July 28, 2000

Mr. H. L. Sumner
Vice-President - Hatch Project
Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
P.O. Box 1295
Birmingham, AL 35201-1295

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE LICENSE RENEWAL APPLICATION

Dear Mr. Sumner:

By letter dated February 29, 2000, the Southern Nuclear Operating Company, Inc. (SNC), submitted for the Nuclear Regulatory Commission's (NRC's) review an application pursuant to 10 CFR Part 54, to renew the operating license for the Edwin I. Hatch Nuclear Plant, Units 1 and 2 (Plant Hatch). The NRC staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete its safety review.

The enclosed Requests for Additional Information (RAIs) are numbered to coincide with the staff's safety evaluation report. However, each RAI references the pertinent section of the license renewal application.

These RAIs, along with those provided to you by letter dated July 14, 2000, constitute the entire set of RAIs from the staff.

Please provide a schedule by letter, electronic mail, or telephonically for the submittal of your responses within 30 days of the receipt of this letter. Additionally, the staff would be willing to meet with SNC prior to the submittal of the responses to provide clarifications of the staff's requests for additional information.

Sincerely,

/***RA***/

William F. Burton, Project Manager
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-321 and 50-366

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION
EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION (LRA) SECTIONS 2.3.3,

Standby Gas Treatment System (SGTS)

RAI 2.3.3-SGTS-1 Table 2.3.3-6 lists the components subject to an aging management review (AMR) for the SGTS. Other components in the SGTS are not identified as being subject to an AMR, although they perform their function without moving parts or a change in configuration or properties and are not replaced based on qualified life or specified time period. These components are listed below. Identify whether these components are subject to an AMR, and if so, provide the relevant information about the components to complete Table 2.3.3-6. If a component is not subject to an AMR, provide a justification for its exclusion. (With regard to the first 3 items in the list of components, the applicant was not consistent in scoping in redundant components for license renewal.)

a. Differential pressure indicator and associated piping (Unit 1, Filter Assembly D001B, HL-16020, SGTS Sh. 1 @ F2)

b. Temperature element and associated piping (Unit 1, Filter Assembly D001B, HL-16020, SGTS Sh. 1 @ G4)

c. Flow switch (FS N011A) and open valves (N011A-RV1, N011A-RV2) and associated piping (3/8 inch diameter piping) (Unit 1, HL-16174, SGTS Sh. 2 @ C7)

d. Filter housing with pre-filter, high-efficiency particulate air (HEPA) and carbon filters (Unit 1, Filter Assemblies D001A and D001B, HL-16020 @ (C2, C3, C4 and C5) and (G2, G3, G4 and G5)); compare with the housing and its contents for the filter assemblies shown in scope on HL-16042 @ (B8 and B9) and (E8 and E9) for the control building HVAC system.

e. Bird screen or wire mesh, if provided as a protective cover, for an exhaust stack (Unit 1, HL-16174, SGTS Sh. 2 @ C10)

f. Guillotine damper housing (Unit 2, Filter Assemblies D001A and D001B, HL-26078 @ C4 and G4)

g. Filter housing with pre-filter, HEPA and carbon filters (Unit 2, Filter Assemblies D001A and D001B, HL-26078 @ (C2, C3, C4 and C5) and (G2, G3, G4, and G5)); compare with the housing and its contents for filter assemblies shown in scope on HL-16042 @ (B8 and B9) and (E8 and E9) for the control building HVAC system.

h. "Buried pipe" (Unit 2, HL-26078 @ G10)

i. Bird screen or wire mesh, if provided as a protective cover, for an exhaust stack (Unit 2, HL-26078 @ C11)

RAI 2.3.3-SGTS-2 Table 2.3.3-6 of the LRA lists components subject to an AMR for the SGTS. Several components, identified on P&IDs HL-16174 and HL-26078 as being within the scope of license renewal, are not included in Table 2.3.3-6. The components listed below perform their function without moving parts or a change in configuration or properties and are not replaced based on qualified life or specified time period, and thus should be subject to an AMR. Identify whether the following components are subject to an AMR, and if so, provide the relevant information about the components to complete Table 2.3.3-6. If a component is not subject to an AMR, provide a justification for its exclusion.

a. Outside air probe tubing (Unit 1, HL-16174, SGTS Sh. 2 @ A9, B9 and C9)

b. Fan housing (Unit 1, HL-16174, SGTS Sh. 2 @ C5 and F5)

c. Outside air probe tubing (Unit 2, HL-26078 @ A9, B9, and C9)

d. Fan housing (Unit 2, HL-26078 @ C4 and G4)

RAI 2.3.3-SGTS-3 Is there a "filter" category for component commodity groups, including the pre-filters, HEPA filters and charcoal adsorbers?

Reactor Building HVAC System (RBHVACS)

RAI 2.3.4-RBHVAC-1 Several components, identified on several P&IDs and in the text of LRA section 2.3.4.15 as being within the scope of license renewal, are not included in Table 2.3.4-15. Table 2.3.4-15 lists the components subject to an AMR for the RBHVACS. The components listed below perform their function without moving parts or a change in configuration or properties and are not replaced based on qualified life or specified time period, and thus should be subject to an AMR. Identify whether the following components are subject to an AMR, and if so, provide the relevant information about the components to complete Table 2.3.4-15. If a component is not subject to an AMR, provide a justification for its exclusion.

a. Air-operated valve bodies, air-operated damper housing, and associated ductwork (Unit 1, HL-16005 @ C5, C10, G10, H4; HL-16014 @ C6, F11 and G11, H4 and J4)

b. Safeguards equipment room cooler housing (Unit 1, HL-16023); especially, Control Rod Drive (CRD) pump room cooler housing that is not identified as being in scope.

c. Air-operated valve bodies, air-operated damper housing, and associated ductwork (Unit 2, HL-26067 @ (A5, B5, and C5), F10 and G10; HL-26072 @ C6 and C7, F4 and G4)

d. Safeguards equipment room cooler housing (Unit 2, HL-26071); especially, CRD pump room cooler housing that is not identified as being in scope.

RAI 2.3.4-RBHVAC-2 Sealant materials are not identified as being within the scope of license renewal and are not included in Table 2.3.4-15 of the LRA. Verify whether the sealant materials are used to control the unfiltered out-leakage to the outside environment. If so, provide justification for the exclusion of the sealant materials or provide the relevant information about the sealants to complete Table 2.3.4-15.

RAI 2.3.4-RBHVAC-3 Identify whether the following components are subject to an AMR, and if so, provide the relevant information about the components to complete Table 2.3.4-15 of the LRA. These components perform their function without moving parts or a change in configuration or properties and are not replaced based on qualified life or specified time period, and thus should be subject to an AMR. If a component is not subject to an AMR, provide a justification for its exclusion:

a. Ductwork (Unit 1, HL-16005 @ G2, G3, G4, and G5)

b. Ductwork (Unit 1, HL-16014 @ G2, G3, G4, and G5)

Outside Structures HVAC System (OSHVACS)

RAI 2.3.4-OSHVAC-1 Several components, identified on P&ID HL-44073 as being within the scope of license renewal, are not included in Table 2.3.4-17 of the LRA. Table 2.3.4-17 lists the components subject to an AMR for the river intake structure HVAC system (RISHVACS). The components listed below perform their function without moving parts or a change in configuration or properties and are not replaced based on qualified life or specified time period, and thus should be subject to an AMR. Identify whether the following components are subject to an AMR, and if so, provide the relevant information about the components to complete Table

2.3.4-17. If a component is not subject to an AMR, provide a justification for its exclusion.

a. roof-mounted exhaust ventilators housing (each with backdraft damper and vent fan), (HL-44073 @ G8,G9, and G10)

b. wall-mounted unit heater housing (HL-44073 @ F7)

c. gravity-operated louvers (each with inlet screen), (HL-44073 @ D6 and E6)

Control Building HVAC System (CBHVACS)

RAI 2.3.4-CBHVAC-1 Several components, identified to be within the scope of license renewal on P&IDs HL-16042 and HL-26116 and/or in the text of LRA Section 2.3.4.20, are not included in Table 2.3.4-20. Table 2.3.4-20 lists the components subject to an AMR for the CBHVACS (including the main control room ventilation system). The components listed below perform their function without moving parts or a change in configuration or properties and are not replaced based on qualified life or specified time period, and thus should be subject to an AMR. Identify whether the following components are subject to an AMR, and if so, provide the relevant information about the components to complete Table 2.3.4-20. If a component is not subject to an AMR, provide a justification for its exclusion.

a. Damper housing and associated ductwork (HL-16042 (several dampers), HL-16042 @ H7 (cable spreading room); HL-26116 @ C4 and D4)

b. Filter train housing with carbon and HEPA filters (HL-16042 @ B8 and B9, F8 and F9)

c. Fan housing (HL-16042 @ E12 and F12, B7, E7; H5, H7 (cable spreading room))

d. Air handling units housing and heating and cooling coils (HL-16042 @ B2 and B3, D2 and D3, F2 and F3)

e. Filters (HL-16042 @ B5, F5)

f. Coolers for low-pressure coolant injection (LPCI) inverter room and Unit 2 vital A/C room (text of Section 2.3.4.20)

RAI 2.3.4-CBHVAC-2 Describe the areas that constitute the main control room envelope (MCRE) for Hatch Units 1 and 2. Verify that all control room ventilation system components (including air handling units and fan coil units with

their associated ductwork, fire damper and control valves, air intake, and exhaust fan with purge ductwork) inside the MCRE, which are relied on to perform the safety-related cooling and filtration functions (in order to maintain the control room habitability (CRH) and meet General Design Criterion (GDC) 19 requirements), are identified to be within the scope of license renewal and subject to an AMR on HL-16042 and in Table 2.3.4-20. If a component is not subject to an AMR, provide a justification for its exclusion.

RAI 2.3.4-CBHVAC-3 Clarify whether sealants, used to maintain the MCRE at positive pressure with respect to the adjacent areas in order to prevent unfiltered in-leakage into the MCRE, are included in the scope of license renewal and subject to an AMR, and if so, provide the relevant information to complete Table 2.3.4-20 of the LRA. If the sealants are not subject to an AMR, provide a justification for their exclusion. With regard to the sealant materials, the staff's view is that condition monitoring, if provided by technical specification (TS) surveillance requirements (SRs) of Hatch Units 1 and 2, does not by itself provide a plant-specific basis for excluding the sealant materials in the control room pressure boundary from an AMR. However, the staff believes that the TS surveillance, in conjunction with related system inspections and the corrective action process, can provide an adequate aging management program for sealant materials in the control room ventilation system.

RAI 2.3.4-CBHVAC-4 The "System to Function Matrix" (dated 5/24/00) lists P&ID HL-16040 as one of the boundary drawings for the control building HVAC system. However, HL-16040 was not among the boundary drawings submitted by the licensee. Please provide HL-16040 for staff review.

Aging Management Programs (AMPs)

RAI 3.1-1 Provide specific details regarding the use of industry (EPRI/NEI)/NRC guidelines for the AMPs.

If an industry/NRC guideline is being used to manage a program, then specific details regarding how the guideline is being utilized, whether the guideline is being used partially or entirely, and how the guideline is managing the aging effects of that program should be discussed.

RAI 3.1-2 How the parameters are being measured/monitored relative to aging effects was not provided. Provide the parameters to be measured/monitored for each AMP and discuss how the parameters adequately identify the aging effect.

RAI 3.1-3 Provide the sampling (inspection/monitoring) frequencies for each parameter measured in each AMP.

RAI 3.1-4 Acceptance Criteria

Provide acceptance criteria for each measured parameter in each AMP.

RAI 3.1-5 Operating Experience

For each program, provide a discussion regarding industry operating experience that may be applicable to Hatch. More specifically, a discussion regarding how the program works at Hatch and how future operating experience at other plants will be monitored by Hatch should be provided.

If the AMP is a generic industry program (i) there should be a description of the industry experience in mitigating or eliminating the aging effect using the AMP, and (ii) there should be a description regarding the program for monitoring and evaluating the effectiveness of the industry programs.

RAI 3.1 - 6 Scope

The staff identified that most, if not all, of the AMP descriptions contained in Appendix A of the application do not clearly identify the scope of the program (what systems and components require the program to manage an aging effect). For each AMP, provide descriptions which clearly identify the systems (and components, if appropriate) that fall within the scope of the AMP.

RAI 3.1 - 7 Revise the description of the AMPs and activities in Appendix A to clearly identify for each AMP and activity (1) the scope of the program, (2) actions to prevent or mitigate aging, (3) parameters monitored or inspected, (4) how aging effects will be detected, (5) how the parameters will be monitored and trended, (6) the acceptance criteria against which the need for corrective action will be evaluated, and the basis for the acceptance criteria, (7) the corrective actions to be taken when the acceptance criteria are not met, (8) the confirmation process used to ensure that the preventive actions are adequate, (9) administrative controls used to provide a formal review and approval process, and (10) plant-specific and industry-wide operating experience relevant to the AMP or activity that has, or may result in, enhancements or additional programs. The bases and the plant-specific information pertaining to the ten key elements identified above in each AMP should be described and discussed in detail. Some of these items may be repeated (with further detail) in the following pages.

<u>Reactor Water Chemistry Control</u>

RAI 3.1.1 - 1 In Section A.1.1.1 of the LRA, it is stated that water chemistry control helps decrease flow-accelerated corrosion (FAC) in the reactor coolant system, as well as in the balance of plant systems. Provide detailed information, including the technical basis, that explains how this is achieved for carbon steel components.

RAI 3.1.1 - 2 The staff understands that hydrogen water chemistry (HWC) and noble metal chemistry addition (NMCA) have been implemented in both Hatch Units. However, such controls were not discussed or mentioned in Section A.1.1 of the LRA. The staff also notes that in the AMRs of commodity groups in Appendix C,

credit is taken in managing the aging effects due to cracking and loss of materials based on hydrogen injection to minimize the oxygen content in the reactor water. Seven commodity groups are identified to be exposed to the reactor water environment. Revise Section A.1.1of the LRA to identify the reactor water chemistry control by HWC and NMCA and describe how this is implemented, controlled and monitored for its effectiveness.

RAI 3.1.1 - 3 Under the conditions of HWC and NMCA, the oxygen content in the reactor water is expected to be very low which is desirable in mitigating intergranular stress corrosion cracking (IGSCC) in stainless steel. However, this low oxygen condition may be detrimental to the corrosion resistance of components made of carbon steel, particularly, for the aging effect of erosion-corrosion or FAC. Describe, in detail, any existing mitigating or preventive program that will mitigate this low oxygen condition, such as, injecting oxygen into the affected systems to improve the resistance to erosion-corrosion in carbon steel components. Provide justification if you do not have such a program.

RAI 3.1.1 - 4 Briefly describe how the water chemistry controls are implemented in the reactor water system, the condensate/feedwater cycle, and the reactor water cleanup (RWCU) system. Detailed plant-specific information should be provided pertaining to the regular sampling, results analysis and chemistry modification. For sampling, the number and location of samples, frequency of sampling, sample expansion, and how conservative the sample is should be discussed. Regarding the results analysis, detailed information regarding the control/diagnostic parameters, methodology for analysis/measurements and accuracies should be provided. The acceptance criteria of each monitored parameter should be discussed or referenced with sufficient detail. If in-situ or on-line measurements are not performed in monitoring the control or diagnostic parameters, discuss the potential sampling line effect on the accuracy of the measurements, particularly, regarding the measurement of oxygen content and electrochemical potential (ECP).

RAI 3.1.1 - 5 In Section 4.3 (Guideline Values for Control Parameters) of EPRI BWR Water Chemistry Guidelines, 1996 Revision, continuous measurements of conductivity, ECP and dissolved oxygen are recommended for reactor water and reactor feedwater/condensate. However, in Section A.1.1.1of the LRA, it is stated that the monitoring is based on regular sampling. Provide justification for not continuously monitoring those parameters as recommended in the referenced EPRI BWR Water Chemistry Guidelines.

RAI 3.1.1 - 6 Identify all the elements in the reactor water chemistry control program that deviate from the referenced EPRI BWR Water Chemistry Guidelines. Provide justification for each deviation and discuss its adequacy.

RAI 3.1.1 - 7 Provide the bases and justification for the following items:

a. The ISI program is not referenced in the aging management of non-Class 1 carbon steel and stainless steel components within the reactor water environment (commodity groups of C.2.2.1.1 and C2.2.1.2)

b. Monitoring and trending are not necessary for timely corrective action for the loss of material (Tables C.2.2.1-1, C.2.2.1-3 and C.2.2.1-4) and IGA/SCC (Tables C.2.1.1-17 and C.2.2.1-4).

c. No program is required to prevent or mitigate aging degradation due to erosion-corrosion (Tables C.2.1.1-10 and C.2.2.1-2).

RAI 3.1.1 - 8 In Table 2.3.1-1 of the reactor assembly system (B11), the following components: access hole covers (nickel-based alloy), core delta P/SLC line (stainless steel), core support plate (stainless steel) and shroud tie rods (stainless steel) are listed as not requiring aging management. Provide the bases for such determinations.

