1. INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This document is a safety evaluation report (SER) on the application to renew the operating license for the R.E. Ginna Nuclear Power Plant (Ginna) as filed by Rochester Gas and Electric Corporation (RG&E or the applicant). By letter dated July 30, 2002, RG&E submitted its application to the U. S. Nuclear Regulatory Commission (NRC or the Agency) for renewal of the Ginna operating licenses for up to an additional 20 years. The application was received by the NRC on August 1, 2002. The NRC staff (the staff) reviewed the Ginna license renewal application (LRA) for compliance with the requirements of Title 10 of the *Code of Federal Regulations*, (CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared this report to document the results of its safety review. The NRC license renewal project manager for the Ginna safety review is Russell Arrighi. Mr. Arrighi may be contacted by telephone at (301) 415-3936 or by electronic mail at rja1@nrc.gov. Alternatively, written correspondence can be sent to the following address:

License Renewal and Environmental Impacts Program
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In its July 30, 2002, submittal letter, the applicant requested renewal of the operating license issued under Section 104b of the Atomic Energy Act of 1954, as amended, for Ginna (License No. DRP-18) for a period of 20 years beyond the current license expiration of midnight, September 18, 2009. The Ginna plant is located in the Town of Ontario, in the northwest corner of Wayne County, NY, on the south shore of Lake Ontario. The Ginna unit consists of a Westinghouse pressurized-water reactor (PWR) with nuclear steam supply systems (NSSS) designed to operate at core power levels up to 1520 megawatts-thermal, or approximately 490 megawatts-electric. Details concerning the plant and the site are found in the updated final safety analysis report (UFSAR) for Ginna.

The license renewal process proceeds along two tracks, which include both a technical review of safety issues and an environmental review. The requirements for these two reviews are stated in NRC regulations 10 CFR Parts 54 and 51, respectively. The safety review for the Ginna license renewal is based on the applicant's LRA, docket correspondences, and on the answers to final requests for additional information (RAIs) from the NRC staff. In meetings and docketed correspondence, the applicant has also supplemented its answers to the RAIs. Unless otherwise noted, the staff reviewed and considered information submitted through September 16, 2003. The public can review the LRA and all pertinent information and material, including the UFSAR, at the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD 20852-2738. In addition, the Ginna LRA and significant information and material related to the license renewal review are available on the NRC's web page at www.nrc.gov.

This SER summarizes the findings of the staff's safety review of the Ginna LRA and delineates the scope of the technical details considered in evaluating the safety aspects of the proposed operation of the plant for up to an additional 20 years beyond the term of the current operating license. The staff reviewed the LRA in accordance with NRC regulations and the guidance

presented in the NRC “Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants” (SRP-LR), which was issued as NUREG-1800 in July 2001.

Sections 2 through 4 of the SER document the staff's review and evaluation of license renewal issues that have been considered during the review of the LRA. Section 5 is reserved for the report of the Advisory Committee on Reactor Safeguards (ACRS). The conclusions of this report are in Section 6 of the SER.

Appendix A is a list of commitments made by RG&E in the “Application for the Renewed Operating License, R.E. Ginna Nuclear Power Plant.” Appendix B is a chronology of the principal correspondence between the NRC and the applicant related to the review of the LRA. Appendix C is a list of the principal NRC staff's reviewers and its contractors for this project. Appendix D is a list of the major references used in support of this SER.

In accordance with 10 CFR Part 51, the staff prepared a draft plant-specific supplement to the Generic Environmental Impact Statement (GEIS). This supplement discusses the environmental considerations related to renewing the license for Ginna. The draft plant-specific supplement to the GEIS was issued separately as draft Supplement 14 to NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding the R.E. Ginna Nuclear Power Plant,” on June 25, 2003.

1.2 License Renewal Background

Pursuant to the Atomic Energy Act of 1954, as amended, and NRC regulations, licenses for commercial power reactors to operate are issued for up to 40 years. These licenses can be renewed for up to 20 additional years. The original 40-year license term was selected on the basis of economic and antitrust considerations, rather than on technical limitations. However, some individual plant and equipment designs may have been engineered on the basis of an expected 40-year service life.

In 1982, the NRC anticipated interest in license renewal and held a workshop on nuclear power plant aging. That led the NRC to establish a comprehensive program plan for nuclear plant aging research (NPAR). On the basis of the results of that research, a technical review group concluded that many aging phenomena are readily manageable and do not pose technical issues that would preclude extending the life of nuclear power plants. In 1986, the NRC published a request for comment on a policy statement that would address major policy, technical, and procedural issues related to license renewal for nuclear power plants.

In 1991, the NRC published the license renewal rule in 10 CFR Part 54 (the Rule). The NRC participated in an industry-sponsored demonstration program to apply the rule to a pilot plant and develop experience to create implementation guidance. To establish a scope of review for license renewal, the rule defined age-related degradation unique to license renewal. However, during the demonstration program, the NRC found that many aging mechanisms occur and are managed during the period of the initial license. In addition, the NRC found that the scope of the review did not allow sufficient credit for existing aging management programs (AMPs), particularly for the implementation of the maintenance rule, 10 CFR 50.65, which also manages plant aging phenomena.

As a result, in 1995, the NRC amended 10 CFR part 54. The amended license renewal rule establishes a regulatory process that is simpler, more stable, and more predictable than the previous license renewal rule. In particular, 10 CFR Part 54 was amended to focus on managing the adverse effects of aging rather than on identifying age-related degradation unique to license renewal. The rule changes were intended to ensure that important systems, structures, and components (SSCs) within the scope of the rule will continue to perform their intended functions in the period of extended operation. In addition, the integrated plant assessment (IPA) process was clarified and simplified to be consistent with the revised focus on passive, long-lived structures and components (SCs).

