For example, on drawing 133013-2287-LR, note 2 states that RE-21 performs a safety-significant detection function. However, neither RE-21 nor the connecting piping are shown as requiring an AMR. On drawing 33013-1278, 2-LR, note 3 states that RE-19 and RM-19 combine to perform a safety significant detection function, yet neither of these is shown as requiring an AMR.

Clarify which information, the list of drawings on page 2-168 or the drawings themselves, is correct.

<u>F-RAI 2.3.3.15 -1</u>

At location A9 on LR boundary drawing 33013-1867-LR, the chilled water cooling coil for the control room air handling unit is shown as being within the scope of LR. At location J7 on LR boundary drawing 33013-1920; however, a similar cooling coil is shown as not being within the scope of LR. Clarify whether or not this cooling coil is within the scope of LR, in accordance with 10 CFR 54.4(a).

<u>F-RAI 2.3.3.16 -1</u>

Identify the components of the fuel handling system that comprise the fuel and reactor internals handling tools and control equipment for safety interlocks (including housings and support structures). Discuss whether the fail-safe feature of the spent fuel handling tool, the control rod drive shaft tool, the rod cluster control assembly changing fixture or other tools used to suspend fuel and reactor internals components above the reactor vessel and spent fuel pool could be compromised by wear, impact damage or other age-related degradation mechanisms. If so, justify the exclusion of this equipment from the scope of LR and being subject to and AMR.

<u>F-RAI 2.3.4.1 -1</u>

Table 7.4-3 of the Ginna UFSAR identifies nitrogen bottles as a safe shutdown motive force for the atmospheric dump valves, also referred to as atmospheric relief valves (ARVs). Section 10.3.2.5 of the Ginna UFSAR states that “backup supply (to the ARVs) is provided by two non-seismic nitrogen supply systems in the event that a loss of offsite power causes loss of the instrument air system.” LR boundary drawing 33013-1231-LR identifies nitrogen bottles, associated tubing, piping, and valves as subject to an AMR. However, Table 2.3.4-1 of the LRA does not list the nitrogen bottles of interest as requiring an AMR. It is noted that the associated tubing, piping and valves are listed in the table. Since the UFSAR identifies the nitrogen bottles as a power supply for the atmospheric dump valves, and the dump valves are required for safe shutdown, the nitrogen supply is within the scope of LR per 10 CFR 54.4(a) and is subject to an

AMR per 10 CFR 54.21(a)(1). Explain the apparent omission of nitrogen bottles from being subject to an AMR. If the nitrogen bottles are considered to be consumable, provide a description of the replacement program.

F-RAI 2.3.4.1 -2

The boundary of the portion of the main steam system that is within the scope of LR and subject to an AMR ends at valves that are shown as normally open (see LR boundary drawing 33013-1232-LR at locations E7 and F7 and 33013-1277, 1-LR, at locations C5 and H5). Failure of the downstream piping may affect the pressure boundary intended function. It is noted that piping downstream of these valves is classified as non safety-related, and the LRA page 2-19 states:

The LR evaluation markups for a system have typically been extended to the first normally closed manual valve, check valve or automatic valve that gets a signal to go closed. A normally open manual valve has also been used as a boundary in a few instances where a failure downstream of the valve has no short term effects, can be quickly detected, and the valve can be easily closed by operators to establish the pressure boundary prior to any adverse consequences. However, for station blackout (SBO), Appendix R, high energy line break (HELB), and flooding events, the LR boundaries for a system have been defined consistent with the boundaries established in the CLB evaluations. Those boundaries do not always coincide with an isolation device.

Provide a brief discussion on the steps to be taken during events such as HELBs, station blackout and fires for closing the valves, the amount of time required to complete these steps, and any other pertinent information to justify an open boundary at these valves.

F-RAI 2.3.4.1 -3

On LR drawing 33013-1232-LR, several lines are shown branching from 24-MS- 600-1 (see locations B6 and E6). However, the branch lines up to a normally closed valve are not shown to be within the scope of LR or subject to an AMR. Failure of these branch lines may affect the pressure boundary intended function of the main steam line. Justify the exclusion of these branch lines from being subject to an AMR.

F-RAI 2.3.4.1 -4

On LR drawing 33013-1231-LR, flanged flexible hose connections are shown to be subject to an AMR (see locations C7 and I7). However, Table 2.3.4-1 of the LRA does not contain an entry for this component type. Clarify if flanged flexible hose connections are considered to be part of the component group, “pipe,” or some other component type listed in Table 2.3.4-1. If not, justify the exclusion of these components from the scope of LR.

F-RAI 2.3.4.1 -5

On LR drawing 33013-1231-LR at location E8, a screwed cap is shown as being subject to an AMR because it serves as a pressure boundary intended function. However, the screwed cap at location I8 is not shown as being subject to an AMR. Clarify if this is a drafting error or if this segment of piping was intentionally shown as not subject to an AMR.

F-RAI 2.3.4.1 -6

Table 2.3.4-1 of the LRA lists “operator” as a component group that requires an AMR. However, the referenced drawings for the main and auxiliary steam systems do not show any valve operators as requiring an AMR. Clarify whether the operator listed in Table 2.3.4-1 is associated with the atmospheric dump or relief valve (valves 3410 and 3411).

F-RAI 2.3.4.2 -1

On LR boundary drawing 33013-1236, 2-LR, flow transmitter FT 466 at location B4 is shown to be subject to an AMR; however, FT 477 at location I4 is not. Additionally, flow transmitters FT 467 at location B1, FT 500 at location C2, FT 503 at location H1, and FT 476 at location I1 are not shown as subject to an AMR. Note 5 on the drawing indicates that these flow transmitters are considered “safety significant” class for pressure boundary considerations. Note 1 to Table 2.3.4-2 of the LRA indicates that selected instruments were conservatively included in the scope of LR if the instrument is unisolable from a pressure source and is of sufficient size that a system function would be degraded should the pressure boundary fail.

Although the transmitters in question appear to be isolable, the instrument line size is not indicated. Briefly discuss the justification for these specific transmitters as not subject to an AMR, that is, whether sufficient time exists to isolate the instruments, the line size is significantly small such that its failure would not degrade the pressure boundary, etc.

F-RAI 2.3.4.2 -2

Clarify why the operator to the main feedwater regulating valve is not subject to AMR, while other operators are included in the scope of LR and subject to an AMR. This operator is credited for isolation in the CLB analysis presented in Section 15.1.1.1 of the UFSAR.

F-RAI 2.3.4.3 -1

LR boundary drawing 33013-1234-LR shows manways on condensate storage tanks “A” and “B” to be subject to an AMR. However, the manways are not listed in Table 2.3.4-3. Explain why these passive, long-lived components are not included in the subject table.

F-RAI 2.3.4.3 -2

LR boundary drawing 33013-1234-LR shows a 6-inch vent on the top of condensate storage tanks “A” and “B”. A class break is shown in the vent line. The vents are not shown to be subject to an AMR. Failure of the vent could potentially create a vacuum. Explain why the vent is not subject to an AMR, or indicate whether there is an alternate means to provide vacuum protection for this tank.

F-RAI 2.3.4.3 -3

On LR boundary drawing 33013-1234-LR, the boundary for AMR is shown to end at valve 4047 (see location I5). This valve appears to be normally open. It is noted that a piping class change occurs at this valve. The note on page 2-19 of the LRA indicates that normally open manual valves are used as a boundary if failure of the downstream piping has no short term effects, can be quickly detected, and be easily closed by the operators to establish the pressure boundary prior to any adverse consequences. However, the staff is unable to determine which of these cases apply for this particular valve. Explain why it is acceptable to terminate the LR boundary at this normally open valve.

F-RAI 2.3.4.3 -4

On LR boundary drawing 33013-1237-LR at locations F9, I7, and J8, flow elements are shown to be subject to an AMR; however, flow element FE 2006 at location I10 is not. This component serves a pressure boundary function. Clarify if this is a typographical error, or justify its exclusion from an AMR

F-RAI 2.3.4.3 -5

Table 2.3.4-3 of the LRA indicates that a “governor” is subject to an AMR. After review of the various documents and drawings, the staff is unable to identify which “governor” or “governors” are those intended to be subject to an AMR. Clarify which valve governor(s) is/are intended by the component group listed in Table 2.3.4-3. It is noted that there are a few governors which are not shown to be subject to an AMR (see LR boundary drawings 33013-1231-LR, locations D2, C5, I5 and 33013-1236, 2-LR, locations D3 and G3).

F-RAI 2.3.4.3 -6

In Section 10.5.3.1.4 of the Ginna UFSAR, it states that connections have been provided allowing the use of the yard fire hydrant system to fill the condensate storage tanks as a source of water for the motor driven and turbine driven pumps. The staff could not identify these connections on the LR boundary drawings. Based on the statement in the UFSAR, it appears that the hydrant connections should be within the scope of LR and subject to an AMR. Explain why such connections do not require an AMR.

F-RAI 2.3.4.4 -1

Section 7.2.6 of the Ginna UFSAR states that the anticipated transient without scram (ATWS) mitigation system actuation circuitry (AMSAC) is a non-Class 1E system designed to trip the turbine and start the AFW pumps if main feedwater flow is lost with reactor power above 40 percent. The valves and piping associated with the pressure transmitters have been included in the scope of LR and are listed in LRA Table 2.3.4-4 as being subject to an AMR. Section 2.3.4.4 of the LRA states that pressure sensors for the turbine first-stage pressure provide a signal used in the AMSAC. The turbine stop valves are also identified as being subject to an AMR on LR boundary drawing 33013-1232 at locations B6 and E6. However, the LRA system function listing for code Z4 does not cite the turbine stop valves as having an ATWS intended function. Intended functions should be identified in accordance with the requirements of 10 CFR 54.4(a)(3). Clarify the intended function of the turbine stop valves that led to their inclusion in the scope of LR and being subject to an AMR.

F-RAI 2.4 -1

In table 2.4.2-11, Essential Yard Structures, of the LRA, it states that the embedded portions of anchor bolts for three component groups (YARD-C-BUR, YARD-C-EXT, and YARD-C-INT) require an AMR. However, it does not address whether the exposed portions of anchor bolts require an AMR. If the exposed portion of anchor bolts requires an AMR, provide the information on component group, passive function, and aging management reference for the exposed portions. If not, provide a justification for their exclusion.

F-RAI 2.4 -2

The terms “threaded fasteners” and “anchor bolts” have been used in several tables in Section 2.4 of the LRA as if they are interchangeable. Define what the terms threaded fasteners and anchor bolts consist of, and clarify whether the two terms mean the same item or different terms.

F-RAI 2.4 -3

In Table 2.4.2-12, Component Supports Commodity Group, it indicates that the grout used for Hilti bolts requires an AMR, but the grout used for Drillco Maxi-Bolts is excluded from an AMR. Provide a justification for the exclusion of the grout used for Drillco Maxi-Bolts.

F-RAI 2.4 -4

Drawing 33013-1250, 1-LR, note 9, states that a set of controlotron mounting tracks and transducers have been permanently installed and evaluated per PCR 2001-0009. At locations C5 and E5 of this drawing, these mounting tracks are shown as not subject to an AMR. Since these mounting tracks are passive and long-lived structural items, provide a basis to justify that they should not be subject to an AMR.

F-RAI 2.4 -5

The intake structure, intake canal, cable trays and supports, tube track, reactor vessel internals, pipe hangers and supports have been listed as items requiring an AMR in other plants submitted for LRA. The staff did not find these structures or structural components listed in Ginna LRA as requiring an AMR. If you determine that these structures or structural components require an AMR, provide the information on Component Group, Passive Function, and Aging Management Reference for them. If not, provide a justification for their exclusion.

F-RAI 2.5 -1

Section 2.5 of the LRA indicates that the electrical and I&C components have been screened and evaluated on a plant-wide basis as component commodity groups rather than on a system basis. Some system level information, however, is provided in that LRA section.

Section 2.1.7.4 of the application indicates that component specific scoping may be performed to limit the number of components for which aging management activities are required, or eliminate aging management activities altogether if nothing remains in the material/environment group population. An example of this is found in Section 3.7 of the application, under the heading Environment, which states that Ginna has four medium voltage power cables installed in underground duct banks, and it was determined that a failure of these cables would not prevent the satisfactory accomplishment of any intended function; therefore, a further review of the environment was not required. Does Ginna have any other underground circuits in the 2 kV or higher voltage range (including 34.5 kV circuits)? If so, include them in the response to the following request.

Identify each of the electrical and I&C components that were eliminated from aging management activities through component specific scoping; and identify the plant SSCs that are served by those components. Provide the basis used in each case for concluding that those SSCs do not provide any LR intended functions identified in 10 CFR 54.4(a).

F-RAI 2.5 -2

Provide an electrical one-line diagram of the offsite power circuits that are included within the scope of LR. In order to allow the staff to determine whether all the electrical components that have a LR intended function consistent with 10 CFR 54.4(a) have been identified in those circuits, include on the diagram the electrical and physical location of the component/commodity groups listed in Table 2.5.8-1, Offsite Power and any other electrical components not listed in Table 2.5.8-1.

F-RAI 2.5 -3

Section 2.5.8 of the LRA indicates that the 115 kV switchyard (Station 13A) is not included within the scope of license renewal. The information in the application also indicates that the 34.5 kV switchyard (Station 204) is not included within the scope of LR. In the Ginna design there are two 34.5 kV circuit breakers shown in UFSAR Figure 8.1-1, upstream of station auxiliary (startup) transformers 12A and 12B, between the transformers and their respective switchyards (Stations 204 and 13A).

The staff guidance on scoping of equipment relied on to meet the requirements of the SBO Rule (10 CFR 50.63) for LR (10 CFR 54.4(a)(3)) was provided to the Nuclear Energy Institute and the Union of Concerned Scientists in a letter dated April 1, 2002. The guidance states that: For purposes of the license renewal rule, the staff has determined that the plant system portion of the offsite power system that is used to connect the plant to the offsite power source should be included within the scope of the rule. This path typically includes the switchyard circuit breakers that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead or underground circuits between circuit breaker and transformer and transformer and the onsite electrical distribution system, and the associated control circuits and structures.

