RG&E
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September 16, 2003

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Mr. Russell Arrighi (Mail Stop O-11F1)
Office of Nuclear Reactor Regulation
Washington, D.C. 20555-0001

Subject: Open and Confirmatory Item Responses
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Arrighi:

RG&E is providing information regarding Open and Confirmatory Item resolutions. Attachment A addresses open items. Attachment B addresses confirmatory items. Attachment C clarifies confirmatory item CI 3.6-1.

I declare under penalty of perjury under the laws of the United States of America that I am authorized by RG&E to make this submittal and that the foregoing is true and correct.

Very truly yours,

Executed on September 16, 2003

Robert C. Mecredy

Attachments

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ATTACHMENT A - OPEN ITEM RESPONSES

OI 2.3.3.2-1

The applicant did not provide an adequate basis in its response to F-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 CCW 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.

Response

As stated in our May 23, 2003 response, the not-in-scope portions of the CCW system, downstream of normally open valves such as 747A and 747B, are located in normally accessible areas subject to routine operator tours (once/shift). Methods for detecting leakage in this piping include both routine observations, as well as CCW surge tank level instruments as discussed in Sections 7.4.2 and 9.2.2.5 of the UFSAR. The surge tank is a 2000 gallon vessel. Normal operation maintains the level at 50%, or 1000 gallons. The low alarm setpoint = 824 gallons or 41.2% of level.

RG&E has studied the operating history of leakage in the CCW system. This system is subject to scrupulous pressure boundary integrity review, since it contains potassium chromate, a highly toxic substance. No abnormal leakage, greater than 0.1 gpm, has ever been noted. Even if this leakage was arbitrarily raised by a factor of 10 to 1 gpm, there would be well over 10 hours available to identify and isolate the affected piping section.

OI 2.3.3.2-2

By letter dated June 10, 2003, in response to F-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 SEP Topic IX-3, "Station Service and Cooling Water Systems," final SER dated November 4, 1981. The cited evaluation does not include providing makeup water to the CCW system until after a postulated leak is identified and isolated, and repairs 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 CCW system components, system leakage will be minimized and the CCW surge tank will act as the make up source for "normal" leakage. Therefore, a failure of any makeup capability other than that provided by the surge tank will not affect a safety function, so the makeup capability from the reactor makeup water system is out of the scope of the Rule.

The staff cannot reconcile the applicants response against the fact that the Ginna current licensing basis relies upon makeup to the CCW system in the event of leakage during post-accident operation. The components of the makeup water supply to the CCW 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).

Response

As noted in our response to OI 2.3.3.2-1 above, operational "normal" leakage in the CCW pressure boundary is very small. The 1000 gallon inventory is considered sufficient to maintain inventory for the course of post-accident operation. Nonetheless, since the RMWT is already in scope for 10CFR54.4, the additional impact of including the makeup piping, valves, and pumps is very small. These components will be added to the scope of license renewal, and be subject to aging management review.

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 bring 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 states that circuits M0089 and M0108 are not relied upon to cope with, or recover from a Station Blackout. 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 question does not indicate how long Ginna can remain in a safe condition following recovery of only safety 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 (M0089 and M0108) in question, 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 are 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 following an SBO would allow energization of the full complement of safety buses, including buses 17 and 18. Hot standby or hot shutdown have been accepted by the staff at some plants for non-SBO scenarios such as fire protection; however, it's 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 should 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 emergency diesel generator in that time period, or comparability of that time to other staff-accepted time periods (e.g., required fuel oil supplies for the Ginna emergency diesel generators).

Response

Ginna Station has been reviewed for safe shutdown capability, including achievement of cold shutdown within 72 hours, without taking credit for any screenhouse components, as part of our fire protection (BTP 9.5-1 App. A, and App. R) review (including the case of a postulated fire in the screenhouse).

The SER approving this shutdown methodology was issued by letter from Dennis M. Crutchfield, NRC, to John E. Maier, RG&E, dated April 11, 1983, Subject: Fire Protection Rule - 10CFR50.48(c)(5) - Alternative Safe Shutdown - Section III.G.3 of Appendix R to 10CFR50 - (SEP Topic IX-6).