RAI 3.1.1 - 9 The U.S. Nuclear Regulatory Commission (NRC) issued a safety evaluation report (SER), dated April 27, 1999, in which the staff found the BWRVIP-27 report, "BWR Vessel and Internals Project, BWR Standby Liquid Control System / Core Plate ΔP Inspection and Flaw Evaluation Guidelines," dated April 1997, acceptable for the current operating period of BWRs. According to Section 2.1 of the BWRVIP-27 report, industry experience has identified IGSCC as a potential aging effect for the ΔP/SLC vessel penetration/nozzle and safe-ends. Section C.2.2.4, of the LRA, does not identify aging due to IGSCC as an applicable aging effect. Identify all components potentially affected by IGSCC and describe how the aging effects due to IGSCC are managed during the period of extended operation.

RAI 3.1.1 - 10 The staff notes that “safe ends” are listed as a component requiring AMR in Table 2.3.1-1 for the reactor assembly system (B11). Safe ends are usually connected to nozzles with dissimilar metal welds to accommodate the configuration changes between nozzles and piping. In which commodity group will the carbon steel “safe ends” with stainless steel or Alloy 182 connecting welds be assigned to for AMR. Provide a discussion regarding how the components with dissimilar metal welds will be adequately managed for aging effects in the existing commodity groups.

RAI 3.1.1 - 11 In Table 3.2.1-1 of the LRA, thermal sleeves are listed as a component requiring AMR. Thermal sleeves, in most cases, are not accessible for inspection and the outside diameter (OD) surface is exposed to a stagnant fluid environment. Therefore, discuss how the AMPs referenced in Table 3.2.1-1 of the LRA effectively mitigate such conditions, to ensure the structural integrity of the thermal sleeves, during the extended licensing period.

RAI 3.1.1 - 12 Provide additional information regarding your operating experience pertaining to water chemistry transients due to resin intrusion, condensate leakage or other causes. Describe the bounding water chemistry transients in the last five years

and the corrective/recovery actions taken to minimize the aging degradation of the affected components as well as to prevent recurrence.

Closed Cooling Water Chemistry Control

RAI 3.1.2 - 1 The applicant states that the closed cooling water chemistry control is designed to mitigate age-related degradation by maintaining closed cooling water chemistry in accordance with EPRI guidelines. Discuss how monitoring the parameters chosen will mitigate the loss of material and cracking.

RAI 3.1.2 - 2 In Section C.2.2.5 of the LRA, the applicant states that the closed cooling water chemistry control has become very complex over the years. The applicant further states that the program has grown to include 11 systems and 14 different analyses (plus coupons on RBCCW). The applicant notes that pH is monitored, corrosion coupons are used, and levels of detrimental impurities and microbiological impurities are monitored and trended. Provide a comprehensive list of the specific chemistry control parameters for the in-scope piping and components that are inspected or monitored.

RAI 3.1.2 - 3 Discuss the bases for the techniques used to measure the parameters discussed in RAI 3.1.2-2 (e.g., EPRI guidelines, and ASTM procedures).

RAI 3.1.2 - 4 To ensure that aging effects are identified before there is a loss of intended function, the staff relies on an adequate program scope, appropriate monitoring of parameters, and appropriate frequency intervals. The applicant did not state the frequency of closed cooling water sampling in Appendix A, Section 1.2.2, of the LRA, other than to state that the “sampling, operational guidelines, type of treatment, and frequency of analysis are determined by the prevailing fluid conditions.” State the frequency of sampling. If the sampling is not as frequent as recommended by the most recent EPRI closed cooling water chemistry guidelines, discuss why the sampling frequency is appropriate.

RAI 3.1.2 - 5 Monitoring and trending provide important information about how a system is performing relative to acceptance criteria. Proactive monitoring and understanding of trending behavior may allow corrective actions to be taken prior to exceeding acceptance criteria. Monitoring and trending of water chemistry parameters are also consistent with EPRI guidelines. The applicant stated in Appendix A, Section 1.2.1 that “[d]ata are reviewed, and trend analysis is performed.” Provide the staff with a discussion of how the closed cooling water chemistry parameters are monitored and trended over time.

Also, the applicant states in Table C.2.2.5-1 of the LRA, that monitoring and trending is not necessary due to chemistry controls. In C.2.2.5.1, under the “Closed Cooling Water Chemistry Control” description, the applicant states that “levels of detrimental impurities and microbiological organisms are monitored and trended.” Resolve this apparent inconsistency.

RAI 3.1.2 - 6 Acceptance criteria is a necessary element to any AMP. The applicant did not provide the acceptance criteria for this program other than to state in Section A.1.2.3 that the ". . . framework for CCW chemistry control at the Hatch plant is based upon the guidance provided in the EPRI closed cooling water chemistry guidelines. Acceptance criteria contained therein are reflected in plant procedures." Provide the staff with the acceptance criteria for each parameter monitored. If the acceptance criteria is not as conservative as the most recent EPRI closed cooling water chemistry guidelines, provide the basis for the acceptability of the acceptance criteria.

Also, the applicant states in C.2.2.5 of the LRA, that the acceptance criteria are tied to loss of material rather than chemistry controls. The applicant states in Section A.1.2 that the acceptance criteria for CCW chemistry is in plant procedures. Resolve this apparent inconsistency.

RAI 3.1.2 - 7 Operating experience provides the staff additional information about the acceptability of an AMP. The application stated in Section C.2.2.5, of the LRA, that "[s]ignificant changes in the sampling and analysis program have been made, based on internally identified deficiencies." The application further states that "[t]he closed cooling water chemistry program has extensive operating history demonstrating quality improvements made based on past problems. The Hatch chemistry program descriptions contain a discussion of this history." The staff has not been able to identify the location of the Hatch chemistry program in the application. Discuss prior chemistry control problems, recent chemistry excursions, and typical responses to such events. Relate the operating experience discussed generically in the relevant commodity groups (e.g., C.2.2.5.1, C.2.2.5.2, and C.2.2.5.3) to the closed cooling water chemistry control program.

<u>Diesel Fuel Oil Testing</u>

RAI 3.1.3 - 1 The diesel fuel oil testing program includes activities to mitigate the loss of material from diesel fuel oil storage and transfer components that could result from intrusion of water or other contaminants. The LRA states that the fire pump fuel oil storage tank and the emergency diesel generator fuel oil storage and day tanks are regularly checked for water and other contaminants in accordance with the Fire Hazards Analysis (FHA) and TS, respectively. Accumulated water is removed and fuel oil chemistry is adjusted when needed. Although these activities will result in managing aging effects, some loss of material may be expected. Indicate how the loss of material, which could potentially lead to leakage, will be detected during the period of extended operation.

RAI 3.1.3 - 2 Explain why in Section C.2.3.2, of the LRA, flow blockage due to sediment buildup in the copper tubing of the supply lines to the fire protection pump diesel engine, was not identified as an aging effect, when in Section C.1.2.5.3, it is specified as an aging effect for the systems exposed to fuel oil.

RAI 3.1.3 - 3 In Section A.1.3.1, of the LRA, the applicant states that the total particulate concentration in diesel fuel oil is within acceptable limits. Specify those "acceptable limits."

RAI 3.1.3 - 4 In Section A.1.3.3, of the LRA, several documents containing acceptance criteria are referenced, but a list of the specific criteria was not provided. List all the acceptance criteria which are specifically applicable to this AMP.

Plant Service Water and Residual Heat Removal (RHR) Service Water Chemistry Control

RAI 3.1.4 - 1 In Section A.1.4 of the LRA, the applicant states that the plant service water and residual heat removal service water chemistry control program is designed to mitigate age-related degradation in system piping and components by controlling water composition. The applicant states that the chemical additions are intended to manage MIC and microorganism intrusion. Are the other aging effects listed (e.g., loss of material due to crevice corrosion, pitting, etc.) managed by chemical additions or analysis? Discuss how monitoring the parameters chosen mitigates loss of material and cracking.

RAI 3.1.4 - 2 In Section A.1.4 of the LRA, the applicant states that the service water is treated with sodium hypochlorite and sodium bromide. In section C.2.2.6.1, the applicant states that these additions are to minimize microbiologically influenced corrosion and macroorganism intrusion within service water systems. The applicant also states that discharged measurable chlorine, free available oxidant, and total residual oxidant levels are governed by the Hatch National Pollutant Discharge Elimination System (NPDES) permit. Clarify that the sole chemistry control parameters for the piping and components that are inspected or monitored are discharged measurable chlorine, free available oxidant, and total residual oxidant levels.

RAI 3.1.4 - 3 Discuss the bases for the techniques used to measure the parameters chosen for inspection and monitoring (e.g., EPRI guidelines, ASTM procedures, etc.).

RAI 3.1.4 - 4 The plant service water and RHR service water chemistry control program is intended to mitigate aging in system piping and components by controlling fluid composition through treatment with sodium hypochlorite and sodium bromide. The description of this program is provided in A.1.4 of the application. Discuss the criteria used to determine the duration of the chemical treatment and the criteria used to adjust the frequency of treatment.

RAI 3.1.4 - 5 To ensure that aging effects are identified before there is a loss of intended function, the staff relies on an adequate program scope, appropriate monitoring of parameters, and appropriate frequency interval. The applicant included a section titled "Sample Size and Frequency" in Section A.1.4, of the LRA. Contrary to the title of the section, there is no discussion of sample sizes or how often the service water is sampled. Instead, there is a discussion of how the water is treated (with chlorination and bromination) and the duration of treatment.

Provide details on how the samples, sample size and sampling frequency are determined, and how this sampling program mitigates the aging effects listed.

RAI 3.1.4 - 6 Monitoring and trending provide important information about how a system is performing relative to acceptance criteria. Proactive monitoring and understanding of trending behavior may allow corrective actions to be taken prior to exceeding acceptance criteria. The only discussion provided on monitoring and trending is in terms of loss of material from inspections, not in terms of water chemistry parameters. Discuss how the closed cooling water chemistry parameters are monitored and trended over time.

RAI 3.1.4 - 7 Acceptance criteria are a necessary element to any AMP. The applicant states in Section A.1.4.3, of the LRA, that the acceptance criteria provided for this program are tied to the National Pollutant Discharge Elimination System (NPDES), rather than to managing aging effects. What are the chemistry acceptance criteria?

RAI 3.1.4 - 8 Operating experience provides the staff additional information about the acceptability of an AMP. The application discusses the applicant's response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." Discuss chemistry control problems, recent chemistry excursions, and typical responses to such events since the program improvements cited in the application's review of operating experience. Relate the operating experience discussed generically in the relevant commodity groups (e.g., C.2.2.6.1, C.2.2.6.2, and C.2.2.6.3) to the plant service water and RHR service water chemistry control program.

<u>Fuel Pool Chemistry Control</u>

RAI 3.1.5 - 1 Several other systems with aluminum components are listed as part of the commodity group for aluminum. These systems include the reactor building, tornado relief vents, yard structures, and control building. The loss of material aging effect and its corresponding AMP of fuel pool chemistry control refers only to aluminum components exposed to the spent fuel pool demineralized water. Clarify how the aging effects of aluminum components in the reactor building, tornado relief vents, yard structures, and control building are managed by the fuel pool chemistry control activities.

RAI 3.1.5 - 2 Fuel pool chemistry control is designed to mitigate and prevent age-related degradation by controlling fluid purity and composition. The application further states that the program accomplishes timely monitoring and goal setting for degradation. The staff finds that the control of impurities in the fuel pool demineralized water can mitigate and prevent age-related degradation. Clarify what specific actions are taken to manage the loss of material due to component exposure to the spent fuel pool demineralized water.

RAI 3.1.5 - 3 The application states that detection of aging effects is not required due to chemistry controls. However, chemical impurities in the fuel pool water may be

indicative of a loss of material or may contribute to the loss of material. Clarify how the loss of material aging effect is detected and/or controlled.

RAI 3.1.5 - 4 The application states that monitoring and trending and parameters inspected or monitored are not required due to chemistry controls. However, the fuel pool chemistry control activities imply that actions are taken to prevent exceeding chemistry parameters. In addition, chemical impurities in the fuel pool water may be indicative of a loss of material or may contribute to the loss of material. Through the monitoring and trending of chemistry parameters, actions to control or detect the loss of material is achieved. In addition, the statement that monitoring and trending is not required due to chemistry controls contradicts Section A.1.5.2 of the LRA; this section states that fuel pool water is sampled regularly for conductivity, pH, chlorides and sulfates, filterable solids and total organic carbons. Clarify what chemical parameters are inspected or monitored in the fuel pool chemistry control activities and how the parameters are monitored and trended to detect and control the loss of material exposed to the spent fuel pool water.

RAI 3.1.5 - 5 The application states that detailed acceptance criteria is provided in the fuel pool chemistry control activities. Specify the acceptance criteria and the basis for such criteria.

RAI 3.1.5 - 6 The application states that the corrective actions program provides for evaluation of aging effects and significant operating events, and requires that reasonable actions be taken to enhance programs and activities to prevent future occurrences. However, the application did not provide any specific examples of the application of fuel pool chemistry control activities. Provide additional information regarding the use of the fuel pool chemistry control activities.

<u>Demineralized Water and Condensate Storage Tank Chemistry Control</u>

RAI 3.1.6 - 1 With respect to the demineralized water and condensate storage tank chemistry control AMP described in Section A.1.6 of the LRA, provide the following information:

a. The program refers to ‘contaminants’ as monitored parameters but does not identify them (e.g., sodium chloride). Identify the contaminants referred to in the program description. In addition, discuss what, if any, potential impact these contaminants could have on the aging effects specified in Section C.2.2.4, as well as the structural integrity of the phenolic resin liner mentioned in Section C.2.2.4.1. If applicable, describe how the aging effects, due to the presence of each contaminant, are managed during the period of extended operation.

b. The program does not clearly describe the activities for prevention and mitigation of the aging effects. For example, the program states that “the demineralized water storage tank influent and effluent are monitored.” Provide details on how the samples, sample size and sampling frequency

are determined. In addition, what methods are employed to quantitatively and qualitatively analyze the results? Provide examples of the types of chemical modifications used, specifically, for a borated water environment. The program also lists the monitoring parameters (e.g., conductivity, pH, silica, chloride, sulfate and total organic carbon). Discuss the allowable values and/or ranges for each parameter as it applies to the borated water environment presented in Section C.2.2.4 of the LRA. Address the potential impact each parameter may have on the aging effects specified in Section C.2.2.4 of the LRA and describe how the aging effects due to a non-allowable monitoring parameter is managed during the period of extended operation.

c. Describe the program using the relevant ten elements for an AMP from the draft standard review plan, in sufficient detail, to allow the staff to evaluate the program's adequacy.

Suppression Pool Chemistry Control

RAI 3.1.7 - 1 The applicant stated in Section A.1.7 of the LRA, that the scope of the suppression pool chemistry control program includes components within the RHR system, core spray system, high pressure coolant injection system, reactor core isolation cooling system, and a portion of the safety relief valve tailpipes. The applicant stated that the program also includes the suppression chamber shell, vent header, deflectors and supports, downcomers and braces, and suppression chamber interior platform support. The staff cannot identify from the application the systems which contain the safety relief valve tailpipes, suppression chamber shell, vent header, deflectors and supports, downcomers and braces, and suppression chamber interior platform support. Provide this information.

RAI 3.1.7 - 2 Based on the tables in Section 3.2 of the LRA and the commodity group discussions, the staff considers the nuclear boiler system, primary containment, and the primary containment purge and inerting system to be included within the scope of the suppression pool chemistry control program. However, the applicant did not identify these systems as being within scope of this program in Section A.1.7, of the LRA. Clarify the scope of the suppression pool chemistry control program to resolve this inconsistency.

RAI 3.1.7 - 3 The applicant monitors conductivity, chlorides, sulfates, zinc, and total organic carbons as part of the suppression pool chemistry control program. Discuss why each of these parameters is monitored in terms of how monitoring these parameters mitigate loss of material and cracking.

RAI 3.1.7 - 4 The applicant monitors conductivity, chlorides, sulfates, zinc, and total organic carbons as part of the suppression pool chemistry control program. Discuss the techniques used to measure these parameters (e.g., EPRI BWR water chemistry guidelines, and ASTM procedures).

RAI 3.1.7 - 5 The applicant did not state the frequency of the suppression pool water sampling, other than to state that the "sample frequencies. . .are based upon the applicable portions of the EPRI guidelines or other updated industry guidance." State the frequency of sampling. If the sampling is not as frequent as recommended by the most recent EPRI BWR water chemistry guidelines, discuss why the sampling frequency is appropriate.