The Ginna offsite power system design is not configured like the typical design described in the guidance. It has the intervening 34.5 kV circuit breakers between the switchyard circuit breakers and the startup (station auxiliary) transformers. In order for the staff to determine whether the plant system portion of the offsite power system should end with the 34.5 kV circuit breakers or with the upstream switchyard circuit breakers at Stations 13A and 204, the staff is seeking to determine which circuit breakers provide the bulk of the plant system electrical services (provide plant power, protect downstream circuits, and provide plant operator-controlled isolation and energization capability). Both groups of circuit breakers clearly provide power to the plant.

Indicate which group of breakers are tripped upon actuation of the electrical protective features for the station auxiliary transformers and downstream circuits and which group can be tripped open or closed by the Ginna plant operator.

If the bulk of the plant system electrical services are provided by the switchyard circuit breakers and not the 34.5 kV breakers, provide the basis for concluding that the plant system portion of the offsite power system ends with the 34.5 kV circuit breakers rather than the switchyard circuit breakers.

F-RAI 3.0 -1

Several of the Ginna AMPs were described by the applicant as being consistent with GALL, but with some deviation from GALL. These deviations are of two types, exceptions and enhancement. Provide detail definition of exception and enhancement used in the LRA.

F-RAI 3.1.2 -1

Programs identified in NUREG-1801 are generic programs. When components experience unusual aging effects, the programs identified in NUREG-1801 may not be applicable. Control rod drive (CRD) housings (LRA Table 3.2-1, item 23) are identified as being susceptible to SCC and primary water stress corrosion cracking (PWSCC) with aging management provided by the Water Chemistry (B2.1.37) and the Reactor Vessel Head Penetration (B2.1.26) programs. Cracking has been reported on CRD housings at Fort Calhoun (January 25, 2002, letter from OPPD) and Palisades (Nuclear Management Company letters to the NRC dated August 20, 2001, and March 14, 2002).

Identify the materials, the inspection history, and future inspection plans for the CRD housings to detect cracking of the type experienced at Palisades and Fort Calhoun. Identify the method of removing oxygen from the CRD housings and other corrective actions taken to prevent cracking of the type experienced at Palisades and Fort Calhoun.

F-RAI 3.1.2 -2

GALL AMP XI.M32 indicates the One-Time Inspection is to be utilized when an aging effect is not expected to occur but there is insufficient data to completely rule it out or an aging effect is expected to progress very slowly. The One-time inspection provides additional assurance that either aging is not occurring or the evidence of aging is so insignificant that an AMP is not warranted. In order to determine whether crack initiation and growth for the reactor vessel flange leak detection line is not expected to occur, the applicant must review its inspection records to determine whether this aging effect has previously occurred at Ginna. If it has not occurred the proposed program is acceptable. If a component has experienced this aging effect in the past, the applicant should identify when it occurred, the corrective action, and the reason for not expecting it to occur in the future. If this aging effect is expected to occur in the future, periodic examination is necessary.

F-RAI 3.1.2 -3

The applicant has identified fatigue as an aging effect for reactor coolant (Class 1) components. The applicant has not identified fatigue as an aging effect for the reactor vessel, reactor vessel internals, pressurizer, steam generator and reactor coolant (Non-Class 1) components. The GALL report identifies fatigue as an aging effect for many components in the reactor vessel, reactor vessel internals, pressurizer, and steam generator. The staff requests that the applicant explain for the components identified in NUREG-1801, Volume 2, Chapter IV, Section A2, B2, C2, and D1 as being susceptible to fatigue, why fatigue is not an applicable aging effect for the Ginna reactor vessel, reactor vessel internals, pressurizer, and steam generator components. In addition, the staff requests that the applicant explain why the components identified in reactor coolant (Class 1) as susceptible to fatigue, while similar components in reactor coolant (Non-Class 1) are not susceptible to fatigue.

F-RAI 3.2.1 -1

Table 3.2-1 of the LRA, line number (6), states that small-bore RCS and connected systems piping are to be sampled using appropriate volumetric examinations techniques near, but prior to, the end of the current license period. This sample will be selected to include various piping sizes, configurations and flow conditions. The staff is concerned with SCC and thermal fatigue resulting from turbulent penetration and thermal stratification. Indicate how the applicant will identify how the inspection sample of pipes will be chosen such that pipes susceptible to SCC or thermal fatigue will be examined.

F-RAI 3.2.1 -2

Table 3.2-1 of the LRA, line number (9), PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for steam generator instruments and drains indicates that the core support pads and the bottom head instrument penetrations are fabricated from Alloy 600 and the Reactor Vessel Head Penetration Inspection Program is used to monitor crack initiation, SCC, and PWSCC. The Reactor Vessel Head Penetration Inspection Program is a plant-specific program which includes participation in industry initiatives related to management of Ally 600 penetration cracking issues.

Confirm that all the components in this item (that perform a LR intended function) will be evaluated as part of the above specified industry initiative? If a component will not be evaluated as part of the industry initiative provide a plant specific program to manage the aging effects for these components.

F-RAI 3.2.2 -1

Table 3.2-2 of the LRA, line number (1), bottom mounted instrument (BMI) guide tubes and seal table fittings identifies these components as being susceptible to cracking from SCC. The AMP for the BMI guide tubes includes Water Chemistry and ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Programs. The AMP for the seal table fittings is the Water Chemistry Program.

a) What is the basis for including stress corrosion cracking (SCC) as an aging effect for these components? Include the inspection history for these components in the justification.

b) Identify the scope, examination method, acceptance criteria, frequency of examination and personnel qualification to be utilized to detect SCC in BMI guide tubes.

c) GALL, typically, requires both mitigation (i.e. Water Chemistry Program) and monitoring (i.e. ISI) for aging management of cracking in stainless steel components in reactor coolant environment. The staff requests the applicant to identify the monitoring program to be utilized for detecting SCC in seal table fittings.

F-RAI 3.2.2 -2

Table 3.2-2 of the LRA, line number (2), primary nozzle safe ends, does not identify cracking due to flaw growth as an aging effect requiring management.

Since the V. C. Summer main coolant loop weld cracking event involving Alloy 82/182 weld material, the staff has been addressing the effect of PWSCC on Alloy 82/182 piping welds on a generic basis for all currently-operating PWR plants. To resolve this current operating issue, the industry is taking the initiative to (1) develop overall inspection and evaluation guidance, (2) assess the current inspection technology, and (3) assess the current repair and mitigation technology.

An interim industry report, "PWR Materials Reliability Project Interim Alloy 600 Safety Assessment for US PWR Plants (MRP-44), Part 1: Alloy 82/182 Pipe Butt Welds," was published in April 2001 to justify the continued operation of PWR plants while the industry completes the development of the final report. The staff documented its acceptance of this interim report in a safety evaluation issued June 14, 2001, which states "Should the industry not be timely in resolving inspection capabilities to identify PWSCC in Alloy 600 welds regulatory action may result." Although the final industry report on this issue has not yet been published, the staff is considering regulatory action to resolve this issue, pending receipt and review of the final industry report.

In view of the V. C. Summer event, there are concerns regarding the potential for PWSCC of Alloy 182/82 weld materials in PWR environment. To ensure that the effect of PWSCC in all Alloy 182/82 components are adequately managed during the extended period of operation, provide the following information:
a) Identify the locations in Ginna RCS piping that contains Alloy 82/182 welds or buttering.

b) Describe the actions you have taken to address this operating experience as it applies to Ginna. Include in your discussion the current inspection program implemented at Ginna station for components identified above including the inspection method/frequency and history of inspection results.

c) Provide the bases that support your conclusion that the existing programs implemented at Ginna station will provide adequate aging management of the PWSCC effect on the components with Alloy 182/82 weld or buttering. In the discussion of the adequacy of the program, the applicant should consider the following industry experiences:

- The inspections performed in accordance with current ASME Section XI ISI Program requirements failed to identify the cracking

- There is no reported deviation from the EPRI guidelines in the water chemistry of the reactor coolant in V. C. Summer, Davis-Besse and other plants where PWSCC was found.
- Industry experiences have shown that early detection of small leakage from insulated welds can not be assured.

F-RAI 3.2.2 -3

Table 3.2-2 of the LRA, line number (11), secondary core support, diffuser plate, guide tube support pins, head vessel alignment pins, BMI columns and flux tubes, head cooling spray nozzles, upper instrumentation column, conduits, and supports, credits the Water Chemistry Control Program, but does not credit the ISI program for monitoring SCC.

GALL item IV B2.2.3 identifies rod cluster control assembly (RCCA) guide tube support pins constructed from stainless steel as being susceptible to crack initiation and growth, SCC, PWSCC, and irradiation-assisted stress corrosion cracking (IASCC). GALL requires the use of a PWR Vessel Internals AMP in addition to a Water Chemistry AMP.

Since components in line number (11) are from equivalent material and operate in equivalent environments as the RCCA guide tube support pins, provide a program to monitor the effects of SCC or justify why an AMP is not required.

F-RAI 3.2.2 -4

Table 3.2.2-2 of the LRA, line number (12), upper and lower internals assembly, holddown spring, upper and lower support column bolts, and clevis insert bolts identifies these components as being susceptible to loss of preload due to stress relaxation. GALL items IV B2.1-d, IV B2.1-k, IV B2.5-h, and IV B2.5-i identify the upper internals assembly, holddown spring, lower internals assembly, and clevis insert bolts as being managed by ASME ISI and loose parts monitoring or neutron noise monitoring.

Provide justification for not including a Loose Parts Monitoring and/or a Neutron Noise Monitoring Program to manage loss of preload due to stress relaxation.

F-RAI 3.2.2 -5

a) Table 3.2.2-2 of the LRA, line number (18), pressurizer manway cover, is identified as being constructed of carbon steel with a stainless steel disc insert and being susceptible to SCC. The staff requests the applicant to specify if the stainless steel insert is a pressure boundary component that requires aging management.

b) GALL item IV C2.5-m identifies pressurizer manway and flanges constructed from low alloy steel with stainless steel cladding in a primary water environment as being susceptible to SCC. GALL requires an ASME Section XI Inservice Inspection Program in addition to a Water Chemistry Control Program. The staff requests the licencee to specify an inspection program to monitor the adequacy of the applicant's specified Water Chemistry Control Program or justify why an inspection program is not required.

F-RAI 3.3 -1

LRA Table 3.3-1, line number (7), for components serviced by open-cycle cooling system, the applicant states that the combination of components, material and environments identified in Items V.A.6-a, V.A.6-b, V.D1.6-b and V.D1.6-c of NUREG-1801, Vol. 2, are not applicable at Ginna Station. Discuss how the AMR is to be performed for the heat exchangers, and their associated components, in the containment spray and emergency core cooling systems.

F-RAI 3.3 -2

LRA Section B2.1.21 states that the Ginna Station One-Time Inspection Program will include measures to verify the effectiveness of an existing AMPs and confirm the absence of an aging effect. In LRA Table 3.3-2, line numbers (25), (41), (42), and (66), One-Time Inspection Program is utilized to manage the loss of material for the cast iron heat exchanger in raw water environments, carbon/low alloy steel pipe in air/gas (wetted)<140 and buried environments, and copper alloy (Zn<15%) thermowell in air/gas (wetted) <140 environments, respectively. The applicant is requested to provide the basis that for the above material/environment combinations the One-Time Inspection Program alone is adequate in ensuring that the aging effect will be effectively managed during the extended period of operation.

F-RAI 3.3 -3

In LRA Table 3.3-2, line number (28), the Water Chemistry Control Program is utilized to manage the aging effect of loss of heat transfer for the HX-Nickel alloy heat exchanger from exposure to a treated water-other environment. The applicant is requested to discuss the basis for not supplementing with an inspection program to verify the effectiveness of the Water Chemistry Control Program.

F-RAI 3.3 -3

In LRA Table 3.3-2, line number (11), and Table 3.4-2, line number (81), for stainless steel fasteners (bolting) in the environment of borated water leaks, the applicant identified no aging effects requiring management (AERM). Provide the basis for this determination.

F-RAI 3.3 -4

a) In LRA Table 3.3-2, line numbers (44), (45), (67), (88), and (89), for copper alloy (Zn < 15%) pipe, thermowell, and valve body exposed to containment or indoor (no air conditioning) environments, the applicant identified no AERM. This may not be supported by industry experience, as the copper alloy material may be susceptible to corrosion in a sheltered, moistured environment. Provide the basis for this determination.

b) LRA Table 3.4.-2, line number (167), identifies no aging effect/mechanism for copper alloy components in the service water systems that are exposed to indoor (no air condition) environment and; therefore, no AMP is required. However, the GALL report , Table VII Item F.1.2, identifies aging effect of loss of material due to pitting and crevice corrosion for copper alloy exposed to warm, moist air environment. Provide the technical basis for not identifying loss of material as an aging effect for these copper alloy components including a discussion of the plant specific operating experience related to copper alloy components that are exposed to indoor no air conditioning environment to support your conclusion.

F-RAI 3.3 -5

In LRA Table 3.3-2, line numbers (97) and (98), for galvanized carbon steel ventilation duckwork, exposed to air and gas (wetted)<140 or containment environments, the applicant identified no AERM. This may not be supported by industry experience, as galvanized steel may be susceptible to galvanic corrosion or boric acid corrosion in a ventilation or sheltered environment. Provide the basis for this determination.

F-RAI 3.4 -1

a) The containment ventilation and essential ventilation systems discussed in Section 2.3 of the LRA include neoprene (elastomer) components in the systems. Normally these systems contain elastomer materials in duct seals, flexible collars between ducts and fans, rubber boots, etc. For some plant designs, elastomer components are used as vibration isolators to prevent transmission of vibration and dynamic loading to the rest of the system. In LRA Table 3.4-1, line number (2), the applicant identified the aging effects of hardening, cracks, and loss of strength due to elastomer degradation and loss of material due to wear. In the ”Discussion” column of that row, the applicant credits the One-Time Inspection (B2.1.21) and the Periodic Surveillance and Preventive Maintenance Program (B2.1.23) for managing the hardening, cracking and loss of strength aging effects. The applicant also credited the System Monitoring Program (B2.1.33) for managing the aging effect of loss of material due to wear. The staff noted that the scope of the One-Time Inspection Program as described on Pages B-38 and -39 of the LRA does not include hardening, cracking and loss of strength as the aging effects of concern and does not include components that are exposed to air and gas.