OI 3.1.2.3.3-1

In response to F-RAI B2.1.27-2 in a May 13, 2003, letter, the applicant indicated that the Reactor Vessel Internals Program is consistent with, but includes one exception to, NUREG-1801 GALL Section XI.M16, "PWR Vessel Internals". The only exception is that NUREG-1801, Section XI.M16 specifies examination schedules in accordance with IWB-2400, which requires core support structures to be inspected once during each 10-year interval. While this applies to the VT-3 examinations, some augmented examinations may be performed only once, unless degradation is detected.

RG&E will participate in industry activities concerning the development of augmented inspection techniques for inspection of core support structures. The required inspections and frequency of inspection will depend upon the results of the industry program on reactor vessel internal. Therefore, the exception may not be relevant and will be further evaluated by the staff when the results of the industry program are known. The applicant is to confirm that the Reactor Vessel Internals Program will be submitted for staff review prior to entering the license renewal period .

Response

RG&E will continue to participate in industry activities as development of augmented inspection techniques for core support structures progress. A Reactor Vessel Internals program will be submitted for staff review prior to Ginna entering the period of extended operation.

OI 3.3.2.3.7-1/2

The AMP Audit performed on June 24-26, 2003, identified a discrepancy between the LRA and the applicant's Fire Protection Program basis document, LR-FP-PROGPLAN. The LRA states the Fire Protection Program is consistent with GALL, whereas the basis document states that

the AMP is consistent with GALL with discrepancies. The applicant was asked to provide the basis for the discrepancies in GALL and LR-FP-PROGPLAN identified during the AMP Audit. The applicant responded that the FPP is consistent with, but includes exceptions to, NUREG-1801, Section XI.M26, "Fire Protection." The exceptions identified are as follows:

Halon system testing frequency is based upon a performance-based evaluation of system components documented in DA-ME-97-081 "Engineering Evaluation of Fire Protection System Inspection and Testing," February 10, 2000. This frequency is different from the six-month frequency stated in NUREG-1801. DA-ME-97-081 justifies a frequency of every two years for the functionality of the system, but does not address aging management review of those passive components . The applicant is requested to confirm that the evaluation in DA-ME-97-081 applies to the aging management aspect of the system components. This is Open Item 3.3.2.3.7-1.

Visual inspections of fire doors and verification of clearances are performed on a quarterly basis, not bi-monthly as stated in NUREG-1801. The applicant is requested to verify, based on plant experience that these frequencies are adequate for aging management concerns related to fire doors. This is Open Item 3.3.2.3.7-2.

Response

DA-ME-97-081 also applies to the aging management aspect of system components. When functional tests are performed, both the active and passive portions of the system are tested. The manual and automatic operation of the Halon system would not be successful without an intact pressure boundary, or with material conditions that could adversely affect the performance of the system. Corrosion, mechanical damage, or damage to dampers would all hinder successful performance of the functional tests.

The aging management issues of concern for fire doors, as noted in NUREG-1801, are clearances, and holes in the skin. A review of our quarterly fire door walkdown operating experience indicates that these issues have not been of concern. It is thus considered that the quarterly frequency established for inspections of fire doors are adequate for aging management.

OI 3.3.2.3.7-3

The AMP audit performed on June 23 - 25, 2003, also identified a discrepancy between the LRA and the applicant's Fire Water System Program basis document, LR-FWS-PROGPLAN. The LRA states the Fire Water System Program is consistent with GALL, whereas the basis document states that the AMP is consistent with GALL with discrepancies. The applicant was asked to provide the basis for the discrepancies in GALL and LR-FWS-PROGPLAN identified during the AMP audit. The exceptions identified are as follows.

In the program basis document, the applicant stated that the parameters monitored/inspected attribute includes exceptions to the GALL AMP related to periodic flow testing of infrequently used loops. The audit team identified differences in the detection of aging effects attribute. The sprinkler system components are not examined for evidence of microbiological fouling as

indicated by GALL. In addition, the GALL recommends visual inspections of yard fire hydrants to be performed every six months, whereas the basis document specifies during windows of opportunities during maintenance activities. The GALL also specifies that fire hydrant flow tests are performed annually and the basis document specifies on a periodic basis. The applicant is requested to provide the basis for these exceptions to GALL. This is Open Item 3.3.2.3.7-3.

Response

The bases for exceptions to GALL, Section XI.M27, "Fire Water System" are as follows. A revised Section 4.0 of the Fire Water System Program Basis Document, is also included below.

Exception:

(1) The sprinkler system components are not examined for evidence of microbiological fouling as indicated by GALL.