RAI 3.1.7 - 6 Monitoring and trending provide important information about how a system is performing relative to acceptance criteria. Proactive monitoring and understanding of trending behavior may allow corrective actions to be taken prior to exceeding the acceptance criteria. Monitoring and trending of water chemistry parameters are also consistent with EPRI BWR Water Chemistry Guidelines. The application did not state that any monitoring and trending of the chemistry parameters discussed above takes place. Provide a discussion of how the suppression pool chemistry parameters are monitored and trended over time. If no monitoring and trending is conducted, discuss why this aspect of an AMP is not needed.

RAI 3.1.7 - 7 Acceptance criteria are a necessary element to any AMP. The applicant did not provide the acceptance criteria for the suppression pool chemistry control program other than to state that the "acceptance criteria. . .are based upon EPRI guidelines or other updated industry guidance. . ." Provide the acceptance criteria for each parameter monitored. If the acceptance criteria are not as conservative as the most recent EPRI BWR water chemistry guidelines, provide the basis for the acceptability of the acceptance criteria.

RAI 3.1.7 - 8 Operating experience provides additional information about the acceptability of an AMP. The application did not provide operating experience relative to the suppression pool chemistry control program. Discuss prior chemistry control problems, recent chemistry excursions, and typical responses to such events. Relate the operating experience discussed generically in the relevant commodity groups (e.g., C.2.2.3, C.2.6.2, and C.2.2.11) to the suppression pool chemistry control program. Finally, discuss your plant-specific experience with MIC and how your chemistry control program addresses the potential for MIC to occur.

RAI 3.1.7 - 9 Discuss how excessive sedimentation of coating materials (for example, as discussed in IN 88-82, "Torus Shells with Corrosion and Degradation Coatings in BWR Containments") affects the chemistry control test results. Discuss how your sampling techniques and/or test methods avoid potential contamination of the samples by excessive debris in the torus.

RAI 3.1.7 - 10 The results of various inspection programs may be directly relevant to the chemistry control program. Discuss how you incorporate the results of the torus submerged components inspection program, the galvanic susceptibility inspection program, the treated water systems piping inspections, the RHR heat exchanger testing and inspection program, and the inservice inspection (ISI) program into your suppression pool chemistry control program.

Corrective Actions Program

RAI - 3.1.8 - 1 Appendix A, “Final Safety Analysis Report Supplement,” Section A.1.8, “Corrective Action Program” (CAP), provides a brief description of the CAP and states that the CAP applies to all systems, structures, and components within the scope of license renewal. The CAP is also described as part of the applicant’s Quality Assurance Program as required by 10 CFR Part 50 Appendix B.

Section C.2 of Appendix C to the LRA provides an AMR summary for each unique structure, component, or commodity group at Hatch determined to require aging management during the period of extended operation. This summary includes identification of aging effects requiring management, aging management programs utilized to manage these aging effects, and a demonstration as to how the identified aging management programs manage aging effects requiring management using attribute tables. The attributes identified for each AMR appear to be consistent with those attributes described in Section A.1, “Aging Management Review - Generic,” Table A.1-1, “Elements of an Aging Management Program for License Renewal,” of the NRC’s Draft Standard Review Plan for License Renewal (DSRP-LR). However, the Hatch LRA does not appear to provide a description of each of these attributes. Please provide a description of each of the 10 attributes identified within the AMR tables. This RAI 3.1.8-1.

RAI - 3.1.8 - 2 Section A.2, “Quality Assurance for Aging Management,” of the DSRP-LR, requires a license renewal applicant to demonstrate that the effects of aging on structures and components subject to an aging management review will be adequately managed to ensure that their intended functions will be maintained consistent with the current licensing basis of the facility for the period of extended operation. Consistent with this approach, the applicant’s aging management programs should contain the elements of corrective action, confirmation process, and administrative controls in order to ensure proper management of the aging programs.

Section C.2 of Appendix C provides an aging management summary for each unique structure, component, or commodity group at Hatch determined to require aging management during the period of extended operation. For the majority of these AMR’s three attributes (Corrective Actions, Confirmation Process, and Administrative Controls) are specifically addressed by reference to the applicant’s CAP. However, Appendix A, Section A.1.8, does not appear to provide a description of how the CAP program specifically addresses those three attributes for which credit is being sought. Therefore, the applicant is requested to provide a description of how the CAP program specifically addresses those three attributes for the aging management programs at Hatch during the period of extended operation.

Inservice Inspection Program

RAI 3.1.9 - 1 Section A.1.9 of the LRA discusses the three types of visual examinations defined in ASME Section XI (IWA-2210) used by Hatch in conducting such exams. However, the submittal does not discuss the inspection requirements of BWRVIP-03, “BWR Reactor Pressure Vessel and Internals Examination Guidelines,” which is given as a general reference. Since Hatch has committed to follow the BWRVIP program, which utilizes the standards listed in the BWRVIP-03 guidelines, discuss how the Hatch ISI applies these standards in performing inspections, especially of the BWR vessel and internal components referenced in Section A.1.15 and Tables C.2.1.1-1 and C.2.1.1-5 of the LRA.

RAI 3.1.9 - 2 Section A.1.9.1 of the LRA states that “The ISI Program provides examination methods and acceptance criteria for Class 1, 2, 3 (equivalent), and Class MC pressure boundary components as well as the associated support.” Confirm that the ISI program at Hatch will include non-Class 1 components. If not, provide the bases and justification for not taking credit for the ISI program in the AMR for non-Class 1 components, such as the components in the commodity groups C.2.2.1.1 and C.2.2.1.2 made of carbon steel and stainless steel, respectively.

RAI 3.1.9 - 3 The staff notes that the referenced ISI program also includes augmented examinations that the applicant is committed to perform. The applicant identified two documents, GL-88-01, “NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping,” and NUREG-0619, “BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking,” for such examinations. The staff also notes that I&E Bulletin (IEB) 80-13, “Cracking in Core Spray Spargers,” dated May 12, 1980, requires augmented examinations of core spray internal piping and spargers in operating BWRs. This document is not identified in the ISI program. Although the inspection guidelines in IEB 80-13 have recently been replaced by those in BWRVIP-18, “Core Spray Internals Inspection and Flaw Evaluation Guidelines,” there should still be a reference to IEB 80-13 in the ISI program for the purpose of identifying the applicant’s original commitment to perform such examinations.

RAI 3.1.9 - 4 GL 88-01 provides guidelines for augmented inspections of the reactor coolant pressure boundary components that are susceptible to IGSCC. The scope of inspection covers all components made of stainless steel and nickel-based alloys (such as Alloy 600 and Alloy 182) with diameters equal to or larger than 4 inches, irrespective of Code classification, that are exposed to a service temperature above 200 °F. Discuss how this program is implemented and identify all the systems and components that are covered under this program. Provide justification for not taking inspection credit for this program in the AMR of non-Class I stainless steel components.

RAI 3.1.9 - 5 When a dissimilar metal weld is fabricated, the weld metal is different from the material of the components being joined. For example, in joining the carbon steel safe-end to the pressure vessel nozzle, usually Alloy 182 is used as a butter and weld metal. Furthermore, the staff notes that dissimilar metal welds are not considered as independent mechanical components in the tables in

Section 3.2 of the LRA, which lists all the components for the mechanical systems. Since the referenced components are made of carbon steel, they would be classified into the carbon steel commodity group. Therefore, the applicant's review process might not have identified the applicable aging effects pertaining to the IGSCC of the dissimilar metal weld and the potential aging effect of galvanic corrosion due to the coupling of different metals. Address this potential deficiency.

RAI 3.1.9 - 6 Provide a detailed description of the programs for augmented examinations that are committed to be performed. Specifically, examinations that are in addition to the ASME Code, Section XI, ISI requirements. Identify the system, components, and inspections for which credit is being taken in the AMP.

RAI 3.1.9 - 7 Provide additional information regarding operating experience pertaining to water chemistry transients due to resin intrusion, condensate leakage, or other causes. Describe the bounding water chemistry transients that have occurred in the last five years and the corrective/recovery actions taken to minimize the aging degradation of the affected components as well as to prevent recurrence.

Crane and Refueling Platform Inspections AMP

RAI 3.1.10 - 1 Loss of material has been identified as an aging effect requiring aging management for the overhead crane and refueling platform. In addition, cracking due to fatigue is a common concern, particularly at flame-cut holes in the rails. Provide clarification as to whether the Overhead Crane and Refueling Platform Inspections include the effects of fatigue on components such as the crane rails. Also, identify the components where flame cut holes exist and describe the specific inspection activities to manage fatigue cracks.

RAI 3.1.10 - 2 Fatigue damage can occur in such sub-components as wire ropes, drums, sheaves, clips, bolts, and stops. In the wire ropes the effects of the fatigue damage are cracking and breaking of the individual strands that make up the rope. Fatigue damage can also result from cyclic bending and vibrational stresses of the wire ropes. Thermal fatigue resulting in wear and mechanical degradation/distortion is a concern for carbon steel components. Describe the inspection and maintenance programs to manage these aging effects.

RAI 3.1.10 - 3 Indicate whether self-loosening of bolted connections, due to vibration, was considered as an aging effect and provide a technical justification if this aging effect was not considered.

RAI 3.1.10 - 4 Due to vibratory loading, the expansion and undercut anchors in concrete may loosen due to local degradation of the surrounding concrete. Provide a technical justification for not identifying loss of preload due to the effects of vibration on the concrete surrounding the expansion and undercut anchors.

RAI 3.1.10 - 5 Table 3.2.4-2 of the LRA states that the Refueling Equipment Assembly [F15] contains aluminum rivets for structural support. What surface does the

aluminum rivets contact? Is galvanic corrosion between the rivets and the structural steel an aging concern?

RAI 3.1.10 - 6 The overhead and refueling platform crane inspection program provides for the visual inspection and testing of the reactor overhead cranes and crane rail supports and refueling platform to assure the safe operation of the crane. The staff requests the applicant to provide operating experience relevant to the application of this aging management program. The discussion in C.2.6.3 of the license renewal application did not specifically discuss this program nor did it discuss the operating experience relative to either the crane or the refueling platform.

Torque Activities AMP

RAI 3.1.11 - 1 Torque activities are intended to mitigate loss of preload through the use of proper torque techniques at Hatch. Plant procedures provide specific instructions for maximizing the effectiveness of torque activities. Torque activities are evaluated in Section 3.1.11 of the LRA. However, loss of preload can occur regardless of applying the correct torque. Discuss how this AMP can manage loss of preload.

RAI 3.1.11-2 In previous applications for license renewal, applicants limited the yield strength on bolts to less than 150 ksi or used operating experience to prevent stress corrosion cracking in the bolts. Indicate if the yield strength in the design specs for ASME SA-193, “Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service,” (Grade B7) is limited to less than 150 ksi to avoid the possibility of stress corrosion cracking.

RAI 3.1.11 - 3 In the LRA, torque activities is identified as an AMP to manage loss of preload for bolts in many systems. However, bolts used in some structures do not appear to require torquing activities. Why are the torque activities not applied to the bolts in the primary containment, fuel storage, reactor building, turbine building, the intake structure, the yard structures, the emergency diesel generator (EDG) building, the main stack, and the control building? Are there any other systems, structures, or components where bolts are used and the torque activities are not applied?

RAI 3.1.11 - 4 Are additional actions (e.g. ISI program, system walkdowns, system leak tests) required to manage the aging of bolted connections?

RAI 3.1.11 - 5 Provide specific examples of the operating experience associated with loss of preload for bolted joints where the torque activities were applied.

Component Cyclic or Transient Limit Program AMP

RAI 3.1.12 - 1 Section A.1.12.1 of the LRA states that “the program tracks reactor coolant pressure boundary (RCPB) cyclic and transient occurrences to ensure that the

RCPB components and the torus remain within the ASME Section III fatigue limits." Provide a description of the methodology used by the Plant Hatch Component Cyclic or Transient Limit Program (CCTLP) to track RCPB cyclic and transient occurrences to ensure that RCPB components and the torus remain within the ASME Section III fatigue limits.

RAI 3.1.12 - 2 To determine that the RCPB and torus remain within the Section III fatigue limit, the fatigue calculations require the use of the ASME fatigue curves to determine the cumulative usage factor (CUF). These fatigue curves have been shown to be affected by the reactor water environment, therefore, the program may underestimate the CUF. Provide the CCTLP methodology for considering the effects of the reactor water environment on the ASME Section III fatigue curves.

RAI 3.1.12 - 3 The magnitude of the CUFs vary from location to location. Presumably, the CCTLP monitors the locations with the highest CUFs. For each unit, provide the limiting location and currently calculated fatigue CUF for the reactor pressure vessel (RPV) main closure studs, the RPV shell, the RPV recirculation inlet nozzles, and the RPV feedwater nozzles.

RAI 3.1.12 - 4 The magnitude of the CUFs vary from location to location. Presumably, the CCTLP monitors the locations with the highest CUFs. For each unit, provide the basis for establishing the limiting locations where fatigue CUFs are calculated.

RAI 3.1.12 - 5 For Unit 1, the limiting locations are the reactor vessel equalizer, core spray, standby liquid control, feedwater, HPCI, RCIC, RWCI, and main steam piping. For Unit 2, the limiting locations are the residual heat removal, feedwater, primary steam condensate drainage, and main steam piping. For each unit, the listed limiting locations for the Class 1 boundary don't add up to nine locations as stated in the LRA. Provide the missing locations and provide the basis for the difference in limiting locations between the two units.

RAI 3.1.12 - 6 Provide a discussion of the engineering evaluations that are performed to disposition the locations projected to exceed a CUF of 1.0 for the next operating cycle.

Plant Service Water and RHR Service Water Inspection Program AMP

RAI 3.1.13 - 1 In Section A.1.13.1 of the LRA, the applicant stated that the Plant Service Water (PSW) and RHR Service Water (RHRSW) Inspection Program includes inspection for the aging effect of flow blockage caused by fouling of the plant service water and RHR SW systems. Describe how the AMP detects, monitors and trends this aging effect and describe the acceptance criteria.

RAI 3.1.13 - 2 In Section A.1.13.1 of the LRA, the applicant stated that the PSW and RHRSW Inspection Program is designed to detect wall thickness degradation or fouling in the PSW and RHRSW systems. However, in Section A.1.13.4, of the LRA, the applicant also took credit for that inspection program as AMP for the aging effects of cracking and loss of heat exchanger performance. Since cracking can be caused by different mechanisms (e.g., thermal fatigue, vibration fatigue, or stress corrosion), specify the mechanism causing the cracking referenced in that section. In addition, clarify the scope and applicability of that AMP. Identify the parameters to be inspected/monitored and describe how the activities (including sampling and frequencies of the activities performed) in that AMP would detect aging effects of cracking and loss of heat exchanger performance. Also, describe the associated monitoring and trending, the acceptance criteria, as well as the operating experience with that AMP, as it applies to the applicable components for the referenced aging effects.

RAI 3.1.13 - 3 In Section A.1.13.3 of the LRA, the applicant referenced several documents containing applicable acceptance criteria, but without specifying these criteria. List all the acceptance criteria which are specifically applicable to this AMP.

RAI 3.1.13 - 4 In Sections C.2.2.6.1, C.2.2.6.2, C.2.2.6.3, and C.2.2.6.4 of the LRA, it was indicated that, in the past, "15 deficiencies on E11 and 155 deficiencies on P41 systems were found" in the plant and RHRSW systems at Hatch. A review of the industry-wide data in the Nuclear Plant Reliability Data System has indicated that similar experience was observed in other plants. However, in these plants since about 1991, there was an obvious decreasing trend of failures. Describe the trend of failures observed in the past 10 years at Hatch.

RAI 3.1.13 - 5 The inspection program description states that inspection frequencies are determined by evaluating the trends in wall thickness reduction. Discuss the size of the sample population, the criteria used to select the sample population, and the criteria used to adjust the inspection frequency and lot size.

Primary Containment Leakage Rate Testing Program

RAI 3.1.14 - 1 Page A.1-17 of the LRA states that the Primary Containment Leakage Rate Testing Program applies to all 10 CFR 50 Appendix J, Option B leakage rate testing requirements for systems, structures, and components within the scope of license renewal. Provide a discussion of the key elements of the Primary Containment Leakage Rate Testing Program and specifically describe the

implementation of regulatory positions C1 through C4 of Regulatory Guide 1.163, “Performance-Based Containment Leak-Test Program.” In addition, provide the bases for any exceptions to these regulatory positions.

RAI 3.1.14 - 2 Page A.1-17 of the LRA states, “Type A tests are performed in accordance with ANSI/ANS 56.8 1994 and/or Bechtel Topical Report BN-TOP-1 and implemented through plant procedures.” To what extent are the provisions of the above standard and report incorporated by the Type A tests performed as part of the Primary Containment Leakage Rate Testing Program?

Boiling Water Reactor Vessel and Internals Program (BWRVIP)

RAI 3.1.15 - 1 BWRVIP has submitted 12 guidelines for staff review that constitute a generic program for managing aging effects in BWRs. Of these 12, Hatch references all but 3 (i.e., BWRVIP-25, Core Plate Inspection and Flaw Evaluation Guidelines, BWRVIP-42, BWR LPCI Coupling Inspection and Flaw Evaluation Guidelines, and BWRVIP-49, Instrument Penetration Inspection and Flaw Evaluation Guidelines). Discuss the plant-specific program that Hatch will utilize to manage the age related degradation (ARD) effects of the core plate, the low pressure coolant injection coupling, and vessel instrument penetrations.