Clarify how the One-Time Inspection is utilized to manage aging effects for components included in Table 3.4-1, line number (2). Also, clarify whether both the One-Time Inspection Program and the Periodic Surveillance and Preventive Maintenance Program are used for managing these aging effects. If only one of these two programs is credited for any single component, justify why One-Time Inspection alone is adequate to manage the aging effects including a discussion of the plant specific operating experience related to the components of concern to support your conclusion.

b) The staff also noted that the program description of the Periodic Surveillance and Preventive Maintenance Program on pages B-42 and -43 of the LRA includes loss of seal and not hardening and loss of strength as the aging effects of concern. Clarify whether loss of seal includes hardening and loss of strength. In addition, provide the frequency of the subject inspection described in Sections B2.1.23 and B2.2.33 for the applicable neoprene components including a discussion of the operating history to demonstrate that the applicable aging degradations will be detected prior the loss of their intended function.

F-RAI 3.4 -2

In LRA Tables 2.3.3-9 and 2.3.3-10, the AMR results for numerous components in the containment ventilation and essential ventilation systems refer to LRA Table 3.4-1, line number (5). These components include carbon/low alloy steel that are exposed to air and gas (wetted) <140 degree F. Table 3.4-1, line number (5), credits the One-Time Inspection Program, among others, for managing aging effects of loss of material due to general, pitting, and crevice corrosion and micro-biological induced corrosion (MIC) for the internal environments of ventilation systems, the diesel fuel oil systems, and the emergency diesel generator systems and credited the System Monitoring Program for managing the aging effect of loss of material for external surfaces of carbon steel components.

The staff noted that the scope of the One-Time Inspection Program as described on pages B-38 and -39 of the LRA does not include components that are exposed to air and gas. In addition, LRA Section B2.1.21, “One Time Inspection”, states that the Ginna Station One-Time Inspection Program will include measures to verify the effectiveness of an existing AMP and confirm the absence of an aging effect. The applicant is requested to clarify how the One-Time Inspection is utilized to manage aging effects for the components in these two ventilation systems that are included in Table 3.4-1, line number (5). Also clarify whether both the One-Time Inspection Program and the other AMPs are used for managing these aging effects. If only one of these aging management programs is credited for any single component, justify why One-Time Inspection alone is adequate to manage the aging effects including a discussion of the plant specific operating experience related to the components of concern to support your conclusion.

F-RAI 3.4 -3

Table 3.4-1, line number (5) of the LRA, credits the Periodic Surveillance and Preventive Maintenance Program (B2.1.23), among others, for managing aging effects for the internal surfaces of components in ventilation systems, diesel fuel oil systems, and the emergency diesel generator system; and credits the System Monitoring Program (B.2.1.33) for managing the aging effect of loss of material for external surfaces of carbon steel components. The staff notes that in Appendix B2.1.23 and B2.1.33, under “Parameters Monitored/Inspected”, it includes leakage as an example of parameters monitored/inspected. The staff is of an opinion that the presence of leakage from a component would indicate that the component’s ability to perform its intended function as a pressure boundary may have been compromised. Clarify whether any of the auxiliary systems components for which the Periodic Surveillance and Preventive Maintenance Program and System Monitoring Program are credited rely on the monitoring of leakage. Discuss why visual inspection technique alone is sufficient in detecting the aging effects described in Appendix B2.1.23 and B2.1.33, without including other NDE procedures, such as volumetric and/or surface techniques. In addition, discuss the operating history of the above components to demonstrate that the applicable aging effects will be adequately managed prior to the loss of their intended functions.

F-RAI 3.4 -4

LRA Table 3.4-2, identifies no aging effect for numerous galvanized carbon steel components (e.g., line numbers (3), (4) ,(5), (6), (61), (62), (163), (164), ...etc.) that are exposed to the environments of air and gas, air and gas (wetted) <140 degree F, containment, or indoor (no air conditioning). The LRA states that no AMP is required and it cites site-specific review of standard industry guidance for aging evaluation of mechanical systems and components as the basis for making the conclusion. It indicates that galvanized carbon steel exposed to ventilation air (T<140 degree F) would be expected to exhibit minimal deterioration of the zinc coating.

Provide the documented evidence for the above stated site-specific reviews of the standard industry guidance. In line number (62), under “Discussion”, the temperature criteria of “T<140 degree F” is not consistent with “T>140 degree F" as listed under “Environment”. Clarify this discrepancy. Similar additional information is also required for “Muffler” in line numbers (193) and (194).

F-RAI 3.4 -5

LRA Table 3.4-2, line number (79), identifies aging effect of cracking due to SCC for carbon/low alloy fasteners (bolting) in the containment ventilation, essential ventilation, and radiation monitoring systems from exposure to indoor (not air conditioning) environment and identified Bolting Integrity Program for managing this aging effect. However, in the “Discussion” column of that row, it indicates that SCC is not an applicable aging effect/mechanism. Clarify this discrepancy.

F-RAI 3.4 -6

LRA Table 3.4-2, line numbers (65), and (225) through (228) of the LRA does not identify aging effects for neoprene pipes exposed to oil and fuel oil, raw water, and treated water other environments that require management. This determination may not be supported by industry experiences. Similar to being exposed to containment or indoor (no air conditioning) environment, as in line numbers (220) through (224), the neoprene material, when expose to the above environments, may be susceptible to changes in material properties and cracking as well. Provide the basis for not considering change in material properties and cracking as applicable aging effects for the neoprene piping components included in Table 3.4-2, line numbers (65), and (225) through (228).

F-RAI 3.4 -7

LRA Section B2.1.21, “One Time Inspection”, states that the Ginna Station One-Time Inspection Program will include measures to verify the effectiveness of an existing AMP and confirm the absence of an aging effect. In LRA Table 3.4-2, at various line numbers, the applicant properly uses the One-Time Inspection Program to verify the effectiveness of an existing program, such as Water Chemistry Control Program. In other cases, such as line number (395); however, the applicant simply proposed to use the One-Time Inspection Program to manage loss of material, without committing to an existing AMP. This practice may not be supported by industry experience, as One-Time Inspection alone may not be sufficient for an early detection of material degradation during the extended period of operation. Provide the basis of not utilizing an existing AMP prior to the supplemental One-Time Inspection Program, for the components included in the above stated line number.

F-RAI 3.4.1 -1

LRA Table 3.4-2, line numbers (16) and (32), identifies the Closed-Cycle (Component) Cooling Water System (CCCCWS) Program for managing the aging effect of loss of material for stainless steel under treated water and other environments for various components in the auxiliary systems (e.g., boric acid evaporator condensers and coolers). However, the CCCCWS program does not reference EPRI TR-10736 and takes many exceptions from the GALL recommendations. Clarify how the degradation of the components such as corrosion product buildup, calcium deposits, and other parameters supposed to be monitored as recommended in GALL report can be managed under these environments.

F-RAI 3.4.1 -2

In LRA Table 2.3.3-1, the AMR results indicated that line number (5) of Table 3.4-1 is applicable to tanks, heat exchangers, and transmitters in the CVCS. However, the “Discussion” column of Table 3.4-1, line number (5), does not include the CVCS components. Clarify whether Table 3.4-1, line number (5) is applicable to the tanks, heat exchangers, and transmitters in the CVCS.

F-RAI 3.4.2 -1

In LRA Table 2.3.3-2, the AMR results indicate that Table 3.4-1, line numbers (5) and (14), and Table 3.4-2, line numbers (120), (130), (132), (133), (151), (152), (153), (154) are applicable to heat exchangers in the CCW system. It identifies the Periodic Surveillance and Preventive Maintenance Program, One-Time Inspection Program, CCCCWS Program, and Water Chemistry Control Program for managing loss of material due to various aging mechanisms, and cracking due to SCC. However, the GALL report recommends that, in addition to the Open-Cycle Cooling Water System (OCCW) Program, the Selective Leaching of Materials AMP under raw water, treated water, and ground water environments be used to detect occurrence of selective leaching by hardness measurement. Confirm that parameters monitored/inspected as recommended by GALL report are adequately covered in the applicant’s AMPs identified above.

F-RAI 3.4.3 -1

LRA Table 3.4-2, line number (430), indicates that, for valve body (copper alloy) in the spent fuel cooling and fuel storage system, under the indoor no air conditioning environment, there is no aging effect. However, the Periodic Surveillance and Preventive Maintenance Program was identified as the AMP. Clarify this apparent inconsistency.

F-RAI 3.4.4 -1

LRA Table 3.4.-1 line number (14) and Table 3.4-2, line number (132), credits the CCCCWS Program (AMP B.2.1.9) to manage the aging effect of loss of material due to general, pitting, and crevice corrosion as well as MIC for heat exchangers in the waste disposal system. However, the program description for the CCCCWS Program (AMP B.2.1.9) does not include waste disposal system. Clarify this discrepancy between Table 2.3.3-4 and Appendix B2.1.9.

F-RAI 3.4.4 -2

LRA Table 3.4.-2, line number (199), identifies the loss of material as aging effects/mechanisms for stainless steel orifice in raw water drainage environment in the waste disposal system. It further indicates that the applicable AMP is the Ginna’s One-Time Inspection Program (B2.1.21). However, GALL states in Table VII Item C1.4-a that the stainless steel orifice in raw water (untreated salt or fresh water) is subject to aging effect of loss of material due to pitting, crevice corrosion, MIC, and bio-fouling. Justify why the aging effects of MIC and biofouling are not required to be managed in this application. In addition, justify the adequacy of the One-Time Inspection Program for managing the aging effect including a discussion of the plant specific operating experience related to the components of concern to support its conclusion.

F-RAI 3.4.8 -1

LRA Table 3.4-1, line number (16), states that components within the emergency power system are subject to the OCCW System Program as implemented by the Service Water System Reliability Optimization Program, and that this program is credited with managing the aging effects of loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling. However, in Table 2.3.3-8, under Aging Management Reference, line number (16) is not listed as a link to the AMR for any components (including heat exchanger) covered in the emergency power system. Explain the above discrepancy.

F-RAI 3.4.8 -2

LRA Table 3.4-1, line number (17), states that for buried piping and fittings, the Buried Piping and Tank Inspection Program is implemented by the Periodic Surveillance and Preventive Maintenance Program, and that tanks in the emergency power system are periodically inspected for signs of applicable aging effects. However, in Table 2.3.3-8, under aging management, line number (17) is not listed as a link to the AMR for pipe or tank covered in the emergency power system. Explain the above discrepancy. Also discuss how potential aging effects due to corrosion at tank bottom will be managed.

F-RAI 3.4.9 -1

LRA Table 3.4-2, line number (1), identifies loss of material as aging effect for cast iron air operated damper housing that are exposed to air and gas (wetted)<140 degree F and credits the One-Time Inspection Program for managing the aging effect. However, the staff noted that the scope of the One-Time Inspection Program as described on Pages B-38 and -39 of the LRA does not include components that are exposed to air and gas. Clarify this discrepancy. In addition, the applicant is requested to provide technical basis to justify why the One-Time Inspection alone is adequate to manage the aging effect including a discussion of the plant specific operating experience related to the component of concern to support its conclusion. Similarly, address the above staff's concerns for the HVAC equipment package (Table 3.4-2, line number (162)), and valve body (Table 3.4-2, line numbers (386), (413), and (426)).

F-RAI 3.4.9 -2

LRA Table 3.4-2, line number (34), identifies loss of material as the aging effect for copper alloy (Zn < 15 %) cooling coil that are exposed to air and gas (wetted)<140 degree F and credited One-Time Inspection Program for managing the aging effect. However, the staff noted that the scope of the One-Time Inspection Program as described on Pages B-38 and -39 of the LRA does not include components that are exposed to air and gas. Clarify this discrepancy.

F-RAI 3.4.10 -1

LRA Table 3.4-2, line number (9), identifies the material for blower casing component as galvanized carbon steel. However, in the “Discussion” column of the same row, it refers to stainless steel. The LRA states that stainless steel exposed to ventilation air (T<140 degree F) would not be expected to exhibit loss of material due to pitting and crevice corrosion. Clarify the discrepancy concerning the material of the component.

F-RAI 3.4.11 -1

LRA Table 3.4-1, line number (13), under the “Discussion” column, indicates that the component of the cranes, hoists, and lifting devices has the potential for exposure to boric acid spillage and may be subject to the aging effect of loss of material due to boric acid corrosion. However, the AMR results of the cranes, hoists, and lifting devices as listed in the Table 2.3.3-11 of the LRA does not refer to Table 3.4-1, line number (13). Clarify this discrepancy.

F-RAI 3.4.12 -1

LRA Table 3.4.-2, line numbers (265) and (434), identifies the loss of material as aging effect/mechanism for aluminum, cast iron, or copper alloy components in raw water drainage environment in the treaded water system. It further indicates that the applicable AMP is the One-Time Inspection Program (AMP B.2.1.21). However, the One-Time Inspection Program is used to determine whether the loss of material, due to selective leaching for aluminum, cast iron or brass components, represents significant aging effects that require aging management. Justify why the One-Time Inspection alone is adequate to manage the aging effect including a discussion of the plant specific operating experience related to the components of concern to support its conclusion.

F-RAI 3.4.12 -2

LRA Table 3.4-2, line number (443), identifies no aging effect for the plastic valve body exposed to raw water drainage environment and; therefore, no AMP is required. Clarify the type of plastic material of the valve body and provide the technical basis for not considering any aging effect for that specific material from exposure to raw water drainage environment including a discussion of the plant specific operating experience related to the component of concern to support its conclusion.

RAI 3.5-1

Table 3.5-1 of the LRA, line number (1) identifies the applicant’s TLAA for cumulative fatigue damage for piping and fittings in the main feedwater line, steam line, and for AFW piping. In the discussion column for this item, the LRA states, “Consistent with NUREG-1801. Cumulative Fatigue Damage is addressed as a TLAA in Section 4.3.” Since NUREG-1801 recommends aging management of cumulative fatigue for the main steam, feedwater, and AFW steam and power conversion system (SPCS) components and the LRA states it is consistent with NUREG-1801, Tables 2.3.4-1 thru 2.3.4-4 of the LRA should identify these components as being managed for cumulative fatigue. However, Tables 2.3.4-1 thru 2.3.4-4, do not identify any SPCS components that are managed for cumulative fatigue. Explain why Tables 2.3.4-1 thru 2.3.4-4 do not identify any SPCS components that are managed for cumulative fatigue.

Also explain if the main steam, main feed, and AFW system piping are evaluated for thermal fatigue using the method described in Section 4.3.2 of the LRA.