In parallel with these efforts, the NRC pursued a separate rulemaking effort to amend 10 CFR Part 51 to focus the scope of the review of environmental impacts of license renewal and to fulfill, in part, the NRC's responsibilities under the National Environmental Policy Act of 1969 (NEPA).

1.2.1 Safety Reviews

License renewal requirements for power reactors are based on two principles:

(1) The regulatory process is adequate to ensure that the licensing bases of all currently operating plants provide and maintain an acceptable level of safety, with the possible exception of the detrimental effects of aging on the functionality of certain SSCs during the period of extended operation, as well as a few other safety-related issues.

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

In implementing these two principles, 10 CFR Part 54.4 defines the scope of license renewal as including those plant SSCs (a) that are safety-related, (b) whose failure could affect safety-related functions, and (c) that are relied on to demonstrate compliance with the NRC's regulations for fire protection, environmental qualification (EQ), pressurized thermal shock (PTS), anticipated transients without scram (ATWS), and station blackout (SBO).

Pursuant to 10 CFR 54.21(a), the applicant for a renewed license must review all SSCs that are within the scope of the Rule to identify SCs that are subject to an aging management review (AMR). SCs that are subject to an AMR are those that perform an intended function without moving parts, or without a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period. As required by 10 CFR 54.21(a)(3), an applicant for a renewed license must demonstrate that the effects of aging will be managed in such a way that the intended function or functions of the SCs that are within the scope of license renewal will be maintained, consistent with the current licensing basis (CLB), for the period of extended operation. Active equipment, however, is considered to be adequately monitored and maintained by existing programs. In other words, the detrimental effects of aging that may affect active equipment are more readily detectable and will be identified and corrected through routine surveillance, performance monitoring, and maintenance activities. The surveillance and maintenance programs for active equipment, as well as other aspects of maintaining the plant design and licensing basis, are required to continue throughout the period of extended operation.

Pursuant to 10 CFR 54.21(d), the LRA is required to include a supplement to the updated final safety analysis report (UFSAR). This UFSAR Supplement must contain a summary description of the applicant's programs and activities for managing the effects of aging.

Another requirement for license renewal is the identification and updating of time-limited aging analyses (TLAAs). During the design phase for a plant, certain assumptions are made about the initial length of time the plant will be operated and these assumptions are incorporated into design calculations for several of the plant's SSCs. In accordance with 10 CFR 54.21(c)(1), these calculations must be shown to be valid for the period of extended operation or must be projected to the end of the period of extended operation, or the applicant must demonstrate that the effects of aging on these SSCs will be adequately managed for the period of extended operation.

In July 2001, the NRC issued Regulatory Guide (RG) 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating License;" NUREG-1800, "Standard Review Plan for the Review of License Renewal Application for Nuclear Power Plants (SRP-LR);" and NUREG-1801, "Generic Aging Lessons Learned (GALL) Report." These documents describe methods acceptable to the NRC staff for implementing the license renewal rule and techniques used by the NRC staff in evaluating applications for license renewal. The RG endorses an implementation guideline prepared by the Nuclear Energy Institute (NEI) as an acceptable method of implementing the license renewal rule. The NEI guideline, NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 3, was issued in March 2001.

RG&E is the third license renewal applicant to fully utilize the process defined in NUREG-1801, GALL Report, dated July 2001. The purpose of GALL is to provide the staff with a summary of staff-approved aging management programs (AMPs) for the aging of most SCs that are subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA will be greatly reduced, thereby, improving the efficiency and effectiveness of the license renewal review process. The GALL Report summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used throughout the industry, and serves as a reference for both applicants and staff reviewers to quickly identify those AMPs and activities that the staff has determined will provide adequate aging management during the period of extended operation.

1.2.2 Environmental Reviews

In December 1996, the staff revised the environmental protection regulations in 10 CFR Part 51 to facilitate environmental reviews for license renewal. The staff prepared a "Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants" (NUREG-1437, Revision 1) to document its evaluation of the possible environmental impacts associated with renewing licenses of nuclear power plants. For certain types of environmental impacts, the GEIS establishes generic findings that are applicable to all nuclear power plants. These generic findings are identified as Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B. Pursuant to 10 CFR 51.53(c)(3)(i), an applicant for license renewal may incorporate these generic findings in its environmental report. Analyses of the environmental

impacts of license renewal that must be evaluated on a plant-specific basis (i.e., Category 2 issues) must be included in an environmental report in accordance with 10 CFR 51.53(c)(3)(ii).

In accordance with NEPA and the requirements of 10 CFR Part 51, the NRC performed a plant-specific review of the environmental impacts of license renewal, including whether new and significant information was not considered in the GEIS. A public meeting was held on August 7, 2003, near Ginna, as part of the NRC's scoping process to identify environmental issues specific to the plant. The results of the environmental review and a preliminary recommendation on the license renewal action were documented in the NRC draft plant-specific Supplement 14 to the GEIS, which was issued on June 25, 2003, for Ginna. After considering comments on the draft, the NRC will prepare and publish a final plant-specific supplement to the GEIS.

1.3 Principal Review Matters

The requirements for renewing operating licenses for nuclear power plants are described in 10 CFR Part 54. The staff performed its technical review of the Ginna LRA in accordance with Commission guidance and the requirements of 10 CFR 54. The standards for renewing a license are contained in 10 CFR 54.29. This SER describes the results of the staff's safety review.

In 10 CFR 54.19(a), the Commission requires a license renewal applicant to submit general information. The applicant provided this general information in Chapter 1 of its LRA for Ginna, submitted by letter dated July 30, 2002. The staff finds that the applicant has submitted the information required by 10 CFR 54.19(a) in Section 1 of the LRA.