RAI 3.1.15 - 2 The Hatch submittal states that “the reactor vessel internals requiring aging management within the scope of license renewal are the shroud, shroud supports, core spray piping and spargers, control rod guide tubes, jet pump assemblies, control rod drive housings, and dry tubes. For Unit 1 only, the top guide is also included.” Discuss why the Unit 2 top guide is not within the scope of license renewal.

RAI 3.1.15 - 3 The Hatch submittal states that “the requirements of Section XI of the ASME Boiler and Pressure Vessel Code apply to attachments welded to the RPV, welded core support structures, and penetrations. In most cases, the BWRVIP Program is more comprehensive than Section XI requirements for use on BWR internals.” Identify and discuss the exceptions to the BWRVIP program that Hatch is taking with regards to this statement, if any.

RAI 3.1.15 - 4 The Hatch submittal states that “the BWRVIP Program for internals subject to license renewal as implemented at Plant Hatch employs the BWRVIP Program criteria documented in the NRC SERs, except where specific exception has been identified to the NRC.” Identify and discuss the exceptions to the BWRVIP program that Hatch is taking with regards to this statement, if any.

RAI 3.1.15 - 5 The Hatch submittal states that “cracking is the aging effect managed by the BWRVIP Program.” The BWRVIP program also discusses fatigue effects. Discuss the exceptions to the BWRVIP program that Hatch is taking with regards to fatigue, if any.

Wetted Cables Activities AMP

RAI 3.1.16-1 A phase-to-ground fault event on a 5kV cable with ethylene-propylene-insulation occurred at Davis-Besse in October of 1999. It appears that the most likely degradation mechanism is intrusion of ground water into the cable over a period of time. The staff is interested in this cable failure because there are potential generic implications for cable failures caused by aging at other nuclear power plants. This cable failure has been addressed as an emerging issue in previous license renewal reviews. Accordingly, identify the type of cable insulation and jacket material that is used for the in-scope 4kV power cables and transformer feeder cables that are subject to wetted cable conditions.

RAI 3.1.16-2 In addition to the megger and polarization index testing that is periodically performed, discuss whether Doble power factor testing and partial discharge testing will be performed on in-scope cables that have been subjected to wetted conditions in order to determine the integrity of the cable insulation.

RAI 3.1.16-3 Discuss how the wetted cable activity parameters are monitored and trended over time to assure that the cable insulation meets the acceptance criteria.

RAI 3.1.16-4 Provide the acceptance criteria and the basis for the acceptance criteria for testing that is performed as part of the wetted cables activities.

RAI 3.1.16-5 Provide a discussion of plant-specific and industry-wide experience relative to the wetted cables activities program at Hatch.

Reactor Pressure Vessel Monitoring Program

RAI 3.1.17 - 1 The LRA indicates that the Hatch RPV material surveillance program may be altered prior to operation during the renewal period. The LRA also indicates that BWRVIP is developing an Integrated Surveillance Program (ISP) and the surveillance program will be provided to the NRC for review and approval.

Address the following attributes of the RPV surveillance program for the license renewal term:

a. Capsules must be removed periodically to determine the rate of embrittlement and at least one capsule must be removed with a neutron fluence not less than once or greater than twice the peak beltline neutron fluence at the expiration of the license renewal period. Capsules must contain material to monitor the impact of irradiation on the limiting beltline materials and must contain dosimetry to monitor neutron fluence. If capsules are not being removed from Hatch during the license renewal period, the applicant must provide operating restrictions (i.e., inlet temperature, neutron spectrum and flux) to ensure that the RPV is operating within the environment of the surveillance capsules, and must provide ex-vessel dosimetry for monitoring neutron fluence.

b. Will the existing Hatch RPV material surveillance program be modified to meet the above attributes during the license renewal period? Describe

the Hatch RPV material surveillance program for the license renewal period.

c. Will Hatch be utilizing data from the BWRVIP ISP to monitor radiation embrittlement of its RPV? Does the BWRVIP plan to add any new capsules to the BWRVIP ISP? Either describe the ISP or provide a schedule for implementing the ISP at Hatch. Explain how the proposed ISP will satisfy the ISP criteria in Appendix H, 10 CFR Part 50, and the attributes discussed above.

Fire Protection Activities

RAI 3.1.18 - 1 Section A.2.1 of the LRA indicates that the AMPs for the compressed gas based fire suppression systems and fire barriers for preventing fire propagation consist of condition and performance monitoring. It does not appear to the staff that condition and performance monitoring alone are sufficient to ensure that the aging effects are adequately managed. Clarify how these programs address all of the aging effects for these two commodities and provide the bases for this conclusion or propose additional aging management programs to ensure that all of the aging effects are adequately managed.

RAI 3.1.18 - 2 Provide the specific parameters for each component that is inspected or monitored as part of the (1) water-based fire suppression system, (2) diesel fuel oil system, and (3) compressed gas fire suppression systems.

RAI 3.1.18 - 3 Discuss how the specific parameters inspected or monitored as part of the fire protection activities detect the aging effects (loss of material, cracking, flow blockage, and changes in material properties) that are managed by this AMP.

RAI 3.1.18 - 4 The description of the fire protection activities does not specify the parameters that are monitored or trended in order to provide predictability of the extent of degradation and timely corrective or mitigative actions. Discuss the technique, frequency, and sample size of the parameters that are monitored and trended within the fire protection activities AMP.

RAI 3.1.18 - 5 Specify the acceptance criteria and discuss the bases for each criteria for the parameters monitored in each fire protection system commodity group.

RAI 3.1.18 - 6 In Section C.2.3 of the LRA, several deficiencies of the compressed gas fire protection system were found related to exterior corrosion of piping components in areas of coating degradation. These deficiencies were managed under the AMP for mechanical component external surfaces. Discuss the adequacy of the fire protection activities in managing the aging effects of this system.

RAI 3.1.18 - 7 Section A.2.1 of the LRA states that the water-based fire protection header loop piping is flushed on a regular basis. However, the acceptability of the automatic wet-pipe sprinkler systems, which are located in some portions of the plant, was not discussed. Discuss the surveillance procedure and criteria that will be used

to verify that the wet-pipe sprinkler systems, which are required for compliance with 10 CFR 50.48, will remain operable throughout the period of extended operation. Furthermore, discuss the routine testing and trending of the closed sprinkler heads (wet-pipe systems) to ensure that pressure losses, resulting from aging effects, will not prevent automatic sprinkler operation.

RAI 3.1.18 - 8 Section A.2.1 of the LRA states that the fire protection activities will be enhanced to include periodic inspection of the water suppression system strainers for flow blockage and loss of material. Provide a discussion of the enhanced surveillance requirements and associated sample size and frequency.

RAI 3.1.18 - 9 Provide justification for the absence of enhanced inspection programs for other components besides the water suppression system strainers such as the sprinklers, which do not have a design life that covers the period of extended operation.

RAI 3.1.18-10 Section A.2.1 of the LRA states that the portion of the Hatch Plant fire protection activities credited for license renewal is that portion included in Appendix B of the FHA. Since Hatch's license condition allows for changes to the fire protection program without NRC approval (provided that the changes do not constitute a decrease in the level of safety), identify the passive long-lived components in the water-based and gaseous fire suppression systems. Also identify the tanks and the piping boundaries in the fire pump diesel fuel oil supply system and fire rated assemblies that are within the scope of license renewal.

<u>Flow Accelerated Corrosion Program</u>

RAI 3.1.19 - 1 Section A.2.2 of the LRA states that the Flow Accelerated Corrosion Program is designed to monitor aging effects due to loss of material caused by FAC. List the major types of components susceptible to FAC which are included in the program and specify their materials of construction and the environment to which they are exposed.

RAI 3.1.19 - 2 The Flow Accelerated Corrosion Program described in Section A.2.2 of the LRA is based on the EPRI recommendations and consists of a method for predicting material loss by the components susceptible to FAC, and of subsequent measurements, the degree of this loss by ultrasonic testing (UT), radiography (RT) or visual examination (VT). To understand the specific nature of the program, provide the following additional information:

What type of predictive methods are used for determining degraded components by FAC? Are these methods based on computer predictive codes and/or some other procedures? If an industry-wide program is used, specify the program, and if it is a plant specific methodology, give a detailed description of the program.

RAI 3.1.19 - 3 In Section A.2.2 of the LRA, it is stated that the acceptance criteria for wall thickness of the FAC affected components will be based upon the governing

code of record for the piping. Specify these codes and their applicability to other components besides piping.

RAI 3.1.19 - 4 The proposed enhancement of the Flow Accelerated Corrosion Program, described in the LRA, will include additional piping for certain systems that are already included in the current program and their examinations will be limited to plant-specific operating experience as opposed to computer modeling. Does the program include components other than piping which are found to be susceptible to FAC? Why will the computer modeling be abandoned in examining components in the enhanced program?

RAI 3.1.19 - 5 Provide a description and basis of the proposed enhanced examination methods and frequencies and compare with those in the current FAC program.

RAI 3.1.19 - 6 In Section A.2.2.5 of the LRA, the applicant states that, for Unit 2 only, portions of the radioactive decay holdup volume will be included in the enhanced FAC program. Provide the bases for including portions of the radioactive decay holdup volume (main steam and steam line drains, and condensate drains) in the Hatch Unit 2 FAC program. Also provide the bases for not including these components in the Hatch Unit 1 FAC program.

RAI 3.1.19 - 7 Since the EPRI guidelines to monitor FAC are too general, the staff must review the details of the program pertaining to safety-related components to determine its adequacy and acceptability. Describe, in detail, how the FAC program applies to the safety-related components that are susceptible to erosion-corrosion.

RAI 3.1.19 - 8 What is the operating experience of FAC at Hatch? Identify the components and environments where high FAC rates have been found to-date and describe, in detail, what corrective actions have been taken.

Protective Coatings Program

RAI 3.1.20 - 1 In order to evaluate the adequacy of this program, the staff requests information on the maximum interval between inspections of non-Service Level I structures and components, including buried pipe.

RAI 3.1.20 - 2 In order to evaluate the adequacy of this program, the staff requires justification for the use of only visual inspections for buried environments.

RAI 3.1.20 - 3 Please provide specific examples of loss of material that were detected using the protective coatings program. Of particular interest, what is the operating experience on buried pipe at Hatch?

Equipment and Piping Insulation Monitoring Program

RAI 3.1.21 - 1 The equipment and piping insulation monitoring program provides for inspection of the insulation for deterioration due to loss of material, cracking, and change in

material properties. The application states that the equipment and piping insulation monitoring program provides timely tests/inspections for detecting degradation. What tests and inspections are performed? What parameters are inspected or monitored? Is the insulation removed to inspect it? How is the proposed inspection able to detect cracking, intrusion of water, compaction/settling, and thermal degradation?

RAI 3.1.21 - 2 The staff requests the applicant specify/explain how the parameters inspected and monitored provide detection of the aging effects of loss of material, cracking, or change in material properties.

RAI 3.1.21 - 3 The staff requests the applicant to discuss the technique, frequency and sample size of the parameters monitored and/or trended which are credited in the equipment and piping insulation monitoring program.

RAI 3.1.21 - 4 The applicant did not specify the acceptance criteria for the parameters upon which the need for corrective actions will be evaluated. The staff requests the applicant to specify the acceptance criteria and discuss the bases for the criteria.

RAI 3.1.21 - 5 The applicant needs to provide information to demonstrate that the equipment and piping insulation monitoring program provides reasonable assurance that the aging effects will be managed such that the insulation and jacketing will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Structural Monitoring Program

RAI 3.1.22 - 1 Describe the criteria for assessing or categorizing the overall condition of the structures and components that are monitored as part of the structural monitoring program (Appendix A, Section A.2.5). Include specific examples such as indications of cracking or spalling on concrete surfaces; corrosion or excessive deflection of structural steel components; and changes in material property or cracking of sealants.

RAI 3.1.22 - 2 Proactive monitoring and understanding of trending behavior is needed to monitor structural aging to allow corrective actions to be taken prior to exceeding acceptance criteria. Describe the monitoring and trending activities that are used as part of the structural monitoring program (Appendix A, Section A.2.5) to track the extent and rate of degradation and their relationship to the acceptance criteria.

RAI 3.1.22 - 3 As a guidance document, the structural monitoring program (Appendix A, Section A.2.5) cites ACI 349.3R-96, “Evaluation of Existing Nuclear Safety-Related Concrete Structures.” In addition, the description of the acceptance criteria for the structural monitoring program (SMP) states that the framework for the SMP is consistent with industry guideline NEI 96-03 and that the NEI 96-03 guidance was conditionally accepted in Regulatory Guide 1.160. Regulatory Guide 1.160 (Revision 2), “Monitoring the Effectiveness of Maintenance at

Nuclear Power Plants," endorses NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," but not NEI 96-03, "Guideline for Monitoring the Condition of Structures at Nuclear Power Plants," since this document was never completed. Unlike the guidance provided by the documents ACI 349.3R-96 and ANSI/ASCE 11-90, "Guideline for Structural Condition Assessment of Existing Buildings," none of the other documents listed above (NUMARC 93-01, NEI 96-03, RG 1.160) provide specific and detailed acceptance criteria for the commodity groups that utilize the structural monitoring program for aging management. For each commodity group that utilizes the structural monitoring program, provide a description of the criteria that are used to (1) assess the severity of the observed degradations and (2) determine whether corrective action is necessary.

RAI 3.1.22 - 4 Since structural condition management necessarily involves "engineering judgement," provide a description of the training, technical qualifications, and practical experience of the personnel that (1) perform the structural monitoring program (Appendix A, Section A.2.5) walkdown activities for structures and components and (2) evaluate the adequacy of the walkdown procedures and interpret the walkdown findings.

RAI 3.1.22 - 5 Provide a general description of the different walkdown procedures, checklists, or inspection forms, if any, that are provided to the personnel that perform the structure and component walkdowns as part of the Structural Monitoring Program (Appendix A, Section A.2.5), as required by Quality Assurance Criteria V of 10 CFR Part 50, Appendix B.

Galvanic Susceptibility Inspections

RAI 3.1.23 - 1 Since the galvanic susceptibility inspections are one-time inspections of a given sample that are intended to provide objective evidence that the applicable aging effects are being adequately managed, provide the sample size, characteristics of the sample population, the basis for selection of the sample and the criteria for sample expansion upon discovery of the aging effects.

RAI 3.1.23 - 2 Section A.3.1.3 of the LRA states that "inspection procedures and acceptance criteria will be developed using the applicable sections of the ASME Code..." Will the procedures and acceptance criteria apply to systems and components outside of Section XI? Will the inspection procedure and the acceptance criteria use as stated "applicable sections of the ASME Code" even though the systems and components are outside the Scope of Section XI? Provide your acceptance criteria for each of these inspections including their bases to mitigate effects of aging prior to loss of intended function of the component during the renewal term.

RAI 3.1.23 - 3 Clarify whether the galvanic susceptibility inspections cover bolting in mechanical joints (non-ISI boundary) susceptible to the aging effects of loss of material and cracking.

RAI 3.1.23 - 4 Galvanic corrosion occurs when two electrically coupled metal surfaces are characterized by different corrosion potentials in an electrolyte. Section C.1.2.2.1 of the LRA states that auxiliary system water environments (which include demineralized, suppression pool, spent fuel pool, and borated waters) which contain carbon steel and aluminum alloys may be susceptible to galvanic corrosion when electrically coupled to stainless steel components. Provide the rationale for excluding galvanic susceptibility inspection of aluminum-carbon steel, galvanized steel-carbon steel, cast austenitic-carbon steel, stainless steel-carbon steel couples for components in condensate transfer and storage system.

RAI 3.1.23 - 5 Galvanic corrosion occurs when two electrically coupled metal surfaces are characterized by different corrosion potentials in an electrolyte. Section C.1.2.4.1 of the LRA states that within river and well water environments, cast irons, among other materials, are susceptible to galvanic corrosion when electrically coupled to stainless steel components. The plant service water system contains cast iron and stainless steel components. Are cast iron pump casings in raw water or treated water environments also included within the Galvanic Susceptibility Inspection AMP? If not, what AMPs are credited in managing galvanic corrosion for these materials in these environments?

Treated Water Systems Piping Inspections

RAI 3.1.24 - 1 As stated in Section C.2.2.2, of the LRA, the treated water systems piping inspection is a one-time inspection program to validate the adequacy of the demineralized water and condensate storage tank chemistry control program in mitigating the loss of material within carbon steel and stainless piping. The treated water program description in Section A.3.2, of the LRA, stated that the scope is limited to carbon and stainless steel tubing and piping, yet the applicant credits this program for managing aging effects for other components such as accumulators and valve bodies. Discuss how the scope of the program accounts for all carbon and stainless steel components exposed to a demineralized water environment.