F-RAI 3.5 -2

In Table 3.5-1 of the LRA, line number (2), it states that piping and fitting, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head and shell (except in main steam system) shall be managed for the aging effect of loss of material due to general (carbon steel only), pitting, and crevice corrosion using the Water Chemistry Program, but the Periodic Surveillance and Preventive Maintenance Program will be used to verify corrosion is not occurring in lieu of the One-Time Inspection program. NRC position is that corrosion may occur at locations of stagnation flow conditions and that a one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation. The Periodic Surveillance and Preventive Maintenance Program does not contain specific details of how this inspection will be performed. For the components listed in Table 3.5-1, line number (2) of the LRA, describe how the applicant's Periodic Surveillance and Preventive Maintenance Program inspects the piping internals to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation. Also, the applicant should describe if the selection of susceptible locations for one-time inspection locations is based on severity of conditions, time of service, and lowest design margin as recommended by NUREG-1801, AMP XI-M32.

F-RAI 3.5 -3

Loss of material due to general corrosion, pitting and crevice corrosion, MIC, and biofouling could occur in carbon steel piping and fittings for untreated water from the backup water supply in the AFW system. In Table 3.5-1, line number (3), the LRA states, "the combination of component, materials and environments identified in Item VIII.G.1-d are evaluated in the SW system. The SW system components are reviewed under NUREG-1801, Chapter VII (Auxiliary Systems), Section C1." Based on this statement and the information contained in the LRA, staff could not make a reasonable assurance finding that these aging effects in the AFW piping connected to the backup water supply are adequately managed. The staff requests the applicant to describe the specific AFW system components exposed to untreated water from the backup water supply and describe plant specific AMP used to manage the loss of material for these components or provide operating experience to explain why aging management is not performed.

F-RAI 3.5 -4

For the steam and power conversion systems, the Periodic Surveillance and Preventive Maintenance Program is credited with managing several aging effects although it does not contain details of how these aging effects will be managed. Explain how the Periodic Surveillance and Preventive Maintenance Program will manage the aging effects for the following components: 1) LRA Table 3.5-1, line number (4) for loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, and MIC could occur in stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers (for steam turbine pumps) in the AFW system, 2) LRA Table 3.5.2, line numbers (18) and (19) for loss of heat transfer and loss of material for heat exchangers in an oil and fuel environment, and 3)

LRA Table 3.5-2, line numbers (23), (47), and (64) for loss of material level glass, pump casing, and valve body in an oil and fuel environment.

Also, in Table 3.5-1, line number (4), for loss of material within the bearing oil coolers, the LRA states in the discussion column, “Consistent with NUREG-1801. The Periodic Surveillance and Preventive Maintenance Program is credited with managing all applicable aging effects.” Since NUREG-1801 does not contain an approved AMP for loss of material within the bearing oil coolers, explain why the AMP is considered to be consistent with NUREG-1801.

F-RAI 3.5 -5

In Table 3.5-1, line number (5), the LRA credits the Systems Monitoring Program to manage the loss of material for the external surface of carbon steel components and states, “Consistent with NUREG-1801. Since NUREG-1801 does not contain an approved AMP for loss of material due to general corrosion on the external surfaces of carbon steel components, explain why the Systems Monitoring Program is considered to be consistent with NUREG-1801.

F-RAI 3.5 -6

Loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, MIC, and biofouling, and buildup of deposit due to biofouling, could occur in stainless steel and carbon steel heat exchangers and coolers/condensers serviced by OCCW. In Table 3.5-1, line number (9) for loss of material heat exchangers and coolers/condensers serviced by OCCW, the LRA states in the discussion column, “the Periodic Surveillance and Preventive Maintenance Program will be credited with managing the applicable aging effects in lieu of the Open-Cycle Cooling (Service) Water System Program.” The applicant’s Periodic Surveillance and Preventive Maintenance Program does not specifically identify inspection of these heat exchangers and coolers/condensers serviced by OCCW. The staff requests the applicant identify how the Periodic Surveillance and Preventive Maintenance Program will be used to manage loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, MIC, and biofouling, and buildup of deposit due to biofouling in stainless steel and carbon steel heat exchangers and coolers/condensers serviced by OCCW. Also discuss if the AMP relies on the recommendations of NRC GL 89-13 to ensure that the effects of aging on the OCCW system will be managed for the extended period of operation.

F-RAI 3.5 -7

LRA Tables 2.3.4-1, 2.3.4-2, 2.3.4-3, 2.3.4-4, 3.5-1, and 3.5-2, list “valve body” in the component column. NRC position is that the aging effects identified in these tables, except for wall thinning due to flow-accelerated corrosion, are applicable to both the valve body and bonnet. Explain why the valve bonnets are not affected by these aging effects or provide aging management for the bonnets.

F-RAI 3.5 -8

Tables 3.5-1 and 3.5-2 of the LRA do not identify galvanic corrosion as an aging effect that requires management for the SPCS. Galvanic corrosion could occur at bimetallic joints in a raw water environment where the water chemistry is not controlled. This condition normally exists for the raw water side of heat exchangers. Do any conditions exists where SPCS piping or components at Ginna should be managed for galvanic corrosion? If conditions do exist, explain how these components are managed for galvanic corrosion.

F-RAI 3.5 -9

Table 2.3.4-4 of the LRA for the turbine-generator and supporting systems does not list fasteners in the component group column. Are there any fasteners in these systems that require aging management review? Also, if it is determined that valve and bonnets are in scope of LR, would the body to bonnet fasteners require an AMR?

F-RAI 3.5 -10

LRA Table 3.5-2, line numbers (38) thru (41) and line numbers (72) thru (75) identify aging management of valve bodies and pipe for cracking due to SCC and loss of material using the Water Chemistry program. For these items, the One-Time Inspection program is identified to verify the effectiveness of the Water Chemistry Program. Table 3.5-2, line numbers (15) and (16) identify aging management of flow elements for cracking due to SCC and loss of material using the Water Chemistry program but does not identify the One-Time Inspection program to verify the effectiveness of the Water Chemistry Program. Explain why the One-Time Inspection Program is not used to verify the effectiveness of the Water Chemistry Program for the flow elements which have identical material and environment as the valve bodies and pipe.

F-RAI 3.5 -11

LRA Table 3.5.2, line numbers (20) and (21), identify the One-Time Inspection Program as managing loss of heat transfer and loss of material for heat exchangers in a raw water environment. The NUREG-1801 AMP for managing these aging effects is the OCCW System Program. Explain how the One-Time Inspection Program will manage these aging effects. Discuss if the AMP relies on the recommendations of NRC GL 89-13 to ensure that the effects of aging on the OCCW system will be managed for the extended period of operation. Also, use of the One-Time Inspection Program does not appear to be consistent with Table 3.5-1, line number (9), where the applicant identifies their Periodic Surveillance and Preventive Maintenance Program to managed similar aging effects for heat exchangers in an OCCW environment.

F-RAI 3.5 -12

A one-time inspection can be used to address concerns for the potential long incubation period for certain aging effects on structures and components. There are cases where either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, or (b) an aging effect is expected to progress very slowly. For these cases, there is to be confirmation (by one-time inspection) that either the aging effect is indeed not occurring, or the aging effect is occurring very slowly as not to affect the component or structure intended function. Based on these guidelines, provide operating experience to confirm that the aging effect is not expected to occur or is expected to progress very slowly for the pipe identified in Table 3.5-2, line number (29).

F-RAI 3.6 -1

Section 2.4.1 adequately describes the unique nature of the containment structure support system. However, neither Table 2.4.1-1 grouping nor the line numbers in Table 3.6-2 include the AMR for components (e.g. neoprene (lubrite?) bearing pads, tension rods) associated with the support system. The applicant is requested to provide information regarding the aging management of the accessible portions of the support system, and evaluation of the inaccessible portion of the support system that would ensure its (support system's) ability to stay functional during the extended period of operation.

F-RAI 3.6 -2

Section 2.4.1 of the LRA states that one of the elements associated with the tendon corrosion system is cathodic protection system (CPS). This important system does not appear either in the component grouping of Table 2.4.1-1, or in the line items in Table 3.6-2. The applicant is requested to provide information regarding the operating experience related to the CPS, and a description of a monitoring program that would ensure the continued functioning of the system during the extended period of operation.

F-RAI 3.6 -3

In line number (2), Table 3.6-1 of the LRA, the applicant stated, "A review of plant-specific operating experience did not identify any occurrence of bellows failures due to SCC." The applicant is requested to provide the following information regarding aging of bellows in Ginna containment:

- Type of bellows, e.g., one ply, two-plies,
- accessibility for IWE inspection,
- ability to detect leakage from the bellows by (Appendix J) Type B testing,
- occurrences of excessive leakage through the bellows.

F-RAI 3.6 -4

In line number (7), Table 3.6-1, the applicant stated: "The Structures Monitoring Program requires periodic monitoring of ground/lake water to verify chemistry remains non-aggressive. The applicant is requested to provide the results of the ground water monitoring program, in terms of chlorides, sulfates, and pH of the ground water.

F-RAI 3.6 -5

In line number (16), Table 3.6-1, the applicant discussed the aging mechanism related to "Elevated Temperature," and concludes that the temperatures are within the specified limits, therefore, loss of material, cracking, and change in material properties due to elevated temperature are not probable aging effects at Ginna, and has not been observed to date. Normally established temperature limits for concrete components is 150°F. Research has shown that change in the concrete material properties is insignificant up to this limit. However, at sustained high temperatures, loss of material due to cracking and spalling are plausible aging effects. The applicant is requested to provide the following information regarding the concrete components inside Ginna containment:

- Sustained temperatures in the annulus between the primary shield wall and the reactor, and in the concrete components around the steam generators,
- Observed condition of the concrete (or liner, if applicable), in these components during the last inspection,
- Schedule for inspection of these components.

F-RAI 3.6 -6

For many of the LRA Table 3.6-1 and 3.6-2 entries, in addition to the GALL- recommended AMP (i.e., the Structures Monitoring Program), the Periodic Surveillance and Preventive Maintenance AMP is listed. For each of these cases, clarify the relationship between the Periodic Surveillance and Preventive Maintenance AMP and the other listed AMPs with respect to the managing of the aging effects identified for the components in Tables 3.6-1 and 3.6-2.

F-RAI 3.6 -7

Line number (7) of LRA Table 3.6-2 for water-control structures states that "Ginna Station does not utilize Reg. Guide 1.127, "Inspections of Water-Control Structures Associated with Nuclear Power Plants," and that the Structures Monitoring Program and Periodic Surveillance and Preventive Maintenance Program "satisfy all the appropriate criteria and provide assurance that the intended function of water control structures will be maintained through the period of extended operation." However, the description of the Structures Monitoring Program (B2.1.32) states that it will be enhanced to be consistent with RG 1.127. Resolve this apparent discrepancy and describe the enhancements that need to be made to Ginna's Structure Monitoring Program in order to make it consistent with RG 1.127. Also describe the division of the water-control structural components between the Structures Monitoring Program and the Periodic Surveillance and Preventive Maintenance Program.

F-RAI 3.6 -8

The Structures Monitoring Program, Boric Acid Corrosion Program, and Bolting Integrity are all used to manage the aging of carbon steel structural fasteners (FAST(CS and HSLAS)). Describe the interaction of these three AMPs with regard to the aging management of this component group. Describe the differences between the inspection methods used by these three AMPs for this component group.

F-RAI 3.6 -9

Line number (17) of Table 3.6-2 discusses an applicable aging effect (loss of material) that will be managed for stainless steel components (refueling cavity, fuel transfer liners, and attachments) of the Containment Vessel through the dual application of the Boric Acid Corrosion and Periodic Surveillance and Preventive Maintenance Programs. However, no aging effect is listed for this component entry (Table 3.6-2 line number (17)). Clarify this discrepancy.

F-RAI 3.6 -10

The containment component group SPP02 for the moveable hatch and equipment hatch in Table 2.4.1-1 of the LRA does not reference table entry 4 in AMR Table 3.6-1. Line number (4) in Table 3.6-1 covers the aging effect loss of material due to corrosion through the Containment ISI and Containment leak rate test AMPS for the personnel airlock and equipment hatch. Explain this omission.

F-RAI 3.6 -11

The containment component group CV-SS(CS)-TENDONS in Table 2.4.1-1 of the LRA does not reference line number (11) in AMR Table 3.6-1. Line number (11) in Table 3.6-1 covers the aging effect loss of prestress due to relaxation, shrinkage, creep, and elevated temperature through a TLAA for containment tendons and anchorage components. Explain this omission.

F-RAI 3.6 -12

The concrete containment component groups (CV-C-BUR, EXT, INT) in Table 2.4.1-1 of the LRA do not reference line number (15) in AMR Table 3.6-1. Line number (15) in Table 3.6-1 covers the aging effects of (1) scaling, cracking, and spalling due to freeze-thaw and (2) expansion and cracking due to reaction with aggregate through the Containment ISI AMP for concrete elements foundation, dome, and walls. Explain this omission.

F-RAI 3.6 -13

Line number (19), in Table 3.6-1 of the LRA is for Group 5: liners, and covers the spent fuel pool liner and refueling transfer canal liner. This table entry covers the aging effects crack initiation and growth from SCC and loss of material due to crevice corrosion through the Water Chemistry Program and monitoring of the spent fuel pool water level. However, line number (19) in Table 3.6-1 is not referenced for any of the component groups in Tables 2.4.2-1 through 2.4.2-12. Explain this omission.

F-RAI 3.6 -14

Line number (26) in Table 3.6-1 of the LRA is for the supports for ASME piping and components and covers the aging effect cumulative fatigue damage through a TLAA. The discussion column for this table entry states that a fatigue analysis for structures and components is not incorporated into Ginna Station's CLB. NUREG-1801 recommends aging management of cumulative fatigue for these support components. Explain how the aging effect of cumulative fatigue for supports for ASME piping and components will be managed during the period of extended operation.

F-RAI 3.6 -15

The Structural Monitoring Program and Boric Acid Corrosion AMPs are used to manage the aging of carbon steel expansion/grouted anchors (CSUPP-EXP(CS)). Neither of these AMPs in Appendix B of the LRA describe how the aging of this component group will be managed. In addition, the GALL AMPs XI.S6 "Structures Monitoring Program" and XI.M10 "Boric Acid Corrosion" do not describe the aging management of carbon steel expansion/grouted anchors. Please provide additional information regarding the aging management proposed for carbon steel expansion/grouted anchors.