Response

Sprinkler system components at Ginna Station are examined for evidence of biological fouling. As indicated in the revised Fire Water System Program Basis Document, these inspections are performed by radiography (RT) and ultrasonic testing (UT). Radiographic inspections are capable of detecting biological fouling, wall thinning, and sedimentation in fire water system piping.

Exception:

(2) The GALL recommends visual inspections of yard fire hydrants to be performed every six months, whereas the basis document specifies during windows of opportunity during maintenance activities.

Response

As indicated in the revised Fire Water System Program Basis Document Section 4.0, visual inspections of yard fire hydrants are performed twice per year, which is reasonably consistent with NUREG-1801.

Exception:

(3) The GALL specifies that fire hydrant flow tests are performed annually, and the basis document specified on a periodic basis.

Response

As indicated in the revised Fire Water System Program Basis Document Section 4.0, fire hydrants are flushed annually at Ginna Station by opening each hydrant fully and verifying (qualitatively) adequate flow. Flow test and performance trending data are collected every three years. The three-year frequency is supported by plant-specific operating experience, (DA-ME-97-081) and industry practice.

The Revision 1 of Section 4.0 of the Ginna Fire Water System Program Basis Document is as follows:

"(4) Detection of Aging Effects

Continuous system pressure monitoring, periodic system flow tests, periodic functional tests, and internal inspections of opportunity of aboveground system piping and components when they are disassembled for maintenance or system modification ensure that corrosion and bio-fouling are not occurring to such an extent that the intended function(s) of the fire water system would be compromised. Volumetric non-destructive examinations of representative sections of fire water system piping are also performed each operating cycle using appropriate techniques to detect wall thinning, sedimentation or bio-fouling. In addition, various surveillance tests and maintenance activities are performed which ensure that fire suppression systems and components are operable.

Visual inspections of fire hydrants, hydrostatic testing of hydrants, fire hoses and hose reels, gasket inspections, and fire hydrant flow tests that are performed on a periodic basis provide opportunities for detection of degradation before a loss of intended function can occur. Visual inspections of yard fire hydrants are performed twice per year. Fire hydrant hose hydrostatic tests, gasket inspections and fire hydrant flushes are performed annually. Flow test data is collected every three years.

Various sections of fire protection system piping are selected annually for NDE inspection and verification of wall thickness requirements. Inspections of various headers will be performed each operating cycle using UT or RT techniques. These inspections are driven by a "Repetitive (Rep) Task" in the Periodic Surveillance and Preventive Maintenance (PSPM) program. The selection criteria, sample size and periodicity of these inspections during the period of extended operation, including the expansion criteria in the event that age-related degradation is found, will be defined prior to the end of the current license period. This commitment is tracked by CATS Item 11332. Testing of individual fire systems verifies that piping up to deluge valves is free of obstructions.

The exterior condition of the underground fire system piping is verified by inspections performed under the Buried Piping and Tanks Inspection program "LR-BTNK-PROGPLAN" (Ref. 9.30). Sprinkler systems are inspected and tested as defined in the procedures listed in section 4.0 to ensure that degradation is detected in a timely manner.

This element is consistent with, but contains an exception to, the corresponding aging management program attribute in NUREG-1801, Section XI.M27. NUREG-1801 requires that

sprinkler systems are inspected once every refueling outage. Sprinkler system headers and spray heads are inspected every two years at Ginna Station in accordance with the Technical Requirements Manual (TRM). The two-year frequency is supported by plant-specific operating experience and is based upon the analysis in DA-ME-97-081. In addition, NUREG-1801 requires that fire hydrant flow tests be performed annually. Fire hydrants are flushed annually at Ginna Station by opening each hydrant fully and verifying (qualitatively) adequate flow. Flow test and performance trending data is collected every three years. The three-year frequency is supported by plant-specific operating experience and industry practice. Therefore the intent of NUREG-1801, Section XI.M27, Paragraph 5.4 is met."

OI 3.6-1

The discussion in LRA Table 3.7-2, Item (1) *Electrical Phase Bus,* indicates that because a one-time inspection found no aging effects requiring management, no additional aging management programs are required through the period of extended operation. The potential aging effects requiring management (*AERMs*) identified in item (1) for the electrical phase bus appear to be associated with organic insulating components of phase bus, although the *Material* column in the table only identifies porcelain insulators at Ginna. NRC Information Notice 89-64 and a recent license renewal application identify bus duct insulation problems requiring management. IN 89-64 indicates a combination of cracked insulation and accumulation of dust, debris, and moisture caused failure of the bus. Corrective actions included enhanced periodic inspections and cleaning of bus bars and their housings.