RAI 3.1.24 - 2 The same program description states that the program will examine a population of tubing and piping in the treated water systems. Discuss the size of the sample population and discuss the criteria which will be used to select the sample population.

RAI 3.1.24 - 3 In Section C.2.2.2.1, of the LRA, the applicant credited the treated water systems piping inspections for managing erosion corrosion. Without additional information, the staff cannot support the use of a one-time inspection to manage erosion corrosion. Discuss how erosion corrosion, which in the staff's experience requires regular surveillance, can be managed by a one-time inspection. Also, clarify why Table C.2.2.2-2, under attribute #4, refers to the treated water systems piping inspections as providing for "periodic inspections of components susceptible to erosion corrosion. . ." This is not consistent with the description of the actual program in A.3.2 of the application which states that this

program is a one-time inspection used to validate the chemistry control program, not manage erosion corrosion.

RAI 3.1.24 - 4 The applicant stated that the Treated Water Systems Piping Inspections provide for condition monitoring via one-time examinations to provide evidence that existing chemistry control is managing aging in piping that is not examined under another inspection program. Specifically clarify what aging in piping, other than cracking and loss of material, is being referred to here.

RAI 3.1.24 - 5 The applicant states that inspections will be conducted using techniques that may include, but not be limited to, volumetric or destructive examination. The applicant also states that mechanical joints may be inspected using an examination method similar to that described for VT-1 in ASME Section XI, paragraph IWA-2210. Specify, for each examination method used, which parameters are examined or monitored and how the examination results will provide detection of the aging effects of cracking and loss of material. Discuss the sample size of the piping selected for each examination.

RAI 3.1.24 - 6 The applicant did not provide the acceptance criteria for the treated water systems piping inspection upon which corrective actions or sample expansion may be required if warranted by the examination results. Specify the acceptance criteria and discuss the bases for the criteria.

<u>Gas Systems Component Inspections</u>

RAI 3.1.25 - 1 Since the gas systems component inspections are one-time inspections of a given sample that are intended to provide objective evidence that the applicable aging effects are being adequately managed, provide the sample size, the basis for selection of the sample and the criteria for sample expansion upon discovery of the aging effects.

RAI 3.1.25 - 2 Section A.3.1.3 of the LRA states that “inspection procedures and acceptance criteria will be developed using the applicable sections of the ASME Code...” Will the procedures and acceptance criteria apply to systems and components outside of Section XI? Will the inspection procedure and the acceptance criteria be used as stated in “applicable sections of the ASME Code” even though the systems and components are outside the scope of Section XI? Provide your acceptance criteria for each of these inspections, including their bases to mitigate effects of aging prior to loss of intended function of the component during the renewal term.

RAI 3.1.25 - 3 Clarify whether the gas systems component inspection program covers bolting in mechanical joints (non-ISI boundary) susceptible to aging effects of loss of material and cracking.

RAI 3.1.25 - 4 The applicant identified stress corrosion cracking as an applicable aging effect for some components and systems exposed to a wetted gas environment. The

gas systems component inspection consists of a visual inspection, which the staff finds inadequate to detect stress corrosion cracking or intergranular attack. Due to their morphology, surface or volumetric inspections must be used to identify these mechanisms. Discuss the acceptability of a VT-1 inspection to detect stress corrosion cracking and intergranular attack.

Condensate Storage Tank Inspection

RAI 3.1.26 - 1 The plant condensate storage tank inspections consist of a one-time inspection of the tanks' internal surfaces to verify the adequacy of the chemical control program. The examination will focus on the standpipes and the connections between aluminum standpipes and galvanized steel flanges, since these locations would be the most susceptible to corrosion. Discuss why these locations were stated to be the most susceptible. Also, discuss how you will apply your inspection findings to other tank components.

RAI 3.1.26 - 2 Table 3.2.4–5, "Components Supporting Condensate Transfer and Storage System," of the LRA, identifies loss of material for the aluminum, galvanized and stainless steel tanks in the demineralized water environment. The loss of material due to galvanic corrosion, crevice corrosion, pitting, and microbiologically influenced corrosion is discussed in Section C.2.2.2.3, "Aging Management Review for Condensate Storage Tanks," of the LRA, and credit for Condensate Storage Tank (CST) Inspections is taken as an AMP. The CST Inspections program includes a one-time visual inspection of internal surfaces to detect the loss of material. Provide the following:

a. Describe the acceptance criteria and methodology used to analyze the results of the inspection under the CST inspection program.

b. Visual inspections may not be sensitive enough to adequately assess the condition of the CSTs. Discuss why UT was not considered, in conjunction with the visual inspection, to adequately inspect the CSTs for corrosion.

c. Discuss examples of corrective actions taken if corrosion/damage is identified.

RAI 3.1.26 - 3 Discuss how the results of the CST inspections will be used, especially with regard to the chemistry control programs.

Passive Component Inspection Activities

RAI 3.1.27 - 1 Provide the following information regarding the Passive Component Inspection Activities AMP:

a. a description of the inspection population, frequency, and sample size, including the bases for its selection,

b. a description of, and the measuring technique for, the parameters to be monitored,

c. a description of the acceptance criteria and their bases, including a methodology for analyzing the inspection results against applicable acceptance criteria, and

d. a description of how the detection of aging effects will occur before there is a loss of the component intended function.

RAI 3.1.27 - 2 The Passive Component Inspection Activities is a new aging management activity at Hatch. These inspections will collect, report, and trend age-related data. This activity will verify the effectiveness of preventive or mitigative programs and activities credited for aging management. The program description seems generic enough to be applied everywhere at Hatch, not just for managing aging of carbon steel components exposed to a wetted gas environment (see Commodity Group C.2.2.9). Discuss this program and explain the unique features that limit its application to the aging management of carbon steel components exposed to a wetted gas environment when it appears as if it should be applied generically.

RHR Heat Exchanger Augmented Inspection and Testing Program

RAI 3.1.28 - 1 In Section C.2.2.11 of the LRA, the applicant stated that visual inspections, eddy current, and leak testing would be used to monitor loss of material, loss of heat exchanger performance, and cracking. Provide a basis for the activities by correlating the inspections and testing to the aging effects they are intended to detect.

RAI 3.1.28 - 2 The applicant provided in Section A.3.6 of the LRA, parameters that would be monitored or inspected. The parameters that can be inspected by visual inspection and eddy current testing are leakage, cracking, and loss of material. To determine the adequacy of using visual inspection and eddy current testing alone for monitoring and trending, provide a basis for not including flow, pressure, and temperature differences across the heat exchanger as parameters to identify reduction of cooling capacity due to fouling and/or loss of material.

RAI 3.1.28 - 3 Discuss the bases for the techniques used to measure the parameters chosen for inspection and monitoring (e.g., EPRI guidelines, and ASTM procedures).

RAI 3.1.28 - 4 To ensure that aging effects are identified before there is a loss of intended function, the staff relies on an adequate program scope, appropriate monitoring of parameters, and appropriate frequency interval. The applicant provided in Section A.3.6, of the LRA, the following inspection intervals for some of the components: 1) visual inspection of the heat exchanger partition plates every 54 months; 2) eddy current testing on the tubes at least once during each 10-year inspection interval or whenever leaks are suspected in tubes and/or the tube

sheet; 3) visual inspection of the shell side of the tube sheets, shell internals and impingement plates once per 10-year inspection interval, where accessible; and leak testing of the tube and tube sheet leak testing whenever leaks are suspected.

To determine the adequacy of these frequencies for monitoring and trending, provide the aging effects which these inspections are intended to detect and the basis for the frequencies indicated.

RAI 3.1.28 - 5 Monitoring and trending provide important information about how a system is performing relative to acceptance criteria. Proactive monitoring and understanding of trending behavior may allow corrective actions to be taken prior to exceeding acceptance criteria. Tables C.2.2.11-1 through C.2.2.11-4 of the LRA state that the program provides for monitoring and trending of data concerning the RHR heat exchanger condition. Provide a discussion of how the parameters are monitored and trended over time.

RAI 3.1.28 - 6 Acceptance criteria is a necessary element to any AMP. The applicant states in Tables C.2.2.11-1 through C.2.2.11-4 of the LRA that the acceptance criteria for the RHR Heat Exchanger aging management is provided in the RHR Heat Exchanger Augmented Inspection and Testing Program. The applicant states in the RHR Heat Exchanger Augmented Inspection and Testing Program description in Section A.3.6 of the LRA that the acceptance criteria provided for this program will be contained in the inspection and testing procedure(s). Provide details of the acceptance criteria for the parameters that will be monitored.

RAI 3.1.28 - 7 Operating experience provides the staff additional information about the acceptability of an AMP. The staff reviewed the AMR for RHR Heat Exchangers, provided in Section C.2.2.11.1, for the review of operating experience. Although the applicant described the operating experience for a five-year period under consideration, the applicant did not identify any corrective actions in the discussion. The discussion should be supplemented with this information in order to evaluate the adequacy of the new AMP.

Torus Submerged Components Inspection Program

RAI 3.1.29 - 1 Appendix A.3.7 of the LRA states that inspections will be conducted on accessible components submerged in suppression pool water, including the emergency core cooling system pump suction strainers and the reactor core isolation cooling pump suction strainer. The submerged portions of the safety relief valve and the vacuum relief piping are also included, as is the low carbon steel non-Class 1 piping. The staff cannot identify from the application the systems that contain the (1) emergency core cooling system pump suction strainers, the (2) submerged portion of the safety relief valve and the vacuum relief piping, and (3) the low carbon steel non-Class 1 piping. Please provide this information.

RAI 3.1.29 - 2 Appendix A.3.7 of the LRA states that inspections will be conducted on accessible components submerged in suppression pool water. Confirm that the results of such inspections will be used to determine the acceptability of inaccessible components as well as components not completely submerged in the suppression pool water. If so, discuss how the results of the inspections will be applied to all Hatch components exposed to the suppression pool water environment and provide examples with technical bases that will lead to a conclusion of acceptance.

RAI 3.1.29 - 3 Based on the tables in Section 3.2 of the application and the commodity group discussions, the staff considers the (1) high pressure coolant injection system, (2) the primary containment purge and inerting system, (3) the nuclear boiler system, (4) the residual heat removal system, (5) the core spray system, and (6) the reactor core isolation coolant system to be within the scope of the Torus Submerged Components Inspection Program. However, these systems are not clearly identified as being within the scope of this AMP in Appendix A.3.7 of the application. Clarify the scope of the Torus Submerged Components Inspection Program to resolve this inconsistency.

RAI 3.1.29 - 4 From the tables in Section 3.2 and the discussion in C.2.2.3 of the LRA, there appear to be four groups of programs to manage the aging effects of components exposed to the suppression pool water environment:

a. the Suppression Pool Chemistry Control and Torus Submerged Components Inspection Program for submerged carbon or stainless steel components;

b. the Suppression Pool Chemistry Control, Galvanic Susceptibility Inspections, and Treated Water Systems Piping Inspections for carbon steel components that are NOT submerged;

c. the Suppression Pool Chemistry Control and Treated Water Systems Piping Inspections for stainless steel components that are NOT submerged;

d. the Suppression Pool Chemistry Control and RHR Heat Exchanger Augmented Inspection and Testing Program for RHR shells and tube components, structural supports, vent pipe, vent header, and down-comers (the Inservice Inspection Program is also used for one particular RHR component).

Confirm that the first group listed above (submerged carbon or stainless steel components) will be covered by the Torus Submerged Components Inspection Program and that the other three groups listed above are not submerged but exposed to the suppression pool water environment.

RAI 3.1.29 - 5 The Galvanic Susceptibility Inspection Program is cited for all non-submerged carbon steel components except for the carbon steel thermowell in the RHR

system and the carbon steel pump casings in the core spray system. Also, the Galvanic Susceptibility Inspection Program is cited for submerged carbon steel piping in the primary containment purge and inerting system. This appears to be a discrepancy. In addition, the special inspections for the RHR system, which manage aging effects caused by exposure to the suppression pool water, are not discussed in C.2.2.3. The staff requests a clarification of your approach to managing aging effects for components exposed to the suppression pool water environment as well as clarification of the discrepancies noted above.

RAI 3.1.29 - 6 Visual inspections of specific carbon and stainless steel submerged components following the guidance for VT-1 inspections in ASME Section XI (IWA-2210), or another suitable method as dictated by the component configuration, are performed as part of the Torus Submerged Components Inspection Program. The staff finds VT-1 visual inspections to be adequate for identifying loss of material. However, the staff finds that VT-1 visual inspections are not sensitive enough for detecting stress corrosion cracking (SCC). According to section C.1.2.2.2 of the application, stainless steel components in the HPCI and RCIC turbine discharge headers inside the torus may be susceptible to SCC. For this type of defect, other nondestructive examination techniques are more appropriate (e.g., enhanced VT-1 visual inspection in accordance with BWRVIP-03). Provide additional information to justify your use of a VT-1 visual inspection for the aforementioned stainless steel components susceptible to SCC or, as an alternative, provide an acceptable alternative inspection technique.

RAI 3.1.29 - 7 Discuss how IN 88-82, "Torus Shells with Corrosion and Degraded Coatings in BWR Containments," including IN 88-82, supplement 1, have been incorporated into the torus submerged components inspection program. The INs discuss how Mark I containment tori have experienced interior protective coating degradation problems (e.g., Nine Mile Point 1 torus), including sedimentation of coating material as debris covering the bottom portion of a torus that prevented adequate inspection by divers (unless divers are directed to look at the torus shell surface after removal of the debris). Provide details regarding how your underwater inspections are conducted to consider this operating experience. How does your inspection procedure provide adequate aging effects management of the bottom half of the torus shell, which may be covered by coating debris?

RAI 3.1.29 - 8 Acceptance criteria are a necessary element to any AMP. The staff requests the applicant provide the acceptance criteria for the Torus Submerged Components Inspection Program.

RAI 3.1.29 - 9 Discuss the industry experience or other inputs that led to the determination that regular, periodic inspections of the submerged components is required. That is, discuss how your plant-specific operating experience and/or your evaluation of the industry's operating experience led to the development of the Torus Submerged Components Inspection Program. Relate the operating experience discussed generically in the relevant commodity group (e.g., C.2.2.3) to the Torus Submerged Components Inspection Program and discuss why it is

acceptable to delay implementation of this program until 2014 and 2018 for Hatch Units 1 and 2, respectively.

RAI 3.1.29-10 Section 4.2.4 of the LRA addresses fatigue (both dynamic and thermal) of the torus structure and concludes that the critical event leading to fatigue of the torus is the lifting of one or more of the main steam system safety relief valves (SRV). The AMP “Component Cyclic or Transient Limit Program,” discussed in Section A.1.12 of the LRA, shows the fatigue CUF calculated for the limiting location for the torus structure on each unit. It is not clear whether the “Component Cyclic or Transient Limit Program” AMP covers the torus submerged components. Clarify this and discuss in detail how the torus submerged components and their supports will be managed for aging effects such as possible vibration cracking, bolt-loosening associated with dynamic fatigue due to SRV loading, the pressure and thermal transients within the torus pool environment, and other dynamic effects (e.g., seismic loading).

RAI 3.1.29-11 Table 3.2.1-2, which lists the components that support the Nuclear Boiler System, does not include two non-Class I piping items in the torus water environment that are covered by commodity groups C.2.2.3.1 and C.2.2.3.2 . These two commodity groups employ the Suppression Pool Chemistry Control and the Torus Submerged Components Inspection Program AMPs. Are there portions of the SRV piping that are submerged in the torus water? If so, Identify these submerged components.

RAI 3.1.29-12 Lifting of one or more of the SRVs could lead to vibratory fatigue of the torus shell and submerged components. Discuss why thermal fatigue but not vibratory fatigue is discussed as a potential aging effect for carbon steel and stainless steel components (e.g., Section C.1.2.2.2).

RAI 3.1.29-13 The application considered aging effects due to the lifting of SRVs during plant operation. The staff notes that following the lift of an SRV, steam enters the SRV discharge line, compressing the air within the line and expelling the water into the suppression pool. The steam and compressed air enters the pool in the form of high pressure bubbles. The oscillating bubbles result in a dynamic loading on the nearby submerged structures including the torus shell. This would cause the removal of protective corrosion films, coatings and the base metal as a result of the highly localized stress produced in the metal surface due to the impingement and the collapse of the vapor bubbles. However, the application does not address the aging effects associated with the suppression pool short term dynamic loading. Please discuss in detail how this aging effect can be managed. Identify AMPs that are applicable to, and systems that are affected by, the aging effects associated with the suppression pool dynamic loadings mentioned above.