F-RAI 3.6 -16

The GALL report recommends further evaluation to manage the aging effect loss of material due to corrosion for the embedded containment liner, if corrosion of the embedded liner is significant. The aging management program recommended by the GALL report for managing loss of material for accessible steel elements within the containment structure is the ASME Section XI, Subsection IWE (XI.S1) Program. Subsection IWE exempts from examination portions of the containment that are inaccessible, such as embedded or inaccessible portions of steel liners and steel containment shells, piping, and valves penetrating or attaching to the containment. To cover inaccessible areas, 10 CFR 50.55a(b)(2)(ix) requires that the licensee evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

The applicant addressed the above criterion defined in the GALL report, regarding the need for further evaluation to manage the aging of the potential aging of the embedded containment liner, in line number (12) of LRA Table 3.6-1. Line number (12) states that "the ASME Section XI, Subsections IWE & IWL Inservice Inspection Program includes inspections and leak rate tests which would indicate the presence of significant degradation due to loss of material from all applicable corrosion mechanisms." This statement does not adequately address the further evaluation criterion stated in the GALL report for the embedded containment liner plate.

Provide information, as recommended by the GALL report for item II.A1.2-a, to show that the embedded portion of the steel containment liner plate has not experienced significant loss of material due to corrosion. Otherwise, provide an AMP for the inaccessible portions of the containment liner plate.

F-RAI 3.7 -1

Section 3.7 of the LRA, under the heading environment states that a review of plant design documentation was performed to quantify the environmental conditions to which Ginna Station equipment is exposed. State whether actual temperatures of the electrical equipment areas were measured, and whether walkdowns of these areas were performed for LR? If not, how was the design documentation validated, and how were adverse localized environments in the electrical equipment areas identified, leading to a conclusion that the effects of aging will be adequately managed consistent with the requirements of 10 CFR 54.21(a)(3)?

F-RAI 3.7 -2

Statements made in Section 3.7 and Table 3.7-1 of the LRA seem to indicate that for the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, all the accessible cable and connections (not just samples) within the identified plant buildings/areas will be visually inspected; and the inspections will include the entire building/area and not be limited to only adverse localized environments within those buildings/areas.

Section 3.7 of the LRA, under AERM, states that thermal life was not used to determine the scope of components in the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. With regard to radiolysis and radiation induced oxidation it's also stated that the results of the review were not used to determine the scope of the components in the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. It's further indicated in Section 3.7 that that the non-EQ cable and connection program includes all in-scope, electrical cables and connections within specified plant spaces, and adequately addresses aging effects due to thermal conditions and radiation.

In Table 3.7-1 of the LRA, under the line number (2), it states that all material/environment combinations will be included under the scope of the program using an encompassing approach. In Section B2.1.11; however, under Program Description, it's stated that selected cables and connections from accessible areas (the inspection sample) are inspected and represent, with reasonable assurance, all cables and connections in the adverse localized environments. It's also indicated in Section 3.7, under Environment, that Ginna Station has identified specific plant spaces that may lead to cables exceeding 80% of ampacity due to cable tray fill deratings; and these areas are included in the non-EQ cable and connection program.

It is not clear from the above statements whether the inspections under the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will be limited to samples within adverse localized environments, or wether all cables and connections within the designated buildings/areas will be inspected. If only a sample of all cables and connections are inspected, provide the technical basis for the sample, consistent with GALL Program XI.E1 attribute number 3 on parameters monitored/inspected. Indicate whether the sample will include the PVC cables in containment identified in line number (2) of Table 3.7-1.

The Ginna UFSAR Supplement in LRA Section A2.1.9, for the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, indicates that inspections are made in accessible areas exposed to adverse localized environments. Based on your response to the above request this supplement may require revision.

F-RAI 3.7 -3

The discussion in line number (3) of Table 3.7-1 indicates that the treatment, at Ginna, of non-EQ electrical cables used in instrumentation circuits that are sensitive to reduction of conductor insulation resistance is not consistent with NUREG-1801. It states that external inspection of cables and connectors and their host environments identifies the possibility of thermal aging long before instrument loop adjustments can't compensate for current leakage.

Provide evidence or operational experience that supports this statement for non-EQ radiation monitoring and nuclear instrumentation cables. Such evidence could come from non-EQ radiation monitoring and nuclear instrumentation cables in the field or following accelerated aging tests. We would be looking for examples of cables that exhibited visual signs of thermal aging, even though the current leakage of the circuits was small relative to the output signal level of the circuit. If this information is not available, the MAP (XI.E2) identified in NUREG-1801 should be adopted to ensure the aging of non-EQ radiation monitoring and nuclear instrumentation cables is appropriately managed consistent with the requirements in 10 CFR 54.21(a)(3).

F-RAI 3.7 -4

The discussion in line number (3) of Table 3.7-1 of the LRA indicates that surveillance, such as calibration, may not be as good a choice as visual inspection to detect aging effects in low signal level instrumentation cable. It states that the predominate cause of non-event driven degradation in cable and connector insulation is thermal aging.

Another potential cause of cable degradation is moisture. Chapter 3 of EPRI report TR-103834-P1-2, “Effects of Moisture on the Life of Power Plant Cables,” identifies some water-related problems with instrumentation type circuits. The operating experience summary states that the first problem type, affecting the noise immunity of instrumentation circuits, was due to submergence degrading the jackets of instrumentation and coaxial cables. It would appear from this statement that activities such as checking for increases in signal distortion level or other signal anomalies during the calibration process, would add additional benefit to the calibration surveillance and make it a more effective tool for detecting cable aging effects. This could be of particular benefit to the highly sensitive radiation monitoring and nuclear instrumentation circuits, on the portion of the cable run that is located in conduit, subject to moisture intrusion, and not capable of being visually checked.

Provide a description of your AMP, in accordance with the requirements of 10 CFR 54.21(a)(3), used to detect cable-in-conduit aging effects that can increase signal distortion level or other signal anomalies in non-EQ radiation monitoring and nuclear instrumentation circuits; or provide justification why such a program is not needed.

F-RAI 3.7 -5

The discussion in line number (1) Electrical Phase Bus of Table 3.7-2 of the LRA indicates that because a one-time inspection found no AERM, no additional AMPs are required through the period of extended operation. The potential AERMs identified in line number (1) for the electrical phase bus appear to all be associated with the insulating components of the bus, and none with the metallic components.

Has the applicant considered oxidation and corrosion of the metallic components, or loosening of the fastener components? For example, oxidation of aluminum electrical connections can be problematic. The oxidation can create a high resistance connection resulting in additional heating at the connection and further oxidation until failure occurs.

With regard to the fasteners, reference 1 to Section 3.7 of the LRA, Aging Management Guideline for Commercial Nuclear Power Plants, on page 4-38 states:

Circuits exposed to appreciable ohmic or ambient heating during operation may experience loosening related to the repeated cycling of connected loads or of the ambient temperature environment ... Repeated cycling in this fashion can produce loosening of the termination under ambient conditions, and may lead to high electrical resistance joints or eventual separation of the termination from the conductor.

Provide a description of your AMP, in accordance with the requirements of 10 CFR 54.21(a)(3), used to detect aging effects associated with oxidation and corrosion of metallic components, and loosening of fastener components in the electrical phase bus; or provide justification why such a program is not needed.

F-RAI 3.7 -6

The discussion in line number (2) Switchyard Bus of Table 3.7-2 of the application states: Plant operating experience reviews show that the activities performed by the Energy Delivery Department on the switchyard buses are effective in managing switchyard bus components.

It appears that the activities performed by the Energy Delivery Department constitute the makings of an AMP for the switchyard bus that should be included under LR in accordance with the requirements of 10 CFR 54.21(a)(3). Describe the ten attributes of the switchyard bus AMP consistent with the guidance provided in Branch Technical Position RLSB-1 of the staff's license renewal Standard Review Plan (NUREG-1800). Include a discussion in your response addressing the topics described in Question 3.7-5 above.

F-RAI 3.7 -7

The discussion in line number (3) high voltage insulators of Table 3.7-2 of the LRA states: Plant operating experience reviews show that the activities performed by the Energy Delivery Department on the high voltage insulators are effective in managing phase bus components.

It appears that the activities performed by the Energy Delivery Department constitute the makings of an AMP for the high voltage insulators that should be included under LR in accordance with the requirements of 10 CFR 54.21(a)(3). Describe the ten attributes of the high voltage insulator aging management program consistent with the guidance provided in Branch Technical Position RLSB-1 of the staff's license renewal Standard Review Plan (NUREG-1800).

F-RAI 3.7 -8

Section B2.1.11.7 of the LRA describes the corrective actions attribute of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. It indicates that all unacceptable visual indications of cable and connection jacket surface anomalies are subject to an engineering evaluation that will consider the age and operating environment of the component.

Will the engineering evaluation consider the potential for moisture in the environment of cables and connections that are found to have jacket surface anomalies? Several aging management references (SAND96-0344, EPRI TR-103834-P1-2, and Aging and Life Extension of Major Light Water Reactor Components edited by V.N. Shaw and P.E. MacDonald) indicate that a moist environment can hasten the failure of circuits that have previously undergone age-related degradation from other means, such as thermal or radiation exposure. If your engineering evaluation does not consider the potential for moisture in the area of degraded cables and connections, please provide the technical basis for why it has been excluded. This information is necessary to ensure the aging of non-EQ cables connections are appropriately managed consistent with the requirements in 10 CFR 54.21(a)(3).

F-RAI 3.7 -9

Section 2.1.6 of the LRA discusses the general process used during the LR integrated plant assessment at Ginna Station for each of six issues the NRC staff has identified in interim staff guidance. The treatment of electrical fuse holders is one of the issues addressed. The final staff position is under development as the staff continues discussions with NEI on this topic. If this process is not finalized in time for this issue to be addressed in the staffs' Ginna LR SER, you will be asked to provide a commitment to implement the final staff guidance on this subject at Ginna, consistent with the staff's practice on previous license renewal applications. If the final staff position is finalized in time for this issue to be addressed in the staffs' Ginna LR SER, you will need to address the position.

F-RAI 4.1 -1

Table 4.1-1 of the LRA identifies TLAAs applicable to the Ginna Station. Tables 4.1-2 and 4.1-3 in NUREG-1800 identify potential TLAAs determined from the review of other LRAs. The LRA indicates that NUREG-1800 was used as a source to identify potential TLAAs. For those TLAAs listed in Tables 4.1-2 and 4.1-3 of NUREG-1800, that are applicable to PWR facilities and not included in Table 4.1-1 of the LRA, discuss whether there are any calculations or analyses that address these topics at the Ginna Station. If calculations or analyses exist that address these topics, discuss how the these calculations or analyses were evaluated against the TLAA definition provided in 10 CFR 50.3.

F-RAI 4.2.1 -1

Section 4.2.1 of the LRA indicates that the upper shelf energy (USE) for the reactor vessel beltline weld material will be less than 50 ft-lbs at the end of the extended period of operation. Consequently, a low upper-shelf fracture mechanics analysis has been performed to evaluate the weld material for ASME Levels A, B, C, and D. To confirm the USE analysis meets the requirements of Appendix G of 10 CFR Part 50 at the end of the LR period:

a) For each beltline material that is projected to remain above 50 ft-lb at the end of the LR period provide the percentage copper, the unirradiated Charpy USE, the projected neutron fluence at 1/4 thickness, the projected Charpy USE at the end of the license LR, and whether the drop in Charpy USE was determined using the limit lines in Figure 2 of RG 1.99, Revision 2 or from surveillance data. If surveillance data was used, provide the surveillance data.

b) If an equivalent margins analysis was required to demonstrate compliance with the USE requirements in Appendix G of 10 CFR 50, provide the analysis or identify an approved topical report that contains the analysis. Information the staff will require to assess the equivalent margins analysis includes: the unirradiated USE (if available) for the limiting material, its copper content, the fluence (1/4T and at 1 inch depth), the end of extended license (EEOL) USE (if available), the operating temperature in the downcomer at full power, the vessel radius, the vessel wall thickness, the J-applied analysis for Service Levels C and D, the vessel accumulation pressure, and the vessel bounding heatup/cooldown rate during normal operation.

<u>F-RAI 4.2.2 -1</u>

In Section 4.2, "Reactor Vessel Neutron Embrittlement," of the LRA it is stated that the methodology used to perform neutron fluence calculations is consistent with Regulatory Guide 1.190. Explain how the calculation adheres to the guidance of RG 1.190, i.e. what code(s) were used, how were they benchmarked, what approximations were used, what cross sections, how were the sources derived, were there any adjustments of the calculations with respect to measured surveillance capsule dosimetry, etc.

<u>F-RAI 4.3.1 -1</u>

Section 4.3.1 of the LRA contains a discussion of the transients used in the design of the RCS components at the Ginna Station. The LRA indicates that a review concluded that the existing design cycles and cycle frequencies are conservative and bounding for the period of extended operation. Provide the following information for each of the design transients reviewed:

a) The current number of operating cycles and a description of the method used to determine the number of the design transients from the plant operating history.

b) The number of operating cycles estimated for 60 years of plant operation and a description of the method used to estimate the number of cycles at 60 years.

c) A comparison of the design transients with the transients monitored by the Fatigue Monitoring Program (FMP) described in Section B.3.2 of the LRA. Identify any transients listed in the LRA that are not monitored by the FMP and explain why it is not necessary to monitor these transients.

<u>F-RAI 4.3.1 -2</u>

The Westinghouse Owners Group issued Topical Report WCAP-14577, Revision 1-A, "Aging Management for Reactor Internals," to address the aging management of the reactor vessel internals (RVI). The staff review of WCAP-14577, Revision 1-A, identified a number of issues that should be addressed on a plant specific basis. Renewal Applicant Action Item 11 specified in WCAP -14577, Revision 1-A, indicates that the fatigue TLAA of the RVI should be addressed on a plant specific basis. In Table 3.2.0-2 of the LRA, RG&E indicates that a discussion of the RVI is contained in Section 4.3 of the LRA. Section 4.3 of the LRA indicates that the RVI were designed in accordance with Westinghouse criteria which were later incorporated into the ASME Code. Discuss the transients that contribute to the fatigue usage for each component listed in Table 3-3 of WCAP-14577, Revision 1-A, and discuss how the these transients were evaluated during the transient review discussed in F-RAI 4.3.1-1.