Item (1) *Electrical Phase Bus* of Table 3.7-2 also 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 were not addressed. 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 fastener components, reference 1 to Section 3.7 of the Ginna LRA, *Aging Management Guideline for Commercial Nuclear Power Plants* (Ref 3.6-1 of this SER), 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.

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, in accordance with the requirements of 10 CFR 54.21(a)(3), used to

detect aging effects associated with these aging stressors; or provide justification why such a program is not needed.

The applicant provided its response in a letter dated July 16, 2003 (Ref. 3.6-5). The response provided the following description of the phase bus at Ginna:

> The phase bus at Ginna within the scope of license renewal is used to provide offsite power from the station auxiliary transformers to Bus 12A and Bus 12B. All phase bus discussed is non-segregated phase bus. The outdoor phase bus installed in the transformer yard was replaced in 1989 to support an offsite power reconfiguration. The outdoor phase bus (Unibus) contains copper conductors and uses an aluminum enclosure. It is non-ventilated, however it contains screened breathers on the bottom of the bus enclosure and electric space heaters for moisture control. Covers are sloped to shed water and gasketed to assist with water tightness. The design of the Unibus provides for overhanging metallic channels such that the gasket is not challenged by normal precipitation. This portion of the switchyard was installed in 1989 and will have 40 years of operation at the end of the period of extended operation.
>
> The indoor phase bus (Westinghouse bus) is original plant construction and begins at the "link" separating the transformer yard from the control building identified on drawing LR33013-2409. This phase bus is constructed of aluminum conductors and uses a steel enclosure. This phase bus is non-ventilated and does not contain vents, breather screens, or electric space heaters.
>
> During the offsite power reconfiguration, the Westinghouse bus was cut and a splice box was built to transition to Unibus. These connection surfaces were constructed in 1989, and will have 40 years of operation upon the end of the license renewal period of extended operation.

The response goes on to address 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 anti-oxident 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.

The staff has reviewed the information in the response and finds that, because the Unibus outdoor phase bus was installed in 1989 and will have only 40 years of operation at the end of the period of extended operation, it does not require an AMP.

With regard to the Westinghouse phase bus, the staff finds that visual inspection of the 12A and 12B phase bus under control of the *Periodic Surveillance and Preventative Maintenance* AMP is acceptable for monitoring aging degradation of the phase bus insulating components. The staff does not agree that inspections of the 11A and 11B phase bus is an acceptable substitute for the 12A and 12B inspections. The staff believes the 11A and 11B phase bus inspections can be used to gain insight into potential future aging degradation of the 12A and 12B phase bus; but should not be used as a substitute for the 12A and 12B inspections due to potential dissimilarities in manufacture, assembly, and operation (faults, transients, surges, lightning, etc.). The applicant should remove or modify this provision. This is Open Item 3.6-1.

Response

Since phase buses 11A and 11B contain the same materials of construction, are constructed by the same company, and are subject to more severe service conditions, RG&E considers that inspections of these buses would have been more conservative than inspections of the 12A and 12B phase bus. However, to address Open Item 3.6-1, the provision for substituting inspections of 11A and 11B phase bus will be removed from the Periodic Surveillance and Preventive Maintenance AMP.

OI 3.6-2

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 (Ref 3.6-8) 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's unlikely the Westinghouse phase bus at Ginna will be subject to the early failures experienced at Diablo Canyon. It's 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 3.6-2.

Response

RG&E does not consider that the EPRI guidance intended for joint resistance tests is intended to be used for routine inspections. The inspection guidance as stated in section 8.2 of EPRI TR-104213 is as follows,

"Inspect bolted joints for evidence of overheating, signs of burning or discoloration and indications of loose bolts. The bolts should not be retorqued unless the joint requires service or the bolts are clearly loose. Verifying the torque is not recommended. The torque required to turn the fastener in the tightening direction (restart torque) is not a good indicator of the preload since the fastener is in service. Due to relaxation of the parts of the joint, the final loads are likely to be lower than the installed loads. However, this load reduction has little effect of the electrical conductivity or joint performance. Check the joint resistance of bolted joints using a low range ohm meter."