Reactor Coolant System

RAI - 3.2.3.1 - 1

To determine whether the applicant has identified all applicable aging effects for the reactor assembly system, nuclear boiler system and recirculation system, the applicant is requested to provide the following:

a. The industry experience related to the aging effects for components in the reactor assembly system, nuclear boiler system, and reactor recirculation system (Hatch experience is identified, but industry experience is not identified). How does industry experience impact the aging effects and aging management program for these components?

b. According to Table 3.2.1-1, all components in the reactor assembly system, except for the shell and closure head, are subject to cracking. Closure studs and nozzles are part of the same commodity group as the shell and closure head and these components list cracking as an aging effect. Provide your basis for excluding cracking as an aging effect for these components.

c. According to Table 3.2.1-2, all components in the nuclear boiler system, except for the bolting, are subject to cracking. Provide your basis for excluding cracking as an aging effect for these materials.

d. Bolting (non-Class 1) in the nuclear boiler system and bolting in the reactor recirculation system are subject to loss of preload and loss of material. Bolting (Class 1) in the nuclear boiler system is identified as not being subject to loss of material and closure studs in the reactor assembly system are identified as not subject to loss of material or loss of preload. Explain why some bolting is subject to loss of preload and loss of material and some are not.

e. Many of the commodity groups associated with the nuclear boiling system and the recirculation system are subject to loss of material. Although the nuclear boiler system, recirculation system and reactor assembly system are in a reactor water environment, the commodity groups in the reactor assembly system are not subject to loss of material. Explain why the materials in the reactor assembly system are not subject to loss of material and materials in the nuclear boiling system and recirculation system are subject to loss of material.

RAI - 3.2.3.1 - 2

Void Swelling is not identified as an aging effect for any component in the reactor assembly system. The impact of change of dimension due to void swelling on the ability of the reactor vessel internals to perform their intended functions is of concern to the staff and has been addressed in previous applications. EPRI TR-107521, “Generic License Renewal Technical Issues Summary,” EPRI, April 1998, cites several sources with conflicting results. One source predicts swelling

as great as 14% for PWR baffle-former assemblies over a 40-year plant lifetime, whereas results from another source indicate that swelling would be less than 3% for the most highly irradiated sections of the internals at 60 years. Provide the peak neutron fluence for the reactor internals at the end of the license renewal term. Based on this neutron fluence provide data that indicates void swelling is not an aging effect during the license renewal term. If it is an aging effect, identify the aging management program that will ensure the function of the internals is not degraded (result in cracking or change in critical dimensions) during the license renewal term.

RAI - 3.2.3.2 - 1

Cast austenitic stainless steel (CASS) components in the reactor assembly system and nuclear boiling system may be subject to loss of fracture toughness due to the synergistic effects of thermal and neutron embrittlement. CASS components are susceptible to thermal embrittlement if they operate at temperatures greater than 550 ^{O}F. Appendix H to 10 CFR Part 50 indicates neutron irradiation embrittlement becomes significant at neutron fluences greater than 10^{17} n/cm^2 (E>1Mev). Identify all CASS components in the reactor assembly system and nuclear boiler system that operate at temperatures greater than 550 ^{O}F and with neutron fluence greater than 10^{17} n/cm^2 (E >1MeV). What are the aging management programs for these components that will ensure cracks in these components will not exceed the critical size resulting from the loss of fracture toughness due to the synergistic effects of thermal and neutron embrittlement?

RAI - 3.2.3.2 - 2

The industry position on CASS is described in the Electric Power Research Institute report EPRI TR-106092, "Evaluation of Thermal Aging Embrittlement for Cast Austenitic Stainless Steel Components in LWR Reactor Coolant Systems," September 1997. This report provides a methodology for determining whether CASS components are potentially susceptible to significant thermal embrittlement that could lead to loss of structural integrity if cracks were in the component. The staff review of this report is documented in a letter from C. I. Grimes (NRC) to D. J. Walters (NEI) dated May 19, 2000. This letter contains an enclosure that establishes the NRC position for inspection and analysis of CASS components.

Will all CASS components satisfy the inspection and analysis requirements specified in the enclosure to the May 19, 2000 letter. What is the proposed aging management program for components that do not satisfy the thermal embrittlement criteria and cannot demonstrate adequate flaw tolerance?

RAI - 3.2.3.2 - 3

Section C.2.1.2 of the LRA indicates irradiation assisted stress corrosion cracking occurs in stainless steel as a result of a neutron fluence exceeding 3-5 x 10^{20} n/cm^2(E>1.0Mev) and that only a small set

of near-core internals exceed the neutron fluence threshold at Hatch during the license renewal term.

a. Identify the components that exceed the neutron fluence threshold criteria. What is the peak neutron fluence at the end of the license renewal term for components that exceed the neutron fluence threshold criteria? What aging management programs are proposed for the components that exceed the neutron fluence threshold criteria?

b. What inservice examination and frequency are required to preclude cracks from exceeding their critical size during the license renewal term? Provide a fracture mechanics analysis to demonstrate that the inservice examination and frequency will be adequate for detecting critical size flaws during the license renewal term, including the effects of neutron irradiation embrittlement on the fracture toughness.

RAI - 3.2.3.2 - 4 For all components that the staff has identified as being within the scope of license renewal (i.e. vessel flange leak detection line), provide Hatch and industry experience with age-related degradation. Identify the aging management program for these components that will ensure that their function is not degraded during the license renewal term.

RAI - 3.2.3.2 - 5 Operating experience in commodity group C.2.2.1.1 indicates that several failures have been observed of piping components downstream of orifices or other pressure reduction devices within steam systems. In all cases the cause of the failure was attributed to erosion corrosion related to pressure fluctuations within the system. The applicant indicates that this experience validates the conclusion that erosion corrosion can occur in areas not identified by the FAC model.

a. Has the amount of thinning of ASME Code class 1, 2, or 3 piping been predicted by your FAC model? If so, what rate has been used in the analyses and what was the acceptance criteria? Also, how are the FAC rates predicted and how are they adjusted based on the inspection results. Identify the implementing document for your FAC program for safety systems.

b. Identify locations in the steam system that were not predicted by the model as being susceptible to FAC, but had significant reduction in wall thinning. Based on these experiences, how has the FAC model for predicting the locations most susceptible to FAC been changed? To ensure the FAC model accurately predicts the FAC rate and most susceptible locations during the license renewal term, will the FAC model be updated based on experiences during the initial operating period (40 years) and the license renewal term?

RAI - 3.2.3.2 - 6

The BWR closure studs are exposed to reactor water and a humid environment and have had stress corrosion cracking (i.e. Dresden). Studs that are removed are required by Section XI of the ASME Code to have surface examination, and studs that are not removed are required by Section XI of the ASME Code to have end-shot ultrasonic examination. Have these examinations identified the loss of material or stress corrosion cracking for the Hatch studs? What is the aging management program for these studs and how do industry experience and the results from the Section XI examinations impact their aging management program?

RAI - 3.2.3.2 - 7

GL 88-01, “NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping,” and NUREG-0313, “Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping,” Revision 2 apply to all reactor coolant pressure boundary welds with piping connections 4 inches in diameter and larger, fabricated using austenitic stainless steel or nickel base alloys (Alloy 600 or Alloy 182) and carrying primary water at temperatures above 200 ^{o}F. The Reactor Pressure Vessel Monitoring program is identified as the aging management program for the stainless steel and nickel base alloy penetrations in the reactor assembly system. This program references BWRVIP-74, “BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines,” which indicates NUREG-0313 applies to safe-end welds. Will the penetrations in the reactor assembly system be inspected to NUREG-0313?

Other systems, such as some of the ECCS systems and the reactor water clean-up system, are in part ASME Code Class 1 and are part of the reactor coolant system. Are any of these systems made of austenitic stainless steel, alloy 600 or welded with alloy 182 wire? Within which systems and commodity groups are they evaluated? Provide a list of systems covered under the scope of GL 88-01. Also, provide a list of all reactor coolant pressure boundary austenitic and nickel base alloy components that operate above 200 ^{o}F. Will all of these components be inspected to NUREG-0313?

RAI - 3.2.3.2 - 8

NRC Bulletin 88-08, “Thermal Stresses in Piping Connected to Reactor Coolant Systems,” identified cracking in an unisolable section of emergency core cooling system piping connected to the reactor coolant system. The cause of the cracking was high cycle thermal fatigue created by relatively cold water leaking through a closed valve. In addition, cracks in piping have also been attributed to vibratory fatigue and stress corrosion aging mechanisms.

Identify any ASME Code Class 1 small bore (nominal pipe size less than 4 inches) piping that could be subject to cracking from thermal fatigue, vibratory fatigue, or stress corrosion aging mechanisms. For

each of these systems, provide your basis for concluding that these systems are subject or not subject to these aging effects. Identify the aging management program that can be used to determine whether cracking has occurred in these components. Identify the nominal pipe size and type of material used in the fabrication of the piping.

Auxiliary Systems

RAI 3.4-1 The control rod drive, plant service water, reactor building closed cooling water, instrument air, primary containment chilled water, and drywell pneumatics systems each contain carbon and low alloy carbon steel bolts fabricated to the requirements of ASTM A-307 (grade B), ASME SA 194 (grade 2H), and ASME SA 193 (grade B7) and exposed to inside and/or outside environments. The applicant evaluated the aging effects for these materials and environments in Sections C.1.2.7, C.1.2.8 and C.1.2.9 of the application and identified several forms of corrosion that may result in loss of material (e.g., general corrosion, pitting, crevice corrosion). The applicant also identified loss of preload as an applicable aging effect for bolting due to various mechanisms (e.g., embedment, gasket creep, thermal effects, self loosening). The staff considers the high strength bolting materials, fabricated to ASME SA 193, grade B7 to be potentially susceptible to stress corrosion cracking (SCC). Discuss why SCC is not considered an applicable aging effect for this particular group of bolting materials.

RAI 3.4-2 The applicant relies on a one-time inspection, the treated water systems piping inspections, to manage loss of material due to erosion corrosion for carbon steel components in the control rod drive system and the emergency diesel generator system. The applicant provided a discussion of operating experience that included past failures in these systems due to erosion corrosion. The staff does not consider a one-time inspection program adequate to manage an ongoing problem with erosion corrosion. Provide additional information that justifies your use of a one-time inspection program to manage erosion corrosion for these systems. Also, clarify Table C.2.2.2-2 of the application, specifically attribute number 4, in which you state that the program provides for “periodic inspections.” This attribute is not consistent with the program description in other portions of this commodity group discussion nor is it consistent with the program description in appendix A.3.3.

RAI 3.4-3 LRA Tables 3.2.4-1, 3.2.4-12, 3.2.4-15, 3.2.4-17, 3.2.4-18, 3.2.4-19, and 3.2.4-20 identify air and carbon dioxide as environments. However, there is no specific commodity group discussion of either air or carbon dioxide in the application. Clarify the environment to which “air” and “carbon dioxide” belong.

RAI 3.4-4 Commodity group C.2.2.9 describes the AMR for a wetted gas environment. This commodity group has four subsections to address four material types:

carbon steel/cast iron, stainless steel, copper/copper alloys, and galvanized steel/aluminum.

a. In the stainless steel and copper alloy subsections, C.2.2.9.2 and C.2.2.9.3, respectively, loss of material and cracking are discussed as aging effects. However, Tables 3.2.4-1, 3.2.4-15 and 3.2.4-20 of the LRA have several stainless steel, galvanized steel, copper alloy and aluminum components that do not reflect this determination. Clarify these discrepancies.

b. In subsections C.2.2.9.1, C.2.2.9.2 and C.2.2.9.4 of the LRA, the applicant relies on the gas systems component inspections and the passive component inspection activities. Discuss why C.2.2.9.3 does not similarly refer to the passive component inspection activities to manage aging. The aging effects for this subgroup are identical to the other three subgroups.

c. The referenced AMPs in Tables 3.2.4-1, 3.2.4-6, 3.2.4-12, 3.2.4-15, 3.2.4-17, 3.2.4-19, and 3.2.4-20 of the LRA do not match the commodity group discussion for various copper alloy, stainless steel, galvanized steel, and aluminum components in Section C.2.2.9 of the LRA. Clarify these discrepancies.

RAI 3.4-5 Table 3.2.4-19 of the LRA references commodity group C.2.2.9 for the stainless steel thermowell exposed to an inside environment. This commodity group does not discuss an inside environment, and the aging effects discussed in this commodity group do not match the aging effects or AMPs discussed in the table. Clarify these discrepancies. Similarly, Table 3.2.4-20 of the LRA references C.2.2.9.4 for galvanized steel and carbon steel exposed to an inside environment. This commodity group does not discuss an inside environment, although in this case the aging effects and AMPs match those referenced in the table. There are several places in the auxiliary system discussions in Section 3.2.4 in which galvanized steel exposed to an inside or outside environment is said to suffer loss of material or cracking (e.g., Table 3.2.4-3 - insulation bolting, Table 3.2.4-18, kaowool hold down straps). However, there is no discussion of such aging effects in the application. Clarify the aging effects for galvanized steel exposed to an inside or outside environment.

RAI 3.4-6 Discuss why fouling is not considered an applicable aging effect for certain components exposed to fuel oil. Section C.1.2.5.3 states that fouling is applicable to copper tubing supply lines for the fire protection pump diesel engine but this is not in 3.2.4-18 nor is it in the commodity group discussion. Also, Information Notice 91-46, “Degradation of Emergency Diesel Generator Fuel Oil Delivery Systems,” indicates that several plants have experienced clogging of strainers with sediment and degraded fuel oil. Also, discuss why selective leaching is not considered to be an applicable aging effect for the cast iron and

copper alloy components exposed to fuel oil, given the potential exposure to water.

RAI 3.4-7 Previous license renewal applications provided one-time inspections to verify the effectiveness of their diesel fuel oil testing programs. Discuss why such a confirmatory program is not needed at Hatch.

RAI 3.4-8 Many commodity groups discuss several AMPs, but not all of these AMPs are applied similarly across the various systems that reference the commodity group. For example, in commodity group C.2.4.1 of the license renewal application, the applicant cited both the protective coatings program and fire protection activities to manage aging effects (e.g., loss of material) due to exposure of various materials to an inside environment. However, it is apparent from the system descriptions in section 3.2.4 of the license renewal application that not all systems benefit from the fire protection activities program. To aid in its review, the staff requests the applicant clarify, for commodity groups that reference more than one AMP, the differences in the application of the AMPs to the various systems referenced in the commodity group.

RAI 3.4-9 The applicant stated that selective leaching is an applicable aging effect for certain types of materials in certain environments. The applicant has not provided a specific AMP for this mechanism. Given that selective leaching may not be detectable through standard visual inspections, discuss how your various inspection programs are adequate to manage this particular aging mechanism.

RAI 3.4-10 Based on the staff's experience, degradation of piping systems (e.g., loss of integrity of bolted closures, cracking of welds and loosening of bolts) may potentially be caused by vibration (mechanical or hydrodynamic) loading. The vibration related aging effects as identified in Table 3.2.4 of the license renewal application appear to be incomplete. Respond to the following staff concerns below:

a. In Table 3.2.4, the applicant often referred to "cracking" as an aging effect. Because cracking can be caused by different mechanisms (e.g., thermal fatigue, vibration fatigue, or stress corrosion), the aging management program attributes may differ significantly. Specify the mechanism causing the cracking referenced in the table.

b. In Table 3.2.4, the applicant identified loss of preload as an aging effect for bolting in many of the auxiliary systems, including HVAC systems. In Section C.1 of the application, the applicant indicated that loss of preload included self-loosening of boltings that may be caused by vibration. However, it is not clear whether the applicant has considered cracking of piping welds and of HVAC ducting which may potentially be subjected to a high vibration environment. Clarify whether these vibration-related aging effects have been considered in the aging review for the auxiliary systems discussed in Section 3.2.4 of the license renewal application. In addition, specifically discuss why

the aging effect of self-loosening of bolted connections due to vibration is not considered for the cranes, hoists and elevators system as well as other auxiliary systems.

c. In Table 3.2.4-12, the applicant did not identify loss of preload as an aging effect for bolting in the EDG system. Since the EDG system may potentially be subjected to a high vibration environment, provide the basis for excluding loss of preload as an aging effect for bolting in that piping system. Also, clarify whether cracking of piping welds due to vibration was considered in the aging review for the EDG system, and if they were excluded, provide the basis.

RAI 3.4-11 The scoping requirements of 10 CFR 54.4(a)(2) includes all non safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs 10 CFR 54.4 (a)(1)(i), (ii), or (iii). In Section 2.1.2.5 of the license renewal application, the applicant stated that the few cases where non safety-related components could impact safety-related functions were included in the scope of license renewal in accordance with the criteria of 10CFR54.4(a)(2). Please clarify whether the scope of the auxiliary systems discussed in Section 3.2.4 of the license renewal application includes any spatially-related components and piping segments within the category of "Seismic II over I" (a non-seismic Category I system, structure, or component whose failure could cause loss of safety function of a seismic Category I system, structure, or component) piping. In addition, clarify how the AMPs for the non safety-related systems and components have been addressed. Specifically, state whether the same AMPs discussed in Table 3.2.4 of the application also apply to those "Seismic II over I" piping components.