<u>F-RAI 4.3.2 -1</u>

Section 4.3.2 of the LRA contains a discussion of the evaluation of USA Standard B31.1 components at the Ginna Station. The LRA indicates that the USA Standard B31.1 limit of 7000 equivalent full range cycles may be exceeded during the period of extended operation for the nuclear steam supply system (NSSS) sampling system and that an engineering evaluation will be performed prior to the period of extended operation. The LRA further indicates that the effects of fatigue may be managed by an inspection program if the results of the engineering evaluation are not acceptable. The UFSAR Supplement provided in Section A3.3.3 does not

discuss this option. Clarify the proposed options for addressing the NSSS sampling system and provide an update of the UFSAR Supplement, if necessary. In addition, describe the existing qualification of the NSSS sampling system and provide the maximum calculated thermal stress range for affected portions of the system.

F-RAI 4.3.3 -1

In Section 4.3.3 of the LRA it is stated that the NRC reviewed WCAP-15338 and included two applicant action items to verify that a plant is bounded by the report evaluation and that the TLAA be described in the plant UFSAR Supplement. For the plant to be bound by WCAP-15338 it must be bound by the number of cycles and transients assumed in WCAP-15338. The staff requests that the applicant confirm that the projected number of cycles for the Ginna reactor vessel at the end of the period of the extended license is less than the number of cycles in the WCAP-15338 analysis.

F-RAI 4.3.5 -1

In Section 4.3.5 of the LRA it is stated that using a 15^{o} focused beam search unit, the indication was resolved into two separate indications which met the criteria for acceptance by examination in ASME Section XI, 1974 with Summer 1995 Addenda. However, according to the Staff Evaluation section of the referenced document, USNRC Letter Johson to Mecredy, “Ginna Flaw Indication in the Reactor Vessel Inlet Nozzle Weld - 1989 Reactor Vessel Examination (TAC No. 71906),” July 7, 1989, “The staff’s evaluation determined that the licensee’s final dimensions of 4.94" x .48" is a realistic representation of the actual flaw size. If the flaw length were assumed constant, a reduction of .036" in the depth dimension (.480" - .44") would result in a flaw indication that meets the ASME Section XI acceptance standard.” Consequently, according to the staff SER, the dimensions of the flaw are not within ASME Section XI acceptance standards. Therefore a fatigue analysis for the extended period of operation for this flaw is a TLAA and its results must be provided in accordance with 10 CFR 54.21(c) and must be described in the UFSAR Supplement.

F-RAI 4.3.7 -1

Section 4.3.2 of the LRA discusses RG&E’s evaluation of the impact of the reactor water environment on the fatigue life of components. The discussion references the fatigue sensitive component locations for an older vintage Westinghouse plant identified in NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components.” The LRA indicates that the later environmental fatigue correlations contained in NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” and NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue on Fatigue Design Curves of Austenitic Stainless Steels,” were considered in the evaluation. Provide the following information for the six component locations listed in NUREG/CR-6260:

a) For those locations with existing fatigue analyses, provide the results of the fatigue usage factor calculation, including the calculated environmental multiplier (Fen). Show how Fen was calculated.

b) For the USA Standard B31.1 locations discussed in Section 4.3.7.3 of the LRA, describe the fatigue usage factor calculation and provide the calculated fatigue usage factor. Include a detailed comparison of the Ginna Station components with the components listed in NUREG/CR-6260 and discuss the significance of the differences. This comparison should also include any differences in the thermal sleeve designs. In addition, provide a comparison the design transients used in the analysis of the NUREG/CR-6260 components with the anticipated transients for the Ginna Station components.

F-RAI 4.5 -1

In order for the staff understand the quantitative aspect of the analysis, the applicant is requested to provide the following information:

a) For the 23 tendons which were retensioned in 1969, the applicant is requested to provide the predicted lower limit line, MRV expected in 2005 and at 60 years (if not retensioned in 2005), a trend line for this group of tendons, and prestressing force values as points above and below the trend line measured during prior inspections.

b) The applicant is requested to provide the same information for the remaining 137 tendons, for the inspections performed after 1980 retensioning.

c) In the operating experience element of Section B3.3 of the LRA, it indicates that 23 tendons out of 160 tendons were retensioned 1000 hours after initial prestressing. It is not clear if the 23 tendons retensioned after initial prestressing were parts of the randomly selected tendons in the subsequent surveillance of tendons performed as per Regulatory Guide 1.35, or IWL-2520. The applicant is requested to provide information regarding the trending of prestressing forces in these 23 tendons.

F-RAI 4.5 -2

Section A4.1 of the LRA (UFSAR Supplement) gives a qualitative description regarding the prestressing forces in Ginna containment. The staff believes that the applicant should, as a minimum, provide target prestressing forces that will be maintained at 40 years and 60 years. The applicant is requested to supplement the present description in A4.1 with the basic quantitative description.

F-RAI 4.6 -1

Provide a list of design transients and corresponding cycles that were prescribed in the design of the containment penetrations.

F-RAI 4.6 -2

For the penetration sleeve and the annular plate connecting the pressure piping to the sleeve, provide the analysis that shows that the six conditions of ASME Section III, Subsection A, N-415.1, 1965, will be satisfied for the period of extended operation.

F-RAI 4.6 -3

Indicate if the hot piping penetration assemblies contain bellows. If yes, provide the basis for not identifying fatigue of these bellows as TLAAs, in accordance with 10 CFR 54.3.

F-RAI 4.7.3 -1

Provide the design transients and corresponding cycles which generated the static stress of 13,600 psi in the fillet weld attaching the channels to the liner.

F-RAI 4.7.3 -2

Indicate the design code to which the fatigue analysis of the fillet welds attaching the channel anchors to the liner was performed.

F-RAI 4.7.3 -3

Provide justification why a fatigue-strength reduction factor was not applied to the stress caused by static loading for determining the allowable cycles for the fillet weld attaching the channel anchors to the liner.

F-RAI 4.7.3 -4

Provide detailed clarification why this fatigue analysis may not meet the definition of a TLAA, as described in 10 CFR 54.3.

F-RAI 4.7.4 -1

The applicant is requested to provide the UFSAR Section numbers where the staff can find information regarding the allowable radial and vertical displacements of the containment stainless steel tendon bellows, and calculations showing the fatigue usage factor less than 0.01.

F-RAI 4.7.5 -1

Section 4.7.5 of the LRA indicates that the estimated cycle numbers were compared to the design load cycles and that the estimated numbers are well below the upper design load cycle limit. Provide the estimated number of load cycles and also the assumptions used in the estimation. In addition provide the upper design loading cycle limit.

F-RAI 4.7.5 -2

Section 4.7.5 of the LRA states that the average percent of the rated load lifted is less than 50% for the design load cycles. Provide assurance that this percentage will not change in the future during the period of extended operation.

F-RAI 4.7.6 -1

The UFSAR Supplement does not describe the RCP flywheel TLAA. Therefore, the applicant is requested to update the UFSAR Supplement to include this TLAA.

F-RAI 4.7.7 -1

The thermal aging embrittlement effect (loss of fracture toughness) on cast austenitic stainless steel is time dependent and is treated as a TLAA. The applicant performed a Leak-Before-Break (LBB/flaw tolerance) analysis to demonstrate that leaks from RCS piping can be detected prior to the cracks growing to a size that would become unstable. The applicant referenced a Westinghouse report (WCAP-15837, "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the R. E. Ginna Nuclear power Plant for the License Renewal Program," April 2002) for its LBB analysis. The applicant also performed a fracture mechanics analysis in accordance with the requirements of ASME Code Case N-481 for the cast austenitic stainless steel (CF8M) reactor coolant pump (RCP) casings for the extended operation period. This fracture mechanics analysis was documented in a Westinghouse report (WCAP-15873, "A Demonstration of the Applicability of ASME Code Case N-481 to the Primary Loop Casings of R. E. Ginna Nuclear Power Plant for the License Renewal Program," April 2002). Code Case N-481 allows the required volumetric inspection of RCP casings to be replaced by a visual examination with the performance of an evaluation to demonstrate the safety and serviceability of the pump casings.

a) Confirm whether the two Westinghouse reports (WCAP-15837 and WCAP-15873) referenced in Section 4.7.7 have been submitted to NRC for review and approval. If these reports have been approved by NRC, identify the NRC approval documents. If these reports have not been reviewed and approved by NRC, submit the reports on the "docket" for Ginna's LRA.

b) If the reports have not been reviewed and approved by NRC, confirm whether the NRC approved methodologies including the material properties and other input parameters that were used in the analysis. Also identify areas in the referenced Westinghouse analyses that deviate from NRC recommended guidelines and provide justification for each deviation. If the requested information is already available in the referenced reports, summarize the information and identify the relevant sections in the reports.

F-RAI B2.1.1 -1

The applicant stated that this program is not specifically used for aging management at Ginna station as it is implemented by the Systems Monitoring and One-Time Inspection Programs.

a) Confirm and discuss whether the subject aging program is consistent with the guidelines provided in AMP XI.M29, "Aboveground Carbon Steel Tanks" of NUREG-1801. Also identify all deviations from the guidelines in AMP XI.M29 and provide justification for each deviation.

b) The staff notes that a one-time inspection of the reactor makeup water tank prior to the period of extended operation will be performed for tank bottom thickness measurements. Provide justification for not performing one-time inspection on the other aboveground carbon steel tanks.

c) The staff notes that the bottom thickness measurement of the aboveground carbon steel tanks are not identified in the scope of program of the One-Time Inspection Program. Since the subject program will not be specifically used for aging management at Ginna station, the performance of bottom thickness measurement of the aboveground carbon steel tanks should be identified in the scope of One-Time Inspection Program.

d) This program should provide guidance for selecting locations with the highest likelihood of corrosion problems for thickness measurements such as the locations where there is observed degradation of sealant or caulking at the interface edge between the tank and foundation, which would allow penetration of water and moisture and cause corrosion of the bottom surface.

e) Provide guidance in this programs for sample expansion and increasing frequency of inspection when surface degradation is observed.

F-RAI B2.1.3 -1

Regarding the overall loss of prestressing forces in majority of the containment tendons, the applicant is requested to provide a summary of the corrective actions taken, including the root cause determination, and the results of subsequent inspections.

F-RAI B2.1.3 -2

As described in Section 2.4.1 of the LRA, the support system of the Ginna containment is unique, and its inspection requirements are not specifically addressed in Subsections IWE and IWL of Section XI of the ASME Code. Provide information regarding the inspection and evaluation of the support system.

F-RAI B2.1.3 -3

Moisture barrier degradation and minor corrosion of the liner has been detected during prior inspections. The applicant is requested to provide, (a) the acceptance criteria used for repairing the liner plate, (b) the successive (IWE-2420), additional (IWE-2430), and augmented [IWE-2500(c)] liner inspections performed (and will be performed), and (c) sampling plans (if any) for removing the insulation for the purpose of inspection.

F-RAI B2.1.3 -4

The scope of the GALL Program XI.S4, provides two options for monitoring the performance of containment isolation valves. The applicant is requested to provide information regarding the applicant’s choice of option for performing Type C testing during the period of extended operation.

F-RAI B2.1.3 -5

Section A2.1.3 of Appendix A (UFSAR Supplement) of the LRA summarizes the content the IWE and IWL AMP. However, it does not include the containment leak rate testing (i.e. GALL Report Section XI.S4) as part of the AMP. The applicant is requested to provide information regarding the inclusion of this aspect of the AMP in the UFSAR Supplement.

F-RAI B2.1.4 -1

In Section B2.1.4, “ASME Section XI, Subsection IWF Inservice Inspection”, of the LRA it states that industry operating experience was incorporated into the LR process through a review of industry documents to identify aging effects and mechanisms that could challenge the intended function of systems and structures within the scope of LR. Review of plant specific operating experience was performed to identify aging effects. The staff noted that there are instances where industry operating experience is not included in the Ginna IWF Program; for instance, loss of material due to general corrosion for the bolts and anchorage; stress corrosion cracking due to improperly heat-treated anchor bolts; deformation or structural degradations of fasteners, springs, clamps; loss of hanger mechanical function; and improper clearances of guides and stops. The GALL program, Section XI.S3, “ASME Section XI, Subsection IWF,” under “Parameters Monitored or Inspected,” states that VT-3 visual examination will be used to monitor or inspect component supports for corrosion; deformation; misalignment; improper clearances; improper spring settings; damage to close tolerance machined or sliding surfaces; and missing, detached, or loosened support items. The applicant is requested to discuss how its IWF program was considered to be consistent with the GALL IWF program, considering conformance of all the relevant program elements.

F-RAI B2.1.4 -2

In the LRA Section B2.1.4, “ASME Section XI, Subsection IWF Inservice Inspection”, it states that discovery of deficiencies during regularly scheduled inspections results in an expansion of inspection scope to assure that the full extent of the deficiencies is identified. Degradation that potentially compromises the support function or load capacity is identified for evaluation. The deficient incidents for pipe and component supports and anchorages have been corrected in accordance with the requirements of Subsection IWF. Provide a discussion and examples of expanding inspection scope when discovering deficiencies in supports and anchorage and evaluating the identified degradation of supports and anchorages at Ginna.

F-RAI B2.1.6 -1

Section B.2.1.6 of the LRA indicates that Boric Acid Program will be consistent with the GALL.

a) Identify when this program will be consistent with GALL.

b) Describe the changes that must be incorporated to make the Ginna Boric Acid Program consistent with the GALL program.

F-RAI B2.1.6 -2

As a result of the insights gained from the recent discovery of boric acid-induced corrosion of the Davis-Besse vessel, the staff requests that the applicant address the changes that were made to its boric acid corrosion prevention program in response to the Davis-Besse event.