In 10 CFR 54.19(b), the Commission requires that LRAs include "conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The applicant states the following in Section 1.3.8 of its LRA regarding this issue:

> The current indemnity agreement for the unit does not contain a specific expiration term for the operating license. Therefore, conforming changes to account for the expiration of the proposed renewed license are not necessary, unless the license number is changed upon issuance of the renewed license.

The staff intends to maintain the original license number upon issuance of the renewed license. Therefore, there is no need to make conforming changes to the indemnity agreement, and the requirements of 10 CFR 54.19(b) have been met.

In 10 CFR 54.21, the Commission requires that each application for a renewed license for a nuclear facility contain: (a) an IPA, (b) CLB changes during staff review of the LRA, (c) an evaluation of TLAAs, and (d) an UFSAR Supplement. Sections 3 and 4 and Sections A and B of the LRA address the license renewal requirements of 10 CFR 54.21(a), (c), and (d) respectively.

In 10 CFR 54.21(b), the Commission requires that each year following submittal of the application, and at least 3 months before scheduled completion of the staff's review, an amendment to the renewal application must be submitted that identifies any changes to the

CLB of the facility that materially affect the contents of the LRA, including the UFSAR Supplement. The applicant submitted Amendment 1 to the LRA in a letter dated July 30, 2003, which summarized changes to the CLB that occurred at Ginna during the staff's review of the LRA. This submittal satisfies the requirement of 10 CFR 54.21(b).

In 10 CFR 54.22, the Commission states requirements regarding technical specifications. In Appendix D of the LRA, the applicant stated that no technical specification changes had been identified as being necessary to support issuance of the renewed operating licenses for Ginna. This adequately addresses the requirements of 10 CFR 54.22.

The staff evaluated the technical information required by 10 CFR 54.21 and 10 CFR 54.22 in accordance with the NRC's regulations and the guidance provided by the Standard Review Plan — License Renewal (SRP-LR). The staff's evaluation of the LRA in accordance with 10 CFR 54.21 and 10 CFR 54.22 is contained in Sections 2, 3, and 4 of this SER.

The staff's evaluation of the environmental information required by 10 CFR 54.23 will be contained in the final plant-specific supplement to the GEIS, which will that state the considerations related to renewing the license for Ginna. This will be prepared by the staff separate from this report. When the report of the ACRS, required by 10 CFR 54.25, is issued, it will be incorporated into Section 5 of an update to this SER. The findings required by 10 CFR 54.29 will be made in Section 6 of an update to this SER.

1.3.1 Westinghouse Topical Reports

In accordance with 10 CFR 54.17(e), the applicant referenced the following Westinghouse Commercial Atomic Power (WCAP) reports in the LRA.

- WCAP-7410-L, "Environmental Testing of Engineered Safety Feature Related Equipment (NSSS – Non-Standard Scope)"
- WCAP-7733, "Reactor Vessel Weld Cladding – Base Metal Interaction," July 1971.
- WCAP-12928, "Structural Evaluation of the Robert E. Ginna Pressurizer Surge Line, Considering the Effect of Thermal Stratification," May 1991.
- WCAP-14422, Revision 2-A, "License Renewal Evaluation: Aging Management for Reactor Coolant Supports," December 2000.
- WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," SER published, September 1996.
- WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," re-publication November 1996.
- WCAP-14574-A, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers," December 2000.

- WCAP-14575-A, "Aging Management Evaluation for Class I Piping and Associated Pressure Boundary Components," December 2000.

- WCAP-14756-A, "Aging Management Evaluation for Pressurized Water Reactor Containment Structure," May 2001.

- WCAP-14577, Revision 1-A, "License Renewal Evaluation: Aging Management for Reactor Internals," March 2001.

- WCAP-15338, "A Review of Cracking Associated with Weld Deposited Cladding in Operating PWR Plants," March 2000.

- 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.

- 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.

- WCAP-15885, "R.E. Ginna Heatup and Cooldown Limit Curves for Normal Operation," Revision 0, May 2002.

The safety evaluations of the topical reports are intended to be stand-alone documents. An applicant that incorporates the topical reports by reference into an LRA must ensure that the conditions of approval stated in the safety evaluations are met. The staff's evaluation of the applicant's incorporation of the topical reports into the application is documented in Section 3 of this SER.

1.4 Interim Staff Guidance

The license renewal program is a living program. The staff, industry, and other interested stakeholders gain experience and develop lessons learned with each renewed license. The lessons learned address the Agency's performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence. The lessons learned are captured in interim staff guidance (ISG) for use by the staff and interested stakeholders until the improved license renewal guidance documents are revised.

The current set of relevant ISGs that have been issued by the staff, and the SER sections in which the issues are addressed by the staff, is provided below.