RAI 3.4-12 This question applies to the reactor building HVAC system and the control building HVAC system. Ductwork generally includes isolators (such as flexible collars between ducts and fans, seals in dampers and doors, etc) made of elastomers, which will degrade because of relative motion between vibrating equipment, exposure to warm moist air, temperature changes, oxygen, and/or radiation. This environment may cause degradation of elastomers resulting in hardening and loss of strength. Because of the degradation of isolators, vibration and subsequent dynamic loads applied to the ductwork and fasteners cannot be eliminated. Provide the technical justification for not considering degradation of the isolators as an applicable aging effect.

Control Rod Drive System (CRD)

RAI 3.4-CRD-1 The control rod drive system contains valve bodies fabricated from copper alloys and exposed to an air environment. The applicant assumed the air contains sufficient entrained moisture and oxygen to enable pooling of liquid at low or especially cool locations and promote corrosion. The applicant evaluated this material and environment in Section C.1.2.6 of the application and identified several forms of corrosion that may result in loss of material (e.g., galvanic corrosion,

pitting, crevice corrosion, microbiologically influenced corrosion (MIC), and selective leaching). However, in Table 3.2.4-1 of the application, the applicant identified only cracking due to thermal fatigue as an applicable aging effect. Discuss why loss of material is not an applicable aging effect for copper alloys exposed to a humid air environment.

RAI 3.4-CRD-2 The applicant's gas systems component inspections program consists of one-time inspections of several gas systems within the scope of license renewal to provide evidence that the aging effects predicted for systems with gases as internal environments are being adequately managed. The applicant credits this program for aging effects of copper alloy valve bodies. Clarify whether these particular components fall within the scope of this AMP. The staff notes also that no AMPs were identified for copper valve bodies in Table 3.2.4-1 of the application, although the associated commodity group C.2.2.9.3 references this program. Resolve this discrepancy.

Refueling Equipment System (RE)

RAI 3.4-RE-1 The refueling equipment system has bolting components yet the applicant did not identify loss of preload as an applicable aging effect for this system and these components. Discuss why loss of preload is not an applicable aging effect for this particular system.

RAI 3.4-RE-2 The discussion in C.2.6.3 of the application states that the structural monitoring program will be applied to the refueling equipment system, yet the applicant does not credit this program in Table 3.2.4-2 of the application. Resolve this discrepancy.

RAI 3.4-RE-3 Provide the commodity group reference for the aluminum rivets in Table 3.2.4-2 of the application.

Insulation System (IN)

RAI 3.4-IN-1 Table 3.2.4-3 of the application describes three aging effects for stainless steel insulation jacketing exposed to an inside environment: loss of material, cracking and change in material properties. The associated commodity group, C.2.4.4.2 discusses only loss of material and cracking. Clarify this discrepancy.

Condensate Transfer and Storage System (COND)

RAI 3.4-COND-1 The applicant discussed the aging effects associated with various materials exposed to a demineralized water environment in section C.1.2.2 of the application. The applicant identified cracking due to thermal fatigue as an aging effect. However, the applicant did not include cracking due to thermal fatigue as an aging effect for the condensate transfer and storage tanks. Neither Table 3.2.4-5 nor

commodity group C.2.2.2.3 includes cracking due to thermal fatigue as an aging effect. Clarify this discrepancy.

Sampling System (SS)

RAI 3.4-SS-1 Discuss why the passive component inspection activities are not credited for the stainless steel components in Table 3.2.4-6 when it is credited in the associated commodity group C.2.2.9.2 of the license renewal application.

Plant Service Water System (PSW)

RAI 3.4-PSW-1 The plant service water (PSW) and residual heat removal service water inspection program is a condition monitoring program designed to detect wall thickness degradation or fouling in the PSW system. The description of this inspection program is provided in A.1.13 of the application. It is not clear from this description that all of the mechanical components in the system which credits this inspection program are within the scope of the inspection program. Confirm that the following PSW system mechanical components are included within the scope of this inspection program: flexible connector, pump bowl assembly, pump discharge column and head, restricting orifices, sight glass bodies, strainers, strainer baskets, thermowells, valve bodies, and venturi.

RAI 3.4-PSW-2 In commodity group C.2.2.6.3 of the application, the applicant credits the PSW and residual heat removal system inspection program for managing the aging effects on copper alloys in the river water environment. However, Table 3.2.4-7 of the LRA does not list this inspection program as an AMP for copper alloy valve bodies. Resolve this discrepancy.

RAI 3.4-PSW-3 The structural monitoring program provides condition monitoring and appraisal of certain important structures and structural components. The description of this inspection program is provided in A.2.5 of the application. It is not clear from this description that all of the mechanical components in the PSW system which credits this monitoring program are within the scope of the inspection program. Clarify whether the aging effects of the following PSW mechanical components are managed by the structural monitoring program: flexible connector, piping, pump bowl assembly, pump discharge column and head, restricting orifices, sight glass bodies, strainers, strainer baskets, and venturi.

RAI 3.4-PSW-4 The aging effects of PSW carbon steel components in the river water environment is further managed by galvanic susceptibility inspections. Section A.3.1 of the application describes this inspection program as a condition monitoring program. This monitoring program is a one-time inspection which will provide objective evidence that galvanic

susceptibility is being managed for specific components within the scope of license renewal. However, in Table C.2.2.6-1 of the LRA, this program is said to provide for periodic inspections of carbon steel components. Resolve this discrepancy.

RAI 3.4-PSW-5 In Section C.2.2.6.1 of the LRA, the applicant credits the galvanic susceptibility inspection program to manage the aging effects of carbon steel components in the river water environment. The carbon steel components crediting this program include valve bodies, strainer bodies, sight glass bodies, thermowells, pump discharge columns and pump discharge heads. However, Table 3.2.4-7 of the LRA does not list this inspection program as an AMP for these plant service water carbon steel components. Resolve this discrepancy.

RAI 3.4-PSW-6 For the PSW system, the applicant refers to commodity group C.2.2.6 for discussion of the aging effects and AMPs. For all four subgroups in this commodity group, the applicant references the PSW and residual heat removal service water inspection program, the PSW and residual heat removal service water chemistry control program, and the structural monitoring program to manage these aging effects. In addition, the galvanic susceptibility inspection was a fourth program for carbon steel components exposed to raw water. However, in Table 3.2.4-7, the applicant does not consistently refer to these programs. For example, the carbon steel pump discharge column, pump discharge head, sight glass body, strainer, and thermowell, do not reference the galvanic susceptibility inspections. The applicant takes credit for these inspections in the commodity group discussion. Clarify these discrepancies. Also, the structural monitoring program also appears to be inconsistently applied. Clarify the scope of this program and how it interfaces/overlaps/complements the PSW and residual heat removal service water inspections.

Instrument Air System (IA)

RAI 3.4-IA-1 The description of the instrument air system in section 2.3.4.9 of the application is confusing. The applicant discusses instrument air, drywell pneumatic system and the compressed air system. Clarify the scope of these three systems and clarify the specific scope of the instrument air system.

Drywell Pneumatics System (DPS)

RAI 3.4-DPS-1 The drywell pneumatics system supplies the motive gas to various equipment inside the drywell. Section 2.3.4.11 of the application provides the description of this system and states the following: "A major portion of the drywell pneumatic system is primarily obsolete and not currently used. The control air is supplied from the nitrogen makeup system or instrument air. The system components still exist . . . but are isolated by valve alignment or the lines are physically cut and capped." Based on this description, it is not clear to the staff which components are supplied the control air from the nitrogen makeup system or instrument air. Resolve this discrepancy and provide the basis for supplying control air to an obsolete portion of this system whose lines are physically either cut or capped.

Cranes, Hoists and Elevators Systems (CHE)

RAI 3.4-CHE-1 Expansion and undercut anchors in concrete may become loose due to local degradation of the surrounding concrete as a result of vibratory loads. Provide the technical justification for not identifying loss of preload due to the effects of vibration on concrete surrounding expansion and undercut anchors.

Reactor Building HVAC System (RBHVAC)

RAI 3.4-RBHVAC-1 Section A.3.3 of the license renewal application, "Gas Systems Component Inspections" states that the sample population for this AMP will include gas bearing piping and ductwork. Does the sample population of ductwork in this AMP include the galvanized steel ductwork in the reactor building HVAC system?

Traveling Water Screens/Trash Racks System (TSR)

RAI 3.4-TSR-1 To manage corrosion-induced aging effects for the carbon steel traveling screens submerged in raw water, the applicant relies on the structural monitoring program, as identified in Table 3.2.4-16 of the LRA. The applicant references commodity group C.2.6.3 for this component. This commodity group states that the protective coatings program is also applicable. Discuss why this system does not rely on a preventative measure such as protective coatings for the carbon

steel traveling screen. This response should also clarify the discrepancy between Table 3.2.4-16 and commodity group C.2.6.3

RAI 3.4-TSR-2 For the traveling water screens/trash rack system, flow blockage is not an applicable aging effect as shown in Table 3.2.4-16 for most of the components. This is consistent with the commodity group discussion in C.2.6.3 but it is not consistent with the aging effects in other raw water systems such as the PSW system. Discuss why flow blockage is not an applicable aging effect for this system.

Fire Protection System (FPS)

RAI 3.4-FPS-1 In Table 3.2.4-18 of the LRA, the applicant did not identify any aging effects for fire doors constructed from galvanized steel. Staff experience has been that galvanized steel can experience loss of material even under relatively benign conditions. Discuss your experience at Hatch with galvanized steel components. Justify your conclusion that loss of material is not an applicable aging effect for galvanized steel components.

RAI 3.4-FPS-2 The fire protection system has various components constructed from cast iron, aluminum, carbon steel, galvanized steel, copper alloy, and stainless steel exposed to raw water. The applicant evaluated the aging effects for these materials in raw water in Section C.2.3.1 of the application and identified loss of material caused by general corrosion, galvanic corrosion, crevice corrosion, pitting, and MIC; cracking caused by stress corrosion cracking, intergranular attack, and thermal fatigue; and flow blockage due to fouling as the aging effects. Clarify which materials are subject to which aging effects when exposed to raw water.

RAI 3.4-FPS-3 The fire protection system has various components constructed from cast iron, copper alloy, aluminum, carbon steel, galvanized steel, and stainless steel exposed to an air environment. The applicant evaluated the effects of aging in Sections C.2.3.1, and C.2.3.3 and identified loss of material and cracking as the aging effects for these materials in an air environment. Clarify which materials are subject to which aging effects when exposed to an air environment.

RAI 3.4-FPS-4 The fire protection system has various components constructed from carbon steel, stainless steel, copper alloy, and cast iron exposed to fuel oil. The applicant evaluated the effects of aging in section C.2.3.2 of the application, and identified cracking due to thermal fatigue, stress corrosion cracking, and intergranular attack and loss of material due to general corrosion, galvanic corrosion, pitting, crevice corrosion, and MIC. Clarify which materials are subject to which aging effects when exposed to fuel oil.

RAI 3.4-FPS-5 The fire protection system has various components constructed from carbon steel, galvanized steel, and copper alloy exposed to a carbon dioxide or dried air environment. The applicant evaluated the effects of aging in section C.2.3.3 of the application and identified loss of material due to general corrosion, galvanic corrosion, selective leaching, pitting, crevice corrosion, wear, and intrusion of waterborne agents; cracking due to thermal fatigue, stress corrosion cracking, and intergranular attack; and change in material properties due to compaction and settling, intrusion of waterborne agents, thermal effects, and material separation within thermal insulating materials. However, Table 3.2.4-18 only lists loss of material and cracking. Clarify this discrepancy.

RAI 3.4-FPS-6 Table 3.2.4-4 of the LRA states that access doors require the protective coatings program. Therefore, the staff believes that similar requirements may be needed for the carbon steel fire doors because of similarities in materials and environment. Discuss why the protective coatings program is not credited for aging management of carbon steel fire doors.

RAI 3.4-FPS-7 To manage aging effects for cast iron, copper alloy, aluminum, carbon steel, galvanized steel, and stainless steel exposed to an air environment, the applicant relies on fire protection activities and the protective coatings program. However, Table 3.2.4-18 does not describe how the protective coatings program will be used to manage these aging effects. Are these components painted/coated similar to the cast iron and carbon steel components?

RAI 3.4-FPS-8 For the fire protection system, you identified several components (e.g., nozzles, strainers, tanks) that have air as an environment. You cited in Table 3.2.4-18 of the LRA that the aging effects include flow blockage. In these instances, you also cite the commodity group as C.2.3.1. Clarify why flow blockage is a concern for components exposed to an air environment. It is not discussed in C.2.3.3. Also, clarify why you reference commodity group C.2.3.1 when this commodity group discusses water environments as opposed to C.2.3.3, which discusses gas environments.

RAI 3.4-FPS-9 Table 3.2.4-18 references commodity group C.2.3.1, “Evaluation of Water Based Fire Suppression Systems” for fusible material, bulbs and links exposed to an inside environment. However, this commodity group discusses aging effects for water and gas environments, not an inside environment. Clarify the aging effects for these materials exposed to an inside environment. Similarly, the table references commodity group C.2.3.3 for organic insulation materials. This commodity group discusses aging effects for dried or wetted gas environments, not an inside environment. Clarify the aging effects for this material exposed to an inside environment. Finally, Table 3.2.4-18 cites cracking and change in material properties as aging effects for kaowool hold down straps and references commodity group C.2.3.4.3. There is no discussion of this

material or these aging effects in this commodity group. Resolve this discrepancy.

RAI 3.4-FPS-10 Section C.1.2.6.2 of the LRA states that 140 °F is the minimum temperature needed for stress corrosion cracking to occur. Will any part of the FPS see temperatures this high? Discuss why cracking due to stress corrosion cracking or intergranular attack is a possible aging effect for water-based fire suppression systems as discussed in commodity group C.2.3.1.

RAI 3.4-FPS-11 In Table 3.2.4-18, the applicant stated that tubing fittings may be exposed to fuel oil and raw water environments and references commodity group C.2.3.1, which is a discussion of the AMR of water-based fire suppression systems. Discuss why a second commodity group, C.2.3.2 is not referenced for this component grouping and why diesel fuel oil testing is not included as an AMP for these components, consistent with other components exposed to fuel oil. For these same tubing fittings, clarify which materials are exposed to just raw water and which are exposed to just fuel oil, if such a distinction exists.

RAI 3.4-FPS-12 You identified elastomers as fire penetration seal materials in Table 3.2.4-18, “Aging Effects Requiring Management for Components Supporting Fire Protection System,” of the license renewal application. However, you did not discuss a need for an AMP for this component type in Appendix C.2.3.4.1. Provide the following information to justify the lack of an AMP for elastomers:

a. Indicate the temperature under which the cracking of elastomers due to thermal exposure is not an applicable aging effect and provide the technical bases (e.g., technical references) for the threshold values for the temperature.

a. Provide a description of the applicable site-specific operating history and include occurrences of observable seepage or leaching through concrete walls below grade, which would be indicative of degradation of waterstops, waterproofing membranes, caulking, and/or sealants.

c. Because seepage through these materials has been previously identified in other nuclear power plant structures, which is indicative of elastomer aging, provide a technical justification for not identifying aging that is applicable to elastomers.

d. If such conditions exist at Hatch, provide an AMR for the affected items or explain why such a review is not required.

RAI 3.4-FPS-13 Table 3.2.4-18 and Appendix C.2.3.4.3 of the application refer to the fire protection system. Previous applications have identified masonry block walls as fire protection barriers. However, cracking for masonry block

walls in the auxiliary building was not identified for an AMR. Provide the following information to justify not performing an AMR for the masonry block walls in the auxiliary building:

a. Identify the masonry walls and the applicable intended functions that are included within the scope of license renewal and therefore are subject to an AMR.

b. Identify any masonry walls at Plant Hatch that are included within the scope of IE Bulletin 80-11, "Masonry Wall Design" and USI A-46, "Seismic Qualification of Equipment in Operating Plants" and that are within the scope of license renewal and subject to an AMR. Provide a justification for excluding any of these walls from an AMR.

c. If Hatch does have an AMP for the auxiliary building masonry walls (although the staff could not identify such an AMP through its review of the fire protection system), describe how this program incorporates the insights provided in Information Notice (IN) 87-67, "Lesson Learned from Regional Inspection of Licensee Actions in Response to IE Bulletin 80-11".

Control Building HVAC System (CBHVAC)

RAI 3.4-CBHVAC-1 The CBHVAC system contains various components fabricated from carbon steel, fibers, nonasbestos synthetic, elastomers, aluminum, galvanized, stainless steel, and copper alloy exposed to an air environment. The applicant evaluated the aging effects for these materials and environment in sections C.2.2.9.1, C.2.2.9.2, C.2.2.9.3, C.2.2.9.4, and C.2.6.7 of the application, and identified cracking and loss of material for carbon steel, stainless steel, and galvanized steel, and material property changes for fibers, nonasbestos synthetics, and elastomers as the aging effects. The staff is not aware of any mechanism for loss of material for stainless steel in an air environment. Please discuss the identification of this aging effect.