F-RAI B2.1.7 -1

The Buried Piping and Tank Inspection Program consists of implementing preventive measure such as applying protective coating and periodic inspections, when inspection opportunities arise, to manage the corrosion effect on the external surfaces of buried carbon steel piping and tanks. In addition, the LRA states that this AMP is not specifically used for aging management at Ginna Station, as the inspection activities are performed through the One-Time Inspection Program.

a) Confirm and discuss whether this program is consistent with the guidelines provided in AMP XI.M34,"Buried Piping and Tanks Inspection" of NUREG-1801. Discuss all the deviations from AMP XI.M34 and provide justification for each deviation.

b) For each buried piping and tank, describe what preventive measures such as coating, wrapping or other protective measures are applied to mitigate the corrosion of its external surfaces. Confirm that the preventive measures applied are consistent with the guidance provided in NACE Standards RP-0285-95 and RP-0169-96.

c) Identify the environment that the inner surface of each buried piping and tank is exposed to and discuss its potential degradation caused by the environment. Also identify any scheduled maintenance that would provide the opportunity for inspection of the buried piping and tanks.

d) Discuss how the proposed inspection frequency based on the inspection of opportunity would provide adequate assurance that the corrosion of external surfaces of the buried piping and tanks will not occur when the opportunity for inspection does not arise.

e) The inspection activities of buried piping and tanks should be identified in the One-Time Inspection Program; if not, justify its exclusion.

f) Discuss the bases for not monitoring/inspecting the potential corrosion or degradation of the internal surfaces of the buried piping and tanks.

F-RAI B2.1.8 -1

Section B2.1.8, Buried Piping and Tank Surveillance Program, does not employ the guidance provided in the NACE Standards of RP-0285-95 and RP-0169-96 to manage the corrosion effect on the external surface of buried carbon steel piping and tanks. The guidance provided in the referenced NACE Standards are recommended in NUREG-1801 for implementing the surveillance and preventive measures to mitigate corrosion on the external surface of buried carbon steel piping and tanks. Instead, the AMP relies on the implementation of ten existing AMPs to maintain the intended functions of buried carbon steel piping and tanks.

a) Confirm and discuss whether this program is consistent with the guidelines provided in AMP XI.M28, "Buried Piping and Tanks Surveillance" of NUREG-1801. Discuss all the deviations from AMP XI.M28 and provide justification for each deviation.

b) For each buried piping and tank, describe what preventive and surveillance measures such as coating, wrapping, cathodic protection system or other protective measures are applied to mitigate corrosion of its external surfaces.

c) For each buried piping and tank, identify the applicable AMPs and discuss in detail how the applicable AMPs provide adequate protective and surveillance measures to mitigate the corrosion of its external surfaces.

d) Discuss in detail as how the ten referenced AMPs meet the guidance provided in NACE Standards RP-0285-95 and RP-0169-96 in providing adequate preventive and surveillance measures to mitigate corrosion of external surface of buried carbon steel piping and tanks.

e) Cathodic protection systems have been shown to be effective in mitigating corrosion of external surfaces of buried piping and tanks. Discuss the feasibility of implementing such protective system on the piping and tank components where adequate protective and surveillance measures are not applied.

f) In Section A2.1.7, “Buried Piping and Tanks Inspection,” of the LRA it states that preventive measures are in accordance with standard industry practice for maintaining external coatings and wrappings. Describe the preventive measures that are applied and compare them to industry practice to determine their adequacy.

F-RAI B2.1.9 -1

Section B2.1.9 of the LRA does not conclude if this AMP is/is not consistent with the GALL, but identifies some areas where the program differs from the GALL. Tables 3.3-1, 3.4-1 and 3.5-1 indicate the CCW Program is consistent with the GALL and requires no further evaluation.

Resolve the potential discrepancy regarding if the program is intended to be consistent with the GALL. If the applicant determines the program is not consistent with the GALL discuss how the CCW program meets the ten elements of an AMP.

If the program is intended to be consistent with the GALL, discuss the following:

a) System chemistry sampling will not permit detection of aging effects. Discuss operating experience or information regarding monitoring, testing and inspections performed on the system/components to ensure aging effects are identified prior to a loss of function.

b) Maintaining and monitoring system chemistry alone does not ensure that heat transfer capabilities are maintained. Loss of Heat Transfer is identified as an AERM that will be monitored by the Closed Cycle Cooling Water System. Discuss operating experience and/or testing and monitoring attributes of the program that prevent loss of heat transfer.

c) The applicant samples for pH, chromates, and radioactivity and indicates sampling for corrosion products, calcium, potassium and refrigerant chemicals is not performed based on plant operating experience. Discuss the operating experience and past samples taken (if any) that support not testing for corrosion products, calcium, potassium, and refrigerant chemicals.

d) EPRI TR 107396 (Closed Cooling Water Chemistry Guideline) recommends that conductivity, chlorides, and sulfates should be monitored in a chromated water system. EPRI TR 107396 indicates that chlorides and sulfates may reduced the efficacy of chromate inhibitors. Further, chlorides and sulfates may negatively impact the corrosion resistance of some alloys in the CCW system. Discuss the program bases for not monitoring these (chlorides and sulfates) parameters as outlined in TR107396 for chromated systems.

e) It may be difficult to establish and maintain chemistry controls in stagnant and low flow sections of systems. Describe how the CCW Program addresses aging effects in these areas.

f) The applicant indicates that due to condensation, external corrosion affected the surface of some CCW piping. Ultrasonic test (UT) readings were taken and no significant wall thinning was noted. Discuss how much of the system was affected, the extent of the UT inspections, how long the affected piping had been in service and how any indicated wall thinning was attributed to internal or external corrosion.

g) The applicant indicates that non destructive examinations (NDE) are used at locations were material loss may occur. Discuss how the CCW Program identifies areas for NDE inspection, the frequency of inspection, acceptance criteria and how the data are trended to ensure detection of aging effects.

F-RAI B2.1.10 -1

a) Section 2.3.3.18 of the LRA states that the plant air system is not safety-related and does not perform a safety-related function and, as such, the plant air systems are not within the scope of LR. It further states that portions of plant air act as containment isolation devices and those portions are evaluated in the containment isolation system. Clarify and provide the basis of the LR intended functions of the plant air system for containment isolation devices. Also, identify the aging mechanisms and the AMPs required for this system or justify why an AMP is not required.

b) Provide the UFSAR Supplements related to this program, as applicable.

D-RAI B2.1.15 -1

In order for the staff to evaluate the acceptability of the Flow Accelerated Corrosion (FAC) Program, the applicant is requested to provide a list of the components in the program most susceptible to FAC. The list should include initial wall thickness (nominal), current wall thickness and the future predicted wall thickness.

D-RAI B2.1.15 -2

The FAC Program at Ginna includes a prediction of the wall thinning for the components susceptible FAC. The wall thinning is predicted by the EPRI’s CHECWORKS computer code. In order to allow the staff to evaluate the accuracy of these predictions, the applicant is requested to provide a few examples of the components for which wall thinning is predicted by the code and at the same time measured by UT or any other method employed in the applicant’s plant.

F-RAI B2.1.16 -1

In Section B2.1.16 of the LRA the applicant does not specify if its Fuel Oil Chemistry Program is consistent with the program in GALL. The staff does not know, therefore, to what extent the program described in the Section B2.1.16 of the LRA deviates from the program specified the GALL. The applicant is requested to specify whether the program described in Section B2.1.16

of the LRA is consistent with the XI.M30 program in GALL. The applicant should also evaluate any deviations which may exist between the applicant's and the GALL programs, including not testing for biological activity, not adding biocide to the fuel oil, and not conducting particulate sampling in accordance with the modified ASTM D2276 standard.

F-RAI B2.1.16 -2

In Section B21.16, of the LRA it states that underground tanks have been drained and inspected annually until 1993. However, since 1993 only pressure tests are performed annually and internal inspections are performed on a 10-year frequency. Since decrease of the frequency of inspection may reduce the chances of detecting tank failure, provide the rationale for changing the inspection frequency of the underground storage tanks from annual to a 10-year frequency.

F-RAI B2.1.18 -1

LRA Section B2.1.18 states that some inconsistencies were identified between crane operation and crane licensing basis at some plants in Bulletin 96-02, "Movement of Heavy Loads over Spent Fuel, Over Fuel in the Reactor Core, Over Safety-Related Equipment." Indicate whether or not any such inconsistencies have been identified at Ginna, either before or after the issuance of Bulletin 96-02. If inconsistencies were identified, provide the corrective actions that were taken.

F-RAI B2.1.18 -2

Clarify whether or not wire ropes are among the subcomponents that are managed for age related degradation. Provide the inspection methods and acceptance criteria for the wire ropes.

F-RAI B2.1.21 -1

The LRA concludes that the One-Time Inspection Program will be consistent with GALL program XI.M32, "One-Time Inspection." A one-time inspection is generally appropriate for confirming the absence of significant aging effects. A review of the AMR tables in Section 3 of the LRA indicates that this program is being credited for items where aging is considered likely, such that a periodic inspection may be more appropriate than a one-time inspection. Justify why a one-time inspection is appropriate for the following: 1) change in material properties of Neoprene, 2) loss of material of cast iron and carbon steel in raw water, treated water (where One-Time Inspection is the only AMP), and drainage water, and 3) loss of heat transfer of cast iron in raw water.

F-RAI B2.1.21 -2

The staff finds that the UFSAR Supplement is generally consistent with the program description in Appendix B of the LRA; however, the UFSAR Supplement does not provide a level of detail commensurate with the SRP-LR. The applicant is requested to augment the UFSAR description to include the items in scope of the One-Time Inspection.

F-RAI B2.1.21 -3

Provide additional information on the construction (e.g., wrapped or protected), condition (any previous inspections), and environment of the buried fuel oil storage tank in the emergency power system.

The staff notes that the applicant does not credit a Buried Tank and Piping Inspection Program. Provide sufficient information to justify why a one-time inspection (ultrasonic wall thickness measurement), and periodic visual inspection of the tank internals under the Periodic Surveillance and Preventative Maintenance Program are adequate to manage aging of this tank.

F-RAI B2.1.21 -4

Provide information on the construction (e.g., wrapped or protected), condition (any previous inspections), and environment of the buried carbon steel pipe in the hydrogen detectors and recombiner system to justify using the One-Time Inspection program as the only aging management for this pipe.

F-RAI B2.1.22 -1

The LRA indicates that the service water system is consistent with the GALL with two minor differences: 1) heat transfer tests are not performed on selected small heat exchangers which are periodically cleaned and inspected in accordance with the Periodic Surveillance and Preventive Maintenance Program, 2) the Service Water System Reliability and Optimization Program (SWSROP) does not address protective coatings which are not credited for aging management in the Ginna service water system.

With regards to the first difference; discuss the following:

a) How and what criteria are used to scope heat exchangers into the service water system or the Periodic Surveillance and Preventive Maintenance Program?

b) What parameters are monitored/ inspected during the preventive maintenance action, what method is used to detect aging?

c) How is heat exchanger maintenance periodicity established?

d) What and how are results trended with respect to applicable aging mechanisms?

e) What acceptance criteria are incorporated into the preventive maintenance action?

Also, the LRA indicates in the conclusion section of the Periodic Surveillance and Preventive Maintenance Program that the program must be enhanced to address aging mechanisms and monitoring. Discuss if and how this is applicable to the small heat exchangers within the Service Water System Program and when actions will be complete. Describe the enhancements to the program; i.e. change in scope, procedures and/or methods applied to small heat exchangers.

F-RAI B2.1.22 -2

The LRA indicates that the service water system is consistent with the GALL with two minor differences: 1) heat transfer tests are not performed on selected small heat exchangers which are periodically cleaned and inspected in accordance with the Periodic Surveillance and Preventive Maintenance Program, 2) the SWSROP does not address protective coatings which are not credited for aging management in the Ginna service water system.

With regards to the second difference, the program attributes of GL-89-13 and GALL identify inspection, monitoring and corrective action for failed internal coatings that could adversely impact heat transfer capability or lead to corrosion in service water systems. Not crediting the protective coatings does not eliminate the possibility that coating failure could have an adverse impact on heat transfer capabilities or corrosion.

Discuss how the Ginna SWSROP ensures internal coating (if any coatings are used) failure will not adversely impact heat transfer capability or corrosion of system components and provide operating experience supporting the applicants position.

F-RAI B2.1.22 -3

The applicant identified that a number of heat exchangers have been replaced or retubed. Discuss the mechanisms leading to retubing or replacement, the means used to identify the degradation, if loss of pressure boundary integrity occurred and any changes made to the Open Cycle Cooling Water Program as a result of the degradation.

F-RAI B2.1.23 -1

Section B2.1.23 of the LRA states that cracking and material thinning will be detected by performing visual inspections and surface examinations. Since cracking and thinning on the interior surfaces (for example, interior surfaces of pipe walls), cannot be detected by such methods, indicate the methods which will be employed to detect such defects.

F-RAI B2.1.23 -2

Section B2.1.23 of the LRA states that inspection for leakage may be utilized for managing ageing effects in selected piping and components. It is the staffs position that actual leakage is indicative of piping or component failure; therefore, the AMP should be aimed at detecting and preventing loss of material so that corrective actions can be taken prior to the occurrence of leakage. Identify the specific circumstances where leakage inspection is proposed to be utilized for aging management.

F-RAI B2.1.23 -3

The Periodic Surveillance and Preventative Maintenance program is an existing program that covers a wide range of systems, structures, and components. The LRA states that the program includes periodic replacement or refurbishment of equipment based on operating experience. It is not clear whether equipment in scope of LR is subject to periodic replacement or refurbishment, or whether the equipment can perform its intended function at the time it is replaced or refurbished. Clarify whether any equipment that requires aging management per 10 CFR Part 54 is managed by periodic replacement or refurbishment, whether any inspections are performed in addition to the periodic replacement or refurbishment, the basis for the replacement or refurbishment period, and the equipment operating experience.

F-RAI B2.1.23 -4

The LRA states that aging effects such as loss of material, cracking, loss of seal, etc., are detected by visual inspection of surfaces for evidence of leakage, material thinning, accumulation of corrosion products, and debris. Under Program Description and Scope of Program, the LRA states that the program uses “visual inspections and surface examinations” to detect aging effects, while Detection of Aging Effects only discusses visual examinations, and Monitoring and Trending describes the use of periodic plant walkdowns (which implies visual external inspections) for monitoring the aging effects. The staff notes that this program is primarily used to detect internal aging of such AERMs as loss of material and cracking due to SCC. Clarify the type of inspections that are used to detect each of the aging effects covered by this program, and discuss their applicability to the AERMs being managed.

F-RAI B2.1.23 -5

The LRA states that the One-Time Inspection Program (AMP B2.1.23) is used to verify the effectiveness of the Water Chemistry Control Program (AMP B2.1.37). The LRA further states that the One-Time Inspection Program is consistent with GALL Program XI.M32, “One-Time Inspection.” A review of the LRA implies that the Periodic Surveillance and Periodic Maintenance Program is frequently used in lieu of the One-Time Inspection Program for verifying the effectiveness of the Water Chemistry Control Program. Clarify whether the Periodic Surveillance and Periodic Maintenance Program is being used for this purpose and, if so, discuss whether the inspections are comparable to the inspections GALL Program XI.M32.