RG&E interprets this guidance to rely on inspection for "evidence of overheating, signs of burning or discoloration" as the precursor to bus damage. When such precursor indications exist, then corrective actions would likely result in removal of the boot and performing inspections of the bolted connections. If degradation of the bolted connection is found, joint resistance measurements may be used to document As-Found conditions as well as As-Left

conditions following maintenance. When the suggested "check" is taken within the context of the entire paragraph, including it's preceding sentence, the joint resistance test is interpreted only as a secondary test when there is some evidence that the joint may be degraded.

In considering appropriate inspections for the phase bus, RG&E reviewed operating experience directly related to IN 2000-14. This operating experience provides the industry with a description and photographs of phase bus that had severely degraded PVC boots resulting from overheating conditions, however the operating experience indicates that this condition was found during a planned inspection and does not indicate that the phase bus had failed.

In response to Open Item 3.6-2, RG&E will require joint resistance tests to be performed when visual inspections of PVC boots or other materials of construction indicate that the joint may be overheating. This will be included in the program basis document for the Periodic Surveillance and Preventive Maintenance AMP.

<u>OI B2.1.28-1</u>

In response to F-RAI B2.1.28-1, the applicant indicated that Ginna has two surveillance capsules left in the core. Their 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 5.25E19, more than the projected dose at 60 years of 4.85E19. Since Ginna has performed, and submitted to the NRC, a reactor vessel equivalent margins analysis, they indicated that they do 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. Since item 6 in GALL XI.M31 indicates the applicant is to withdraw one capsule at an outage in which the capsule receives a neutron fluence equivalent to the 60-year fluence to test the capsule in accordance with the requirements of ASTM E 185, the staff believes the capsule withdrawn during the 2003 refueling outage should be tested. Testing of this capsule is important because the RTPTS value in the pressurize 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 a 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 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. Since the last capsule 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.

<u>Response</u>

RG&E will withdraw a surveillance capsule during the 2005 RFO, at which time it will have accumulated fluence greater than that projected through the period of extended operation. We will subsequently recalculate RT-PTS, using Regulatory Guide 1.99 Revision 2 methodology, to verify that the RT-PTS screening criteria will be met through 60 years.

The last capsule will be withdrawn after it accumulates fluence greater than that projected through 80 years of operation. All test specimens will be removed, and only the neutron dosimetry will be reinserted into the core so that fluence can continue to be monitored.

OI B2.1.36-1

Question [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 because these are locations that are susceptible to wear resulting from flow induced vibration. The applicant states that all thirty-six thimble tubes are within the scope of this inspection program. The staff found the scope of the program to be adequate because all thirty six thimble tubes are within scope and the inspection is performed at locations most susceptible to wear resulting from flow induced vibration. The applicant has not identified the locations on the thimble tubes and guide tubes to be inspected for SCC.

Response

The entire length of each thimble tube is inspected for SCC by eddy current examination.

Question [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.

Response

The eddy current examination technique has been qualified for detection of SCC. Plant-specific operating experience indicates that OD-initiated SCC indications 20% through-wall and greater are consistently detectable. Since sizing of SCC indications from eddy current data is somewhat unreliable, repair criteria are based on detection. Any thimble tube containing an SCC indication detected by eddy current examination is removed from service (isolated) and replaced.

Question [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.

Response

The eddy current examination technique has been qualified for detection of SCC. Plant-specific operating experience indicates that OD-initiated SCC indications 20% through-wall and greater are consistently detectable. Since sizing of SCC indications from eddy current data is somewhat unreliable, repair criteria are based on detection. Any thimble tube containing an SCC indication detected by eddy current examination is removed from service (isolated) and/or replaced.

Question [Monitoring and Trending]

In the applicants response to F-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 the thimble tubes and guide tubes to detect SCC.

Response

Eddy current inspections of all 36 thimble tubes for detection of SCC indications are currently scheduled to be performed each refueling outage throughout the remainder of the current license period and the period of extended operation.

Question [Acceptance Criteria]

The acceptance criteria is 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 inspection of the thimble tube and guide tube to detect SCC.

Response

Any SCC indication in any thimble tube detected by eddy current examination requires repair of the thimble tube.

ATTACHMENT B - CONFIRMATORY ITEM RESPONSES

CI 3.6-1

In F-RAI 3.6-1 the applicant was asked to provide a description of its aging management program used to detect aging effects associated with these 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's response states 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 anti-oxidant material was indeed used on the electrical joint mating surfaces. Although the splice box will have only 40 years of operation upon the end of the license renewal period of extended operation, lack of a suitable anti-oxidant coating on the aluminum to copper mating surfaces could result in early failure of the electrical joint.