Interim Staff Guidance for License Renewal

ISG Issue (Approved ISG No.)	**Purpose**	**SER Section**
Station Blackout (SBO) Scoping (ISG-02)	The license renewal rule 10 CFR 54.4(a)(3) includes 10 CFR 50.63(a)(1)–SBO. The SBO rule requires that a plant must withstand and recover from an SBO event. The recovery time for offsite power is much faster than that of EDGs. The offsite power system should be included within the scope of license renewal.	2.5.1.5.2 3.5.2.4.2
Concrete Aging Management Program (ISG-03)	Lessons learned from the GALL demonstration project indicated that GALL is not clear whether concrete needs any AMPs.	3.5.2.2.1.1 3.5.2.2.2.2 3.5.2.4.1 3.5.2.4.2
Fire Protection (FP) System Piping (ISG-04)	To clarify staff position for wall thinning of FP piping system in GALL AMPs (XI.M26 and XI.M27). New position is that there is no need to disassemble FP piping, as oxygen can be introduced in the FP piping which can accelerate corrosion. Instead, use non-intrusive method such as volumetric inspection. Testing of sprinkler heads should be performed every 50 years and 10 years after initial service. Eliminated Halon/carbon dioxide system inspections for charging pressure, valve line ups, and automatic mode of operation test from GALL. The staff considers these test verifications to be operational activities.	3.3.2.3.2 3.3.2.3.3 3.3.2.4.6

Identification and Treatment of Electrical Fuse Holder (ISG-05)	To include fuse holder AMR and AMP (i.e., same as terminal blocks and other electrical connections). The position includes only fuse holders that are not inside the enclosure of active components (e.g., inside of switchgears and inverters). Operating experience finds that metallic clamps (spring-loaded clips) have a history of age-related failures from aging stressors such as vibration, thermal cycling, mechanical stress, corrosion, and chemical contamination. The staff finds that visual inspection of fuse clips is not sufficient to detect the aging effects from fatigue, mechanical stress, and vibration.	3.6.2.4.1.2

1.5 Summary of Open Items

As a result of its review of the LRA for Ginna, including additional information submitted to the NRC through September 16, 2003, the staff identified the following issues that remained open at the time this report was prepared. An issue was considered open if the applicant had not presented a sufficient basis for resolution. Each open item (OI) has been assigned a unique identifying number.

OI 2.3.3.2-1: The applicant did not provide an adequate basis in its response to RAI 2.3.3.2-1 dated May 23, 2003, for concluding that a failure in the out-of-scope piping will not result in failure of the component cooling water (CCW) system in performing its intended functions. The staff cannot make its finding regarding the acceptability of the applicant's basis without information such as the available methods of detecting piping failure, the inventory of CCW that could be lost through failed piping from the time of detection to failure of the component cooling water system, the rate of loss of inventory through a failed pipe considering that the system is pressurized, and the time necessary for reasonable assurance that operators could identify and isolate the failed piping.

OI 2.3.3.3-1: By letter dated March 21, 2003, the staff requested that the applicant justify the exclusion of the alternate spent fuel pool (SFP) makeup water supply piping and valves from the scope of license renewal and AMR (RAI 2.3.3.3-2). By letter dated May 13, 2003, the applicant responded that Ginna was built before RG 1.13 was issued. The applicant further stated that RG 1.13 is used as guidance, but is not a requirement.

The staff cannot reconcile the applicant's argument with the fact that these alternative makeup water supply paths are relied upon in Ginna's CLB not only to offset boil-off due to the loss of SFP cooling, but also to mitigate potential leaks in the SFP liner. The 1998 staff approval of the

re-racking of the Ginna SFP was based, in part, on redundancy in the SFP makeup water supply. The applicant specifically cited the refueling water storage tank (RWST) and chemical and volume control system (CVCS) holdup tanks as alternate sources of SFP makeup in an F-RAI response dated November 11, 1997. Although these makeup water paths are non safety-related, they are within the scope of 10 CFR Part 54 because their failure could prevent satisfactory performance of functions necessary to prevent or mitigate significant offsite exposures resulting from SFP accidents. The Statements of Consideration for 10 CFR Part 54 state that "the Commission believes it inappropriate to permit generic exclusion of redundant, long-lived, passive structures and components." In other words, redundancy is not an adequate basis in itself to exclude a system from AMR. As such, all of the components that comprise these alternate flow paths should be within the scope of license renewal and subject to an AMR per the requirements of 10 CFR 54.4(a)(2).

OI 2.3.3.6-1: The applicant did not provide an adequate basis in its response to RAI 2.3.3.6-1 dated May 13, 2003, for concluding that the fire service water booster pump, piping, and valves back to the service water system were excluded from the scope of license renewal.

The staff evaluated the applicant's position concerning the jockey pump and storage tank and studied the relevant documents, including the Ginna UFSAR Section 9.5.1 and the associated SER, as well as branch technical position (BTP) 9.5-1. The staff concluded, based upon this review, that National Fire Protection Association (NFPA) 20, "Standard for the Installation of Centrifugal Fire Pumps," is endorsed by Section 6.b.6 of BTP 9.5-1, which was cited by the Ginna UFSAR as the licensing basis for the plant. The requirement for jockey pumps/pressure maintenance device is stated in Section 31(e) of the 1972 edition of NFPA 20. The 1996 edition further clarifies this requirement in Section 2-19.5 which states, "The primary or standby fire pump shall not be used as a pressure maintenance pump." The jockey pump and storage tank, and their associated piping and valves, perform a pressure maintenance function which protects the large fire pumps from damage during low-flow, high-pressure operation and is an essential part of the fire water system. The staff therefore disagrees with the applicant's response to RAI 2.3.3.6-1 concerning the fire service water booster pump, piping, and valves back to the service water system.

OI 2.5-1: The staff questioned the elimination of cables M0089 and M0108 from the license renewal scope. These circuits are part of the offsite power path that brings offsite power into the safety buses. The staff therefore asked the applicant to clarify how the Ginna plant can be brought to a shutdown condition from the offsite power supply if these circuits to the safety-related shutdown buses are not included within the scope of license renewal.

In a July 11, 2003, response to staff clarification questions the applicant stated that circuits M0089 and M0108 are not relied upon to cope with, or recover from a station blackout (SBO). The entry conditions for plant procedure ECA-0.0, "Loss of All AC Power," is the loss of bus 14 and bus 16. This procedure is not entered when bus 17 and bus 18 are lost. Upon restoration of bus 14 and/or bus 16, recovery actions are taken. These recovery actions do not rely upon bus 17 or bus 18, although they may be used if available. This procedure directs activities required to achieve shutdown conditions.