Structures and Structural Components

RAI 3.6-1 Referring to page A.1-17, Section A.1.14, "Primary Containment Leakage Testing Program," you stated that your program applies to all 10 CFR 50 Appendix J, Option B leakage rate testing requirements for systems, structures, and components within the scope of license renewal. Provide a summary discussion of the key elements of the above testing program and describe specifically how the intent of regulatory positions C1 through C4 of Regulatory Guide 1.163,"Performance-Based Containment Leak-Test Program," are implemented in your program. If exceptions to these positions were taken by your testing program, please provide the basis for these exceptions.

RAI 3.6-2 Referring to the third paragraph in Section A.1.14.1, “Description” on page A.1-17, you stated that “Type A tests are performed in accordance with ANSI/ANS 56.8, 1994 and/or Bechtel Topical Report BN-TOP-1 and implemented through plant procedures.” Please explain the extent to which you intend to adopt the provisions of the referenced ANSI/ANS standard/report by your Type A test program. Also, clarify if the provisions that you adopted from the Bechtel Topical Report BN-TOP-1 are either equivalent to or more stringent than those corresponding provisions of ANSI/ANS 56.8-1994. If not, list those BN-TOP-1 provisions that are less stringent than those of ANSI/ANS 56.9-1994 and reconcile the differences.

RAI 3.6-3 In Section C.2.6.4, “Aging Management Review for Component Supports” of the Hatch LRA, it is stated that the SMP (A.2.5) provides for the visual inspection of component supports on a scheduled basis. However, in A.2.5, “Structural Monitoring Program,” no detailed information is provided for relevant aging effects and the corresponding management programs, for the in-scope structures and components and their supports. The staff requests the applicant to revise A.2.5 to include a discussion of the aging effects of general corrosion of structural steel, including piping supports, cable raceway supports, HVAC duct supports, and equipment supports.

RAI 3.6-4 Since the effects of loadings from rotating/reciprocating machinery may cause degradation of the steel load path and cracking of the concrete in the vicinity of the equipment anchorages, address the aging effects caused by such vibratory loading. The applicant should address the necessary criteria and attributes for an acceptable AMP for this mechanism.

RAI 3.6-5 Since the effects of loadings from seismic, hydraulic or water hammer, and thermal expansion, may cause loss of weld integrity, loosening of bolted connections, displacement or misalignment of components, and cracking of concrete, address the aging effects caused by such loadings, for hangers and supports for ASME and non-ASME piping, tubing, and ducts, listed in Table 3.3.1-1 of the application. The applicant should address the necessary criteria and attributes for an acceptable AMP.

RAI 3.6-6 The applicant identified loss of material as the aging effect for carbon steel and possibly galvanized steel in Table 3.3.1-1. It is not clear if galvanized steel is included for loss of material. Please confirm that galvanized steel is included for loss of material aging effect. If not, justify its exclusion.

RAI 3.6-7 Table 3.3.1-1, “Aging Effects Requiring Management for Components Supporting Piping Specialties Intended functions and Their Component Functions” of the Hatch LRA does not list piping insulation material as a submaterial under piping support requiring an AMR. The staff believes that insulation is within the scope of license renewal and subject to an AMR. In order for the staff to understand the basis for not including the insulation in Table 3.3.1-1, provide the following information:

a. As applicable, discuss the extent of usage of insulation materials in Hatch structures and component supports.

b. Intended function(s) associated with these insulation materials and the technical basis for its exclusion from the scope of Table 3.3.1-1

c. Discuss if the aging effects and the AMPs associated with steel component supports are applicable to the insulation materials. If so, identify the attributes monitored to detect the aging associated with the materials.

d. As applicable, discuss potential aging of steel components and their supports due to contact with these insulation materials.

e. Can application of the insulation materials reduce or compromise the effectiveness of AMPs credited with managing the aging of the insulated steel structural components (e.g., render component inaccessible for inspection)? If so, how does the credited AMP compensate for this potential concern?

RAI 3.6-8 Conduits, raceways, and trays are fabricated from either carbon steel, galvanized steel, or aluminum exposed to an inside containment environment. The applicant identified loss of material as the aging effect for carbon steel and possibly galvanized steel in Table 3.3.1-2. Please confirm that loss of material is considered as an aging effect for galvanized steel. If not, justify its exclusion.

RAI 3.6-9 Table 3.3.1-2, "Components Supporting Cable Trays and Supports" of the LRA identifies loss of material due to corrosion of carbon steel and galvanized steel. You discussed aging effects for the loss of materials in the LRA, Appendix C, Section 2.6.4, "Aging Management Review for Component Supports," and took credit for SMP and Protective Coating Program as an AMP. However, you did not identify that self-loosening of bolted connections due to vibration is an aging effect. The staff believes that expansion and undercut anchors in concrete may become loose due to local degradation of the surrounding concrete as a result of vibratory loads. Provide the technical justification for not identifying loss of pre-load due to the effects of vibration on concrete surrounding expansion and undercut anchors.

RAI 3.6-10 Table 3.3.1-3, "Aging Effects Requiring Management for Components Supporting Primary Containment Intended Functions and Their Component Functions," of the Hatch LRA, lists the in-service inspection program (ISI) as one of the programs to manage the aging effects of structural steel, steel bellows and vent pipe. Section A.1.9.3 of Appendix A discusses industry codes, standards and acceptance criteria adopted by the ISI program. Title 10 of the Code of Federal Regulations, Part 50 endorsed ASME Section XI, Subsection IWE Code with the condition that 10 CFR 50.55a(b)(2)(ix) provisions be complied with. The Hatch submittal is not clear regarding this requirement. Please confirm that your reference to the 1992 Edition of ASME Section XI, Subsection IWE Code with

the 1992 addenda, as stated in the ISI program, includes the requirements of 10 CFR 50.55a(b)(2)(ix) or justify your exclusion of the 10 CFR 50.55a requirements.

RAI 3.6-11 Section C.2.6.2, “Aging Management Review for Steel Primary Containment and Internals,” states that the Hatch ISI program provides for visual inspection of the internal and external surfaces and fasteners, thereby providing assurance that the containment shell and internal structures have not degraded due to corrosion and/or cracking. 10 CFR Part 50 endorsed ASME Section XI, Subsection IWE Code with the condition that 10 CFR 50.55a(b)(2)(ix) provisions be complied with. The Hatch submittal is not clear regarding this requirement. Confirm that both the scope and the detail of the inspection implemented in accordance with ASME Section XI Table IWE-2500-1 also complies with the requirements for 10 CFR 50.55a(b)(2)(ix). In accordance with NUREG-1611, “Aging Management of Nuclear Power Plant Containments for License Renewal,” , applicants for license renewal need to evaluate, on a case-by-case basis, the acceptability of inaccessible areas even though conditions in accessible areas may not indicate the presence of degradation to inaccessible areas. Accordingly, for the Hatch primary containment and internal structures, describe how the aging effects for inaccessible areas will be addressed.

RAI 3.6-12 Section A.1.9.4 of the LRA states that loss of material, cracking, loss of pre-load, and loss of fracture toughness are the aging effects monitored by the Hatch Inservice Inspection Program. Provide a discussion of past Hatch experience with respect to managing and monitoring these aging effects, including your experience with the embedded shell and the sand pocket regions of the Hatch primary containment and the loss of pre-load for metal fasteners.

RAI 3.6-13 Table 3.3.1-3,”Aging Effects Requiring Management for Components Supporting Primary Containment Intended Functions and their Component Functions,” does not list attachment welds to the containment shell elements as an item requiring aging management. Welds between integral attachments to the primary containment are included within the scope of ASME Section XI, Subsection IWE. As such, provide the following information:

a. The primary containment shell welds have a pressure boundary intended function as well as a structural support intended function. Discuss why the containment attachment welds were not included in Table 3.3.1-3.

b. Describe the AMP that manages the aging of attachment welds to the primary containment shell plates consistent with the 10 elements in the Standard Review Plan (SRP) in sufficient detail to allow the staff to assess the adequacy of this program to manage the applicable aging effects and compare the inspection requirements of this AMP to the requirements of ASME Section XI, Subsection IWE. In addition, if the inspection requirements of this AMP are less stringent than those of Subsection IWE, then provide a technical justification for these differences.

RAI 3.6-14 According to Table 3.3.1-3 of the LRA, the primary containment system contains various components (e.g., bolts and anchors, blind flange, containment isolation valves, miscellaneous steel) fabricated from carbon steel, possibly galvanized steel, and stainless steel exposed to torus water. From the application, it is not clear if any primary containment galvanized steel components are exposed to torus water. Please clarify whether any primary containment galvanized steel components are subject to the torus water environment and, as applicable, indicate the appropriate AMP.

RAI 3.6-15 Table 3.3.1-3, “Aging Effects Requiring Management for Components Supporting Primary Containment Intended Functions and Their Component Functions,” does not provide any information regarding the aging management, including surveillance requirements, for gears, latches, and linkages, of personnel hatches and penetrations. Identify where fretting and lockup of hinges, locks and closure mechanisms for personnel hatches is discussed in the Hatch LRA, or provide a technical justification for not considering fretting and lockup as applicable aging effects for these components. Provide a description of the AMP for the personnel hatches consistent with the 10 elements in the SRP in sufficient detail to allow the staff to assess the adequacy of this program to manage the applicable aging effects.

RAI 3.6-16 Are any elastomers used in Hatch that are within scope and subject to an AMR? If yes, discuss their applicable aging effects. Since seepage through elastomers has been previously identified in other nuclear power plant structures, which is indicative of elastomer aging, provide a description of the applicable, site-specific operating history and include any occurrences of observable seepage or leaching through concrete walls below grade, which would be indicative of degradation of water stops, waterproofing membranes, caulking, and/or sealants and, as applicable, describe the AMP for managing the aging of Hatch elastomers.

RAI 3.6-17 Section C.2.2.6.3 and Table 3.3.1-3 of the Hatch LRA are not consistent. Table 3.3.1-3 does not include flow blockage as an aging effect, while Section C.2.2.6.3 does include flow blockage. Please resolve this apparent discrepancy.

RAI 3.6-18 In Table 3.3.1-3 of the LRA, it is noted that the primary containment system contains various components (e.g., anchors and bolts, containment penetrations, miscellaneous steel) fabricated from carbon steel and possibly galvanized steel and stainless steel that are embedded. The application does not clearly indicate the materials that are embedded. Please provide such information.

RAI 3.6-19 Several items in Table 3.3.1-3 of the Hatch LRA (e.g., anchors and bolts, miscellaneous steel, steel bellows) do not include cracking as an aging effect, while Section C.2.6.2, which is referenced by these items, does include this aging effect. Please clarify the discrepancy.

RAI 3.6-20 Table 3.3.1-4, “Aging Effects Requiring Management of Components Supporting for Fuel Storage Intended Functions and Their Component Functions,” of the LRA identifies loss of material as an aging effect for the aluminum restraints in the spent fuel pool (SFP) demineralized water. You discussed the loss of material due to galvanic corrosion, crevice corrosion, pitting, and micro-biologically influenced corrosion in the LRA, Appendix C, Section 2.6.6, “Aging Management Review for Aluminum,” and took credit for Fuel Pool Chemistry Control as an AMP; however, Table 3.3.1-4 and Section 2.6.6 of Appendix C indicate that the aluminum racks do not require an AMP. Explain the discrepancy.

RAI 3.6-21 Appendix C, Section 2.6.5, “Aging Management Review for Spent Fuel Pool Liner, Components, and Racks,” of the LRA states that you regularly check SFP chemistry control activities under the Fuel Pool Chemistry Control Program. The staff assumes that the inspections would provide information related to corrosion, deposits, clarity of water, general cleanliness, appearance, and biological growth. Explain how this program manages cracking of stainless steel components (e.g., liner plate). To determine whether these inspections help to ensure that cracking does not occur, the staff needs to know whether these inspections check for cracking, the techniques used, and how many times such inspections of the spent fuel system stainless steel components have been performed to date.

RAI 3.6-22 Discuss any AMP that has been successful in ensuring the proper identification, evaluation, and repair of borated water leakage with specific experience in applying the program to the SFP carbon steel bolting and other components at Hatch. Describe the scope of this program as applied to the carbon steel bolting and external valve parts in the spent fuel system and submit information about the operating experience related to the leakage of borated water from the carbon steel bolting and external valve parts of the spent fuel system.

RAI 3.6-23 The fuel storage system contains components fabricated from carbon steel, stainless steel, aluminum, and concrete exposed to an inside environment. Table 3.3.1-4 of the LRA does not clearly identify the environments for which the listed aging effects are managed by the corresponding AMPs. Clarify the environments for which the listed aging effect occurs and the AMP that manages the aging effect.

RAI 3.6-24 According to Table 3.3.1-4, loss of material is an applicable aging effect for stainless steel components in an embedded environment. However, based on the information in the same table, there is no applicable AMP or activity. Specify the applicable AMP to manage the loss of material aging effect for stainless steel components in an embedded environment or provide the basis for concluding that an AMP is not required.

RAI 3.6-25 Bolts, which are used in safety and non-safety-related structural support, are fuel storage system components in the anchors and bolts (C.2.6.5) commodity group. Bolts are susceptible to a loss of pre-load (due to embedment, gasket creep, thermal effects, and self-loosening). Provide the basis for not including this aging effect.

RAI 3.6-26 Table 3.3.1-1 of the LRA does not list any AMPs for those components exposed to an embedded environment. Embedded components (e.g., anchorage items) are susceptible to aging. Provide the basis for not providing an AMP for components exposed to an embedded environment.

RAI 3.6-27 Table 3.3.1-5 of the LRA lists the Structural Monitoring Program and the Protective Coatings Program as the AMPs for panel joint seals and sealants; however, Section C.2.6.7 of the application lists Passive Component Inspection Activities, Structural Monitoring Program, and Gas Systems Component Inspections as the AMPs for this commodity group. Explain the discrepancy between the information provided in Table 3.3.1-5 and Commodity Group C.2.6.7.

RAI 3.6-28 In Table 3.3.1-5 of the application for Anchors and Bolts (C.2.6.3), the staff notes that Commodity Group C.2.6.3 is established for the AMR of Seismic Category I buildings and structures and select Category II buildings and structures important to the safety of Category I structures. As intended, this AMR is not specifically focused on anchors and bolts; therefore, the applicant is requested to address the loss of pre-load as a possible aging effect for the anchors and bolts, and provide the corresponding AMPs.

RAI 3.6-29 Tables 3.3.1-1 through 3.3.1-13 of the Hatch LRA omit any reference to the various aging effects for threaded fasteners such as (1) loss of material from boric acid wastage for threaded fasteners in structural connections in the vicinity of the spent fuel pool and stress corrosion cracking, and (2) inter-granular attack of stainless steel threaded fasteners in raw water. It is not clear what AMPs are intended for the management of aging effects for threaded fasteners exposed to these environments. In addition, the above-mentioned tables do not state that self-loosening of bolted connections, due to vibration, is an aging effect requiring aging management. Furthermore, expansion and undercut anchors in concrete may loosen due to local degradation of the surrounding concrete as a result of vibratory loads. Provide the following information:

a. Identify the specific AMPs that are credited for managing each of the above noted, applicable aging effects for threaded fasteners;

b. Provide a technical justification for not identifying loss of pre-load due to the effects of vibration on concrete surrounding expansion and undercut anchors.

RAI 3.6-30 Tables 3.3.1-3 through 3.3.1-5 and Tables 3.3.1-8 through 3.3.1-13 of the Hatch LRA do not list prestressed concrete structural components. Confirm that Hatch has no prestressed concrete structural elements in its structures that are within the scope of an AMR. Otherwise, list the Hatch prestressed concrete elements requiring AMR and discuss applicable AMPs for managing their aging effects.

RAI 3.6-31 Table 3.3.1-4, "Aging Effects Requiring Management for Components Supporting Fuel Storage Intended Functions and Their Component Functions," does not list cracking of spent fuel pool stainless steel liners as an aging effect under the structural steel category. Previous staff experience in this area has shown that stress corrosion cracking of stainless steel liners in a borated water environment is an aging effect requiring aging management. Justify your exclusion of this aging effect from Table 3.3.1-4 or provide a plant-specific discussion of the aging effect and the appropriate AMP for managing the cracking of spent fuel pool stainless steel liners.

RAI 3.6-32 Loss of material is listed as an aging effect for reinforced concrete components under Tables 3.3.1-3 through 3.3.1-13 (except for Tables 3.3.1-5, 3.3.1-11 and 3.3.1-13) and cracking as an additional aging effect is added for reinforced concrete components. Section C.1.4.2, "Concrete Structural Components" of the Hatch LRA only discusses loss of material due to corrosion of embedded steel and cracking in masonry block walls due to expansion or contraction. Provide an assessment regarding the applicability of the following aging effects for Hatch reinforced concrete structural components and, as applicable, describe the