Response

Unibus Drawing D-1800-013, Revision 2 (Attachment C) provides details of the "Bus Duct Tap" or splice box. Revision 2 has a note that states, "Use Penetrox between existing aluminum and new copper bus bars". This drawing is maintained by Ginna as a controlled document, which was reviewed and approved by Ginna engineers prior to construction.

CI 4.3-1

In the LRA, the applicant indicated that the 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 F-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 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.

Response

Section A3.3.3 is being revised as follows. The third sentence of the second paragraph should be replaced by the following. "For the sampling system, a detailed engineering analysis was performed which showed that the maximum thermal stress developed during heatups and cooldowns was less than the code allowable stress range for 100,000 or more operational cycles. The existing NSSS sampling system is thus acceptable for the period of extended operation, in accordance with 10CFR54.21(c)(1)(ii)."

CI 4.3-2

In the June 10, 2003 response, the applicant indicated that 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.

Response

In Section A3.3.5, "Environmentally Assisted Fatigue," the last phrase "with the exception of the pressurizer surge line" should be deleted.

Section A3.3.6 should be replaced in its entirety with the following:

"A3.3.6 Pressurizer Lower Head and Surge Line

The EPRI FatiguePro software program was customized to monitor fatigue-critical locations in the surge line and pressurizer lower head in the Ginna plant. An analysis was performed based on available template sets of real plant data to determine the incremental fatigue usage factor for known plant transients, including the effects of "insurge/outsurge" and environmentally-assisted fatigue (EAF). Cumulative usage factors for the operating life of the plant were computed based on the results of real plant data, and expected future usage was computed using projections of expected plant cycles.

The technical approach is summarized as follows:

- The flow rate in the surge line was computed based on a mass balance approach, using the incoming spray demand and the rate of change of the pressurizer water level, taking into account temperature effects.
- A 2-dimensional model was created to take into account (a) the advance and time delay of colder water from the hot leg into the surge line and lower head of the pressurizer, and (b) the heat transfer between the fluid and metal.
- Finite element models (including thermal sleeves in the pressurizer surge nozzle and hot leg RCS surge nozzle) were created to compute stress responses to step changes in temperature at various zones in the pressurizer. Stresses could then be computed based on the calculated fluid temperatures at the various zones in the pressurizer and surge line.
- The stress history was used to compute fatigue usage in FatiguePro.

Real plant data from various heatup/cooldown cycles since 1996 were analyzed to compute incremental fatigue usage for a heatup/cooldown cycle. The location with the highest fatigue usage in the pressurizer bottom head was determined to be the heater tube-to-lower head (penetration) weld. For the heater penetration location, the primary stress transient is not due to insurge and outsurge, but rather the general thermal expansion stress that arises from the global

heatup and cooldown of the pressurizer. This location is a stainless steel weld to the tube and clad very close to the low alloy steel pressurizer shell. A high steady state dissimilar metal thermal expansion stress is established during the heatup and is relaxed during the cooldown. It is of a magnitude that overwhelms the small stress additions coming from insurges and outsurges of fluid. The next most fatigue sensitive location is the pressurizer surge nozzle. This location is affected most by insurges and outsurges, having essentially no steady state stress. This location has a much smaller stress concentration effect than the heater weld.

The cumulative usage factors for the heater penetration, pressurizer surge nozzle and surge line nozzle-to-RCS hot leg connection were calculated and the results are as follows:

Pressurizer Heater Penetration

Material: Type 316 Stainless Steel
Usage Factor (60 years[1]): 0.048
Maximum Environmental Factor: 15.35

Usage Factor (60 years): CUF$_{60env}$ = **0.74**

Pressurizer Surge Nozzle

Material: SA 376 Type 316 Stainless Steel
Usage Factor (60 years[1]): 6.276E-07
Maximum Environmental Factor: 15.35

Usage Factor (60 years): CUF$_{60env}$ = **9.633E-06**

RCS Hot Leg Surge Nozzle

Material: SA 376 Type 316 Stainless Steel
Usage Factor (60 years[1]): 0.0132
Maximum Environmental Factor: 15.35

Usage Factor (60 years): CUF$_{60env}$ = **0.2022**

[1]Note: Fatigue usage factor was calculated based on 200 heatup and cooldown cycles."

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DRAWING NO. D-1800-013,
"5KV, 3000A, BUS DUCT TAP",
REVISION 02

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D-01