The response to the staff's question does not indicate how long Ginna can remain in a safe condition following recovery of only buses 14 and 16. The Ginna UFSAR (Section 8.3.1.1.6)

indicates that buses 17 and 18, which are powered from the cables in question (M0089 and M0108), supply power to the Ginna service water pumps. The concern is that recovery of offsite power to only buses 14 and 16 following an SBO will only allow the plant to continue to operate in the hot standby or hot shutdown condition. While hot standby or hot shutdown is acceptable for plant operation during the SBO coping period, if Ginna cannot be brought to cold shutdown, recovery of buses 14 and 16 may result in only a few additional hours beyond Ginna's required 4-hour coping capability. Unavailability of condensate feedwater or other limitations could limit operation in these modes. The staff notes that recovery of the Ginna emergency diesel generators (EDGs) following an SBO would allow energization of the full complement of safety buses, including buses 17 and 18. Hot standby or hot shutdown has been accepted by the staff at some plants for non-SBO scenarios such as fire protection; however, it is not clear that the same limitations as those following an SBO event exist for the other scenarios. The applicant should identify the length of time Ginna can remain in a safe condition following recovery of only safety buses 14 and 16, and provide the justification for the acceptability of that time. The justification could refer to the staff's acceptance of comparable times for other scenarios at Ginna, evidence of the ability to repair a Ginna EDG in that time period, or comparability of that time to other staff-accepted time periods (e.g., required fuel oil supplies for the Ginna EDGs.

OI 3.6-1: Item (1) Electrical Phase Bus of Table 3.7-2 of the LRA does not address aging effects associated with the metallic electrical current carrying components of the phase bus. Oxidation and corrosion of the metallic components, or loosening of the fastener components (bolted bus connections) are examples of aging stressors that are not addressed.

Similarly, NRC Information Notice 2000-14 identifies the phenomenon of "torque relaxation" of bus splice plate connecting bolts that can lead to overheating and arcing at the bus joint connection.

As a result of this background, the applicant was asked to provide a description of its aging management program used to detect aging effects associated with these aging stressors; or provide justification why such a program is not needed.

The response addresses aging effects for the phase bus, the conductor heat rise and bolting stress, and a review of insulating materials and anti-oxidant. The response states that Ginna Station performed a visual inspection of both the Unibus and the Westinghouse bus in 2002. The inspection confirmed the lack of moisture, significant contaminants, and insulation degradation.

The response states that the rated ampacity of for the 4 kV phase bus at Ginna is 3000 A. The normal loading of the phase bus within the scope of license renewal is less than 500 A under single offsite source operation, and during the more common two offsite source operation this current is split between the two buses. Under startup conditions, the conductors may experience short term increase of no more than 1250 A to carry station auxiliary loads. Therefore, under worst case loading conditions the maximum current experienced by the phase bus is conservatively calculated at 1750 A. The applicant calculates service temperatures based on this loading and compares it to applicable ANSI standards and the calculated temperatures on the Diablo Canyon phase bus found in IN 2000-14. The Ginna temperatures are significantly lower. The applicant concludes that plastic deformation of connection

hardware will not occur and states that this is supported by Section 7.2.4 of EPRI TR-104213, Bolted Joint Maintenance and Application Guide. The applicant states that, based on analysis and industry guidance, there is reasonable assurance that bolt relaxation is not an aging effect requiring management at Ginna Station.

The response provided a review of the insulating materials and antioxident believed to have been used on the phase bus. Aging information was not readily available for the exact materials of construction, however, the service temperature was evaluated for all materials identified in EPRI 1003057, Table B-3, License Renewal Electrical Handbook. The response states that, while the original AMR considered all Westinghouse splices to be tape wrapped based on installation instructions, photographs confirm that removable boots are used; and it is reasonable and conservative to consider these connections to be constructed of PVC. The applicant concludes that there is reasonable assurance that all insulating materials except the PVC boots will perform their design function throughout the period of extended operation. The applicant committed to visual inspections of boots installed on Westinghouse bus to identify potential degradation due to thermal effects. This inspection will be added to procedures for existing periodic switchgear inspection and preventative maintenance. Switchgear maintenance procedures and requirements for administrative controls will be referenced within the basis document for the Periodic Surveillance and Preventative Maintenance AMP submitted in the LRA and modified by RAI responses. The scope attribute of this program will be modified to indicate that phase bus inspections are included within the program. Since inspections were performed in 2002, inspections will be required to be performed once prior to 2012 and continue consistent with scheduled bus inspections and maintenance. The program owner will be provided with the option of substituting inspections of 11A and 11B phase bus instead of performing inspections of 12A and 12B phase bus because, although not included within the scope of license renewal, 11A and 11B are subject to larger loading and resulting temperatures/stresses.

The response provided a review of potential oxidation of phase bus connections. It states that during the offsite power reconfiguration, the Westinghouse bus was cut and a splice box was built to transition to Unibus. It assumed that Penetrox was used to connect the aluminum to the copper transition piece because the Westinghouse bus was not plated at the field cut/prepared end. In this location the anti-oxidant material is credited with preventing oxidation of the connecting surfaces. Also considered in the response is that connection surfaces were constructed in 1989 and will have 40 years of operation upon the end of the license renewal period of extended operation.