F-RAI B2.1.23 -6

The LRA states that the inspection intervals are established to provide timely detection of degradation and are based on service environment as well as industry and plant-specific operating experience and manufacturers recommendations. In order to evaluate the acceptability of this program, the staff requires additional information on the frequency of inspections for the various AERMs covered by this program. Explain how the frequency of inspection was derived for the various AERMs covered by this program.

F-RAI B2.1.23 -7

The LRA states that acceptance criteria for this program “will be developed.” Discuss how the criteria will be developed for each applicable AERM, and how this criteria, coupled with the inspection frequency, will ensure that the components continue to meet their LR intended function.

F-RAI B2.1.23 -8

LRA Table 3.4-1, line number (2), indicates that the Periodic Surveillance and Preventive Maintenance Program will be used to address hardening, cracking, and loss of strength due to elastomer degradation for elastomers in the ventilation system. The LRA is unclear about how these items will be inspected. Describe the inspections that will be performed on the elastomers in the ventilation systems.

F-RAI B2.1.23 -9

a) LRA Table 3.4-1, line number (9), states that Periodic Surveillance and Preventive Maintenance Program will be used to monitor for loss of neutron absorbing capacity and loss of material in neutron absorbing sheets in the spent fuel pool. The LRA is not clear how these items will be inspected. Describe the inspections that will be performed on the neutron absorbing sheets.

b) The existing evidence of the resistance of the neutron absorbing panels to degradation in the spent fuel pool environment is based on the results of one examination of a single coupon. Explain how these results are used for predicting capability of the neutron absorbers for performing their functions over the remaining life of the racks?

F-RAI B2.1.24 -1

The LRA indicates that the Protective Coatings Monitoring and Maintenance Program is not credited as a license renewal AMP, but has included a discussion of the 10 elements of an AMP “to demonstrate compliance with the resolution of generic safety issue (GSI) 191". After discussing the 10 elements the applicant concludes their Coatings Program is consistent with the GALL, but states the program is not credited for LR. GSI 191 is related to PWR sump clogging. Failed coatings are only one potential source of debris that could clog the sump. License Renewal is not the correct forum for resolving GSIs.

The staff requests that the applicant clarify the intent of providing the discussion on the Protective Coatings Monitoring and Maintenance Program and GSI 191 in the LRA.

F-RAI B2.1.25 -1

Section B2.1.25 of the LRA indicates that the reactor head closure studs are fabricated from ASME SA-320 Grade L43 (AISI 4340) low-alloys steel and are not susceptible to SCC (specified minimum yield strength of 105 ksi).

a) Provide plant experience regarding the number and results of the inspections of the reactor head closure studs and the basis for concluding that the reactor head closure studs are not susceptible to SCC.

b) Bolting is susceptible to SCC when heat treated to a maximum tensile strength limited greater than 1,172 MPa (170 ksi). What controls are in place at Ginna to ensure that no reactor head closure studs were heat treated to a tensile strength greater than 170 ksi?

F-RAI B2.1.25 -2

The LRA contains only a program description and Appendix A; the UFSAR does discuss this program. The applicant must identify whether all 10 elements of the program are in accordance with GALL Program XI.M.3 and whether the applicant's program contains any exceptions or enhancements to the 10 elements in GALL Program XI.M.3. The applicant is requested to describe this program in the UFSAR.

F-RAI B2.1.26 -1

The Reactor Vessel Head Penetration Inspection Program consists of (1) performing primary water stress corrosion cracking (PWSCC) susceptibility assessment to identify susceptible components, (2) monitoring and control of reactor coolant water chemistry to mitigate PWSCC and (3) performing ASME Code, Section XI inservice inspection of reactor vessel head penetrations and bottom-mounted instrument tube penetrations. The applicant plans to replace the reactor vessel head and control rod drive mechanism (CRDM) penetrations during the fall 2003 refueling outage.

a) Confirm and discuss whether this program is consistent with the guidelines provided in AMP XI.M11,"Nickel Alloy Nozzles and Penetrations" of NUREG-1801. Discuss all the deviations from AMP XI.M11 and provide justification for each.

b) Describe in detail the parameters and criteria used in the susceptibility assessment for PWSCC to identify susceptible components. Based on your susceptibility assessment, what components are determined to be not susceptible to PWSCC.

c) The LRA states that the reactor vessel head is planned to be replaced in the fall of 2003 using Alloy 690TT material. Describe in detail the Alloy 690TT material, including its chemical composition, heat-treatment, process of fabrication and its susceptibility to PWSCC. Also discuss the differences between Alloy 690TT and Alloy 690.

d) PWSCC is a time-dependent material degradation process and its initiation and growth depends on a number of factors such as: susceptibility of materials, stress conditions, environmental condition, and operational temperature. Even if there is no PWSCC found in the susceptible components in the first 40 years of operation, there is no assurance that PWSCC will not occur in the next 20 years unless it is adequately mitigated and periodically verified. Provide the bases for not performing augmented inspection such as volumetric and eddy current examinations of the bottom-mounted instrumentation penetrations to verify that PWSCC is not occurring in those components during the extended period of operation.

e) Discuss in detail the conclusion that the Ginna station ASME Section XI ISI Program has been effective in maintaining the intended function of the current reactor vessel upper and lower head penetrations. The current industry experience does not support the applicant's conclusion. Describe in detail the ASME Section XI ISI Program implemented in Ginna station for reactor vessel upper and lower head penetrations, particularly regarding the method and frequency of inspection and the capability of detecting the PWSCC when cracks in susceptible components are not yet through-wall.

F-RAI B2.1.27 -1

Section B2.1.27 of the LRA identifies the following reavtor vessel internals (RVI) components to be most susceptible to crack initiation and growth due to IASCC and loss of fracture toughness due to neutron irradiation embrittlement and/or void swelling:

- Lower core plate and fuel alignment pins;
- Lower support columns;
- Core barrel and core barrel flange in active core region;
- Thermal shield and neutron panels;
- Bolting - lower support column, baffle-former, and barrel former

Provide the criteria for choosing these locations.

F-RAI B2.1.27 -2

The applicant has described the 10 elements of the Reactor Vessel Internals Program but has not identified whether all 10 elements of the program are in accordance with GALL Program XI.M16 and whether the applicant's program contains any exceptions or enhancements to the 10 elements in GALL Program XI.M16. The applicant is requested to identify whether all 10 elements of the program are in accordance with GALL Program XI.M16 and whether the applicant's program contains any exceptions or enhancements to the 10 elements in GALL program XI.M16.

F-RAI B2.1.28 -1

Section B2.1.28 of the LRA indicates that an additional capsule will be withdrawn at a neutron fluence equivalent to approximately 52 EFPY of exposure. Items 5 through 7 in GALL XI.M31 provide recommendation for withdrawal of capsules during the period of LR.

a) Identify how the Ginna capsule withdrawal schedule for the period of LR complies with Items 5 through 7 in GALL XI.M31.

b) Provide the neutron fluence to be received by this capsule when it is removed from the vessel at a neutron fluence equivalent to approximately 52 EFPY.

c) Provide the calendar date at which time the capsule with be withdrawn.

F-RAI B2.1.29 -1

As stated in the LRA Section B2.1.29, the applicant has removed the hardness testing from its inspection program. The Selective Leaching Program in GALL identifies hardness measurements in addition to visual inspections as a method for determining whether there is a degradation of material on select components due to selective leaching. Hardness test measurements are helpful in evaluating degradation of material in a component due to leaching, where visual inspection may be ineffective. The LRA states that an assessment of the feasibility of performing hardness tests and the value of hardness data is made on a component specific basis. Therefore, the staff requests the applicant to justify the deviation from hardness testing and to describe how the applicant will determine if selective leaching is occurring without hardness measurements, particularly on the components where visual inspection cannot be effective. Additionally, the staff requests the applicant to provide more detailed information concerning the assessment of determining the need for a hardness evaluation, list the components that will be assessed, and how the hardness testing will be performed.

F-RAI B2.1.31 -1

The LRA states that the Steam Generator Tube Integrity (SGTI) AMP is credited for maintaining the integrity of the steam generator tubes and is consistent with XI.M19, "Steam Generator Tube Integrity," in the GALL report. However, Tables 3.2-1 and 3.2-2 identifies additional components for which the SGTI AMP (B2.1.31) is credited. In addition, the GALL report states that the scope of XI.M19 is specific to steam generator tubes. Therefore, the staff requests responces to the following questions:

a) Table 3.2-1, line number (2), "Steam Generator Shell Assembly", states that the aging effect for this component (i.e., loss of material due to pitting and crevice corrosion) is managed, in part, by the Steam Generator Tube Integrity Program (B2.1.31). It is not clear to the staff how the SGTI AMP manages this component and aging effect. The GALL report and the applicant's SGTI AMP state that the scope of XI.M19 is specific to steam generator tubes; therefore, provide details for the following attributes for this component: preventive actions; parameters monitored/inspected; detection of aging effects; monitoring and trending; and acceptance criteria. Ensure that your discussion identifies how the steam generator program manages this aging effect (e.g., the part of this component that is managed by the steam generator tube integrity program and how it is managed by the Steam Generator Tube Integrity Program).

b) Table 3.2-1, line number (15), "(Alloy 600) Steam generator tubes, repair sleeves, and plugs," states that the aging effects for these components are managed, in part, by the SGTI AMP (B2.1.31). The GALL report and the applicant's SGTI AMP state that the scope of XI.M19 is specific to steam generator tubes; therefore, provide details for the following attributes for the repair sleeves and plugs: preventive actions; parameters monitored/inspected; detection of aging effects; monitoring and trending; and acceptance criteria.

c) Table 3.2-2, line number (25), "SG Lattice Grid Tube Supports, U-Bend Fan Bar Restraints" and Table 3.2-1, line number (17), "Carbon Steel Tube Support Plate," state that the aging effect for these components is managed by the SGTI AMP (B2.1.31). The GALL report and the applicant's SGTI AMP state that the scope of XI.M19 is specific to steam generator tubes; therefore, provide details for the following attributes for this component: preventive actions; parameters monitored/inspected; detection of aging effects; monitoring and trending; and acceptance criteria.

F-RAI B2.1.31 -2

Appendix "A" of the LRA contains a Supplement for the Ginna UFSAR. Supplement A2.1.22 describes the Steam Generator Tube Integrity AMP. This description did not indicate that the applicant has included (in the Steam Generator Tube Integrity AMP) aging management activities to address additional components, beyond those discussed in GALL, which are identified in Tables 3.2-1 and 3.2-2 of the LRA. In addition, the UFSAR Supplement did not identify any program specific details (i.e., inspection method, acceptance criteria, etc.) related to the additional components identified in Tables 3.2-1 and 3.2-2 of the LRA. This information must be added to the USAR Supplement in order to resolve this issue.

F-RAI B2.1.33 -1

The LRA states that the acceptance criteria for external corrosion will consider the design margin of the component being inspected. The staff notes that this program covers a wide variety of components, including metal expansion joints and pump bodies, that may have a wide range of design margin with respect to allowable corrosion. Provide additional information related to the acceptance criteria for the visual inspections with respect to how the design margin will be considered.

F-RAI B2.1.34 -1

The Thermal Aging Embrittlement of Cast Austentic Stainless Steel (CASS) Program is to manage the loss of fracture toughness (embrittlement) in the CASS components in the reactor coolant system due to thermal aging. The LRA provides only a brief description of this program without a detailed discussion of the ten program elements/attributes as delineated in Appendix A of the SRP, and also does not state whether this program is consistent with AMP XI.M12 in NUREG-1801. However, the staff notes that in line numberm (20) of Table 3.2.1, the subject program is credited with managing loss of fracture toughness in CASS piping due to thermal aging embrittlement. The credited management programs are described as consistent with NUREG-1801.

a) Discuss whether the subject AMP is consistent with the guidelines provided in AMP XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)” of NUREG-1801. Also identify all deviations from the guidelines in AMP XI.M12 and provide justification for each deviation.

b) Confirm that this program covers the following CASS components: (1) valves bodies equal to or larger than 4 inches in size, (2) pump casings and main flanges and (3) RCS elbows.

c) Provide the service experience, previous inspection and leakage test results of CASS components at Ginna.

d) Provide the industry-wide service experience of CASS components.

F-RAI B2.1.36 -1

Section B2.1.36 of the LRA indicates that eddy current examinations are performed on a periodicity consistent with the severity of wear damage for each thimble tube. When wall loss in a tube exceeds 55%, but less than 65%, the tube is repositioned such that wear is redistributed, or other corrective action is taken.

Based on the results of a plant-specific analysis, examination results are compared to an upper allowable limit of 65% through-wall wear.

Eddy current examinations performed in 1988, 1989, 1990, 1991, and 1992 provided a basis for establishing the wear rates, and thus the inspection intervals, for thimble tubes. Based on those results, the inspection frequency and acceptance criteria are:

- Previous indication 10% to less than 45% - every third refueling outage (approximately once every 4.2 years)
- Previous indication 45% to less than 55% - every other refueling outage (approximately once every 3 years)
- Previous indication 55% or greater - perform corrective action, if support plate wear is the suspected cause. For other indications, corrective action will be taken at 65% or greater. Future inspection frequency will be every other or every third outage, as stated above.
- Previous inspection never exceeded 10% through-wall - no specified frequency. Future inspections will be based on a Ginna Station periodic assessment.

a) Identify the wear rate that was determined from the 1988 through 1992 inspections. Based on this wear rate, how were the inspection intervals determined to ensure that wear resulting from flow induced vibration does not result in the wall thickness below the minimum required for thimble tube integrity?

b) Provide the results (the amount of wear observed) from all inspection performed after 1992 and identify whether the amount of wear exceeded the amount identified in question a).

c) How will the applicant evaluate future inspection results to determine their impact on the inspection frequency of thimble tubes during the license renewal period?

F-RAI B2.1.37 -1

In Section B2.1.37 of the LRA, the Water Chemistry Control Program specifies a one-time inspection for only those components exposed to low flow or stagnant water. The components exposed to high velocity water were excluded from the one-time inspection. Since, in general, high velocity water provide a more corrosive environment, explain the rationale for excluding these components which, in some instances, may also be exposed to degradation mechanisms.