With regard to torque relaxation of the Westinghouse phase bus connecting bolts, the staff agrees that the conditions at Ginna are less severe than those found on the Diablo Canyon Unit 1 phase bus identified in IN 2000-14. The conditions at Diablo Canyon Unit 1, however, led to early failure of the phase bus in May 2000, less than 20 years following licensing of the plant in 1984. The staff reviewed the EPRI bolting guide referenced by the applicant. The guide provides general good bolting practices and guidelines for the use of threaded fasteners. Sections 6.12 and 7.0 provide guidance on proper assembly of electrical bolted connections. Section 8.2 provides guidance for inspection of electrical bolted joints. The staff believes it is unlikely the Westinghouse phase bus at Ginna will be subject to the early failures experienced at Diablo Canyon. It is unclear, however, at what electrical loading profile a bolted electrical joint will not be subject to thermal relaxation over a 60-year period. The staff, therefore, believes the applicant should follow the inspection guidance in EPRI TR-104213 calling for

bolted joint resistance testing (utilizing an ohm meter of appropriate magnitude), or should obtain the phase bus manufacturer's (Westinghouse) endorsement that the testing is not required given the electrical loading profile seen on these phase buses at Ginna. This is Open Item 3.6-1.

OI 4.2.2-1: In the June 10, 2003, letter, the applicant changed its method of determining the reference temperature for pressurized thermal shock (RT_{PTS}) value for the limiting weld, SA-847, from one that was based on the chemistry factor from Table 1 in RG 1.99, Revision 2 and 10 CFR 50.61 to one that was based on the use of the Ginna surveillance data. Two methods of determining the chemistry factor and RT_{PTS} value are identified in 10 CFR 50.61 – one method based on the amount of copper and nickel in the weld and one based on the use of surveillance data. As specified in 10 CFR 50.61(c)(2)(ii)(A) the surveillance data deemed credible according to the criteria of paragraph (c)(2)(i) of 10 CFR 50.61 must be used to determine the material-specific chemistry factor. The applicant chose to utilize surveillance data in determining the chemistry factor but has not demonstrated that the data satisfies the credibility criteria of paragraph (c)(2)(i) of 10 CFR 50.61. The chemistry factor identified in the June 10, 2003, letter is 161.9 ^{o}F. The chemistry factor identified for this weld in the Reactor Vessel Integrity Database (RVID) is 158.7 ^{o}F, which is based on the surveillance data. Although the difference in chemistry factor calculated by the applicant and that in the RVID is small, the staff would like to review the surveillance data and methodology utilized by the applicant to determine the chemistry factor and to confirm that the results satisfy 10 CFR 50.61. The applicant is to provide the surveillance data, the detailed calculations for determining the chemistry factor from the surveillance data, and the analysis that demonstrates that the surveillance data meets the credibility criteria in 10 CFR 50.61. In addition, this analysis differs from that identified in UFSAR Section A3.1.2. The applicant is also requested to provide an update to this UFSAR Section.

OI B2.1.28-1: In response to RAI B2.1.28-1, the applicant indicated that Ginna has two surveillance capsules left in the core. The current schedule is to withdraw one of the capsules during the 2003 refueling outage. At that time, the capsule will have received a fast neutron fluence of 5.25×10^{19}, more than the projected dose at 60 years of 4.85×10^{19}. Because Ginna has performed, and submitted to the NRC, a reactor vessel equivalent margins analysis, the applicant indicated that it does not plan on testing that capsule. In addition, the current plan is to leave one capsule in the reactor vessel until about 2009, at which point it will have received a fast neutron fluence equivalent to 80 years of operation. However, Item 6 in GALL XI.M31 indicates that the applicant is to withdraw one capsule at an outage in which the capsule receives a neutron fluence equivalent to the 60-year fluence so that the capsule may be tested in accordance with the requirements of the American Society for Testing and Materials (ASTM) E-185. Therefore, the staff believes the capsule withdrawn during the 2003 refueling outage should be tested.

Testing of this capsule is important because the RT_{PTS} value in the pressurized thermal shock evaluation was determined using Ginna surveillance data. The highest capsule neutron fluence is 3.746×10^{19} n/cm^2, which is below the neutron fluence projected for the reactor vessel at the end of the period of extended operation. Testing this capsule, which has a projected neutron fluence of 5.25×10^{19} n/cm^2, will ensure that the reactor vessel will remain below the pressurized thermal shock screening criteria at the end of the period of extended operation.

Item 7 in GALL XI.M31 indicates that applicants without in-vessel capsules during the period of extended operation should use alternative dosimetry to monitor neutron fluence during the period of extended operation. Because the last capsule at Ginna is to be removed in 2009, and capsules will not be available to determine the neutron fluence during the period of extended operation, alternative dosimetry should be utilized during the period of extended operation to monitor neutron fluence.

In response to RAI clarification (C-RAI) 4.2-1, the applicant indicates, in a letter dated July 30, 2003, that the capsule withdrawn in 2003 will not be tested in accordance with Table 10 Footnote E in ASTM E-185. This footnote indicates that this capsule may be held without testing following withdrawal. ASTM E-185 provides guidance for withdrawal and testing for 40 years of operation. Based on the above discussion, the staff believes this capsule should be tested. In this clarification, the applicant also indicates that Item 7 in GALL XI.M31 is not applicable to Ginna because the applicant will be using the guidance in Item 6. Item 6 and 7 are separate guidance and they should not be substituted for each other.

OI B2.1.36-1: [Program Scope] The applicant's program inspects locations in the thimble tube associated with geometric discontinuities or area changes along the reactor coolant flow path, such as areas near the lower core plate, the core support forging, the lower tie plate, and the vessel penetrations. These locations are susceptible to wear resulting from flow-induced vibration. The applicant states that all 36 thimble tubes are within the scope of this inspection program. The staff found the scope of the program to be adequate because all 36 thimble tubes are within scope and the inspection is performed at locations most susceptible to wear resulting from flow-induced vibration. However, the applicant has not identified the locations on the thimble tubes and guide tubes to be inspected for stress-corrosion cracking (SCC). This is open item B2.1.36-1(a).

[Parameters Monitored/Inspected] The eddy current examinations determine the wall thickness of the thimble tubes, allowing an assessment of the wear, and wear rate, of each tube in each location. Eddy current examination will also be utilized to detect SCC. This is acceptable because eddy current examination has been successfully utilized to determine wall thickness and wear rate. The applicant has not identified whether the eddy current examination has been qualified to detect and size SCC. This is open item B2.1.36-1(b).

[Detection of Aging Effects] Thimble tube inspections are conducted using a methodology specified in a Ginna Station plant-specific procedure. This procedure requires the use of a Zetec MIZ-18 Multifrequency Eddy Current Testing System. These inspections provide indication of tube wear and tube wear rate. This is acceptable because eddy current examination has been successfully utilized to determine wall thickness and wear rate. The applicant has not identified whether the eddy current examination has been qualified to detect and size SCC. This is open item B2.1.36-1(c).

[Monitoring and Trending] In the applicants response to RAI B2.1.36-1, the applicant committed to perform the thimble tube inspection at every refueling outage during the period of extended operation unless inspections on a reduced frequency can be justified by engineering evaluation. However, the applicant has not identified the frequency and the basis for the frequency of inspection for detection of SCC for thimble tubes and guide tubes. This is open item B2.1.36-1(d).

[Acceptance Criteria] The acceptance criteria are provided in Monitoring and Trending. The acceptance criteria are acceptable because the criteria allows tubes to be replaced prior to the wear reducing the wall thickness to a size that could result in failure of the tube. However, the applicant has not identified the acceptance criteria for SCC for thimble tubes and guide tubes. This is open item B2.1.36-1(e).

1.6 Summary of Confirmatory Items

As a result of its review of the LRA for Ginna, including the additional information and clarifications that were submitted by the applicant to the NRC through September 16, 2003, the staff identified the following confirmatory items (CI). An issue is confirmatory if the staff and applicant have reached a resolution of the issue, but the resolution has not yet been formally submitted to or reviewed by the staff.

CI 2.3.3.2-1: By letter dated June 10, 2003, in response to RAI 2.3.3.2-2, the applicant stated that the piping, valve bodies, bonnets, and pump casings that can be used to fill the component cooling surge tank from the reactor water makeup tank, shown on drawing 33013-1245, are not within the scope of license renewal. The applicant cited UFSAR Section 9.2.2.4.1.3 that describes the evaluation performed in Systematic Evaluation Program (SEP) Topic IX-3, "Station Service and Cooling Water Systems," in the final SER dated November 4, 1981. The cited evaluation does not include providing makeup water to the component cooling water system until after a postulated leak is identified and isolated and repairs are made to restore the flow path to essential equipment. The applicant also references UFSAR Section 9.2.2.2 that identifies the function of the CCW surge tank as ensuring "a continuous CCW supply until a leaking cooling line can be isolated." The applicant further identified that through proper aging management of the in-scope component cooling water system components, system leakage will be minimized and the CCW surge tank will act as the makeup source for "normal" leakage. It is the applicants position that a failure of any makeup capability other than that provided by the surge tank will not affect a safety function; therefore, the makeup capability from the reactor makeup water system is out of the scope of the Rule.

The staff cannot reconcile the applicant's response with the fact that the Ginna CLB relies upon makeup to the component cooling water system in the event of leakage during post-accident operation. The components of the makeup water supply to the component cooling water system may be required to replace system leakage necessary to maintain operation of the CCW, and as such, are within the scope of license renewal and subject to an AMR per the requirements of 10 CFR 54.4(a)(2). In a letter dated September 16, 2003, the applicant stated that the components from the reactor makeup water tank will be added to the scope of license renewal and subject to an AMR.

CI 2.3.3.5-1: By letter dated March 21, 2003, the staff requested that the applicant justify why a portion of the service water system piping that is not subject to an AMR connects two parallel portions of the service water system piping that are subject to an AMR at valves 4733, 4651B, and 4562B. These valves are shown as normally open on license renewal boundary drawing 33013-1250, 3-LR, at locations I2, I7, and J7 (RAI 2.3.3.5-2). Two issues were raised in the subject RAI regarding this piping.

First, this piping run has two parallel trains containing air conditioning 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 and the components are all identified as augmented quality. 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. The staff infers that this statement applies to the cooling function of the system because the filtration and boundary integrity functions do not support control room equipment operability. UFSAR Section 6.4 states that the control room ventilation system cools the recirculated air as required using chilled water coils. LRA Sections 2.3.3.5, 2.3.3.10, and 2.3.3.15 do not provide an adequate basis for excluding the associated systems and components from an AMR. The applicant was requested to provide information identifying important-to-safety portions of the service water, chilled water, and control room ventilation systems as SCs subject to an AMR, or to justify their exclusion from an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

By letter dated May 13, 2003, the applicant responded that those portions of the service water, chilled water, and control room ventilation systems that are subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), are identified in the LRA. While UFSAR Sections 9.4.3 and 6.4 describe all the design functions of the control room area ventilation system, only some design functions meet the inclusionary criteria in 10 CFR 54.21(a)(1). While control room cooling via chilled water with the heat ultimately rejected to service water is the preferred method, it is not the only method and does not take into account cooling via radiant heat conduction into the surrounding building members or the cooling provided by the exchange of air through the filtration and pressure boundary equipment.

The components addressed in this question were reviewed under Item III.D.3.4, “Control Room Habitability,” as part of NUREG-0737 (final docketed SER dated April 11, 1983). That review included the understanding that, under certain accident conditions, service water to the chiller units is automatically isolated, thus rendering this heat removal media ineffective. The NRC design bases inspection performed in 1997 (see NRC inspection report IR 50-244/97-201) also led to additional reviews to verify that the control room would not heat up to a temperature above acceptable limits. Additionally, plant operating experience supports the assessment that control room equipment remains functional and operable without the use of the chiller packages to condition the air. Thus, the basis for the exclusion from the scope of license renewal is that these components are not important to safety and do not perform any functions listed in the scoping criteria requirements of 10 CFR 54.4.

The staff evaluated the applicant’s response to RAI 2.3.3.5-2. The staff did not identify information in the references cited by the applicant that provides the information needed to support exclusion of the piping from the scope of license renewal. While it is stated in the references that redundant isolation dampers are installed on the control room ventilation system to protect against accidental releases of toxic or radioactive gases, no information could be found in either reference to support the statement that service water to the chiller units is automatically isolated, thus rendering this heat removal media ineffective. In a meeting following receipt of the response, the applicant stated that license renewal boundary drawing 33013-1250, 3-LR, dampers 4562 and 4733 are shown as isolating automatically following a “T” signal. The staff does not agree with the applicant’s assertion that closing the isolation dampers implies that control room cooling function is not required by the Ginna CLB, as the

cooling function could continue in a recirculation mode when the dampers are closed. Therefore, the staff requested that the applicant provide additional references demonstrating that the Ginna CLB does not credit control room cooling using the service water system following an accident to assure the continued operability of safety-related equipment needed for accident mitigation.

CI 2.3.3.10-1: By letter dated May 21, 2003, the applicant responded to RAI Generic HVAC-2, that "the specific cooling/heating coils and heat exchangers in question only have a pressure boundary intended function, that is, their heat transfer function is not credited in the current licensing basis." However, the staff noted that under the component group, "heat exchangers," in LRA Tables 2.3.3-9 and 2.3.3-10, both pressure boundary and heat transfer are listed as intended functions. This appears to be in contradiction with the above response and was discussed with the applicant. The applicant stated that the tables were in error and committed to make the necessary corrections.

CI 3.3.2.3.4-1: In LRA Section B2.1.16, "Fuel Oil Chemistry," the applicant describes its AMP to manage aging of the components exposed to the fuel oil environment. The LRA states that this AMP is consistent with GALL AMP XI.M30, "Fuel Oil Chemistry," with exceptions regarding not adding biocides, stabilizers, or corrosion inhibitors to the fuel oil and not sampling for particles in accordance with the modified ASTM D2276 test procedure. In letters dated May 13 and June 10, 2003, the applicant, responding to the staff's request for additional information F-RAI B2.1.16-1, stated that in a review of plant-specific operating experience no evidence of oil degradation or MIC has ever been observed. Therefore, addition of biocides, stabilizers, or corrosion inhibitors has not been needed to date. Effectiveness of using fuel oil without additives will be verified by the results of periodic inspections of the fuel storage tanks. In its letter, the applicant also modified its position regarding measuring particles and applying the "clear and bright" method for determining water and particulate contamination in the diesel fuel oil. The applicant made a commitment to change its technical specifications by incorporating specific particulate testing requirements for diesel generator fuel oil in accordance with the ASTM D2276 standard or its successor, and eliminating the need for the "clear and bright" method of the ASTM D4176 standard.

CI 3.6-1: In RAI 3.6-1, the applicant was asked to provide a description of its AMP used to detect aging effects associated with certain aging stressors. The applicant provided its response in a letter dated July 16, 2003. With regard to the splice box that was constructed in 1989 to join the existing aluminum conductor Westinghouse phase bus to the new copper conductor Unibus phase bus, the applicant stated that, "It is assumed that Penetrox was used to connect the aluminum to the copper transition piece because the Westinghouse bus was not plated at the field cut/prepared end." The applicant should confirm that Penetrox or another suitable antioxidant material was indeed used on the electrical joint mating surfaces. Although the splice box will have only 40 years of operation at the end of the license renewal period of extended operation, lack of a suitable antioxidant coating on the aluminum to copper mating surfaces could result in early failure of the electrical joint.

CI 4.3-1: In the LRA, the applicant indicated that the American National Standards Institute (ANSI) B31.1 limit of 7000 equivalent full range cycles may be exceeded during the period of extended operation for the NSSS sampling system. In RAI 4.3.2-1, the staff requested that the applicant describe the existing qualification of the NSSS sampling system and provide the

maximum calculated thermal stress range for affected portions of the system. In the applicant's June 10, 2003, response the applicant indicated that the engineering evaluation of the affected portions of the NSSS sampling system has been completed and concluded that the NSSS sampling system is acceptable for the period of extended operation. The staff agrees with the applicant's conclusion. The applicant should update the UFSAR Supplement summary to include the TLAA evaluation of the NSSS sampling system as described above.

CI 4.3-2: In its June 10, 2003, response, the applicant indicated that the CUF for the pressurizer surge line nozzle is not expected to exceed 1.0 during the period of extended operation. The staff finds the applicant's evaluation to be reasonable. The applicant should update the UFSAR Supplement summary to include a description of the completed environmental fatigue evaluation of the pressurizer surge line as described above.

1.7 Summary of Proposed License Conditions

As a result of the staff's review of the Ginna application for license renewal, including the additional information and clarifications submitted subsequently, the staff identified two proposed license conditions. The first license condition requires the applicant to include the UFSAR Supplement in the next UFSAR update required by 10 CFR 50.71(e) following issuance of the renewed license. The second license condition requires that the future activities identified in the UFSAR Supplement be completed prior to the period of extended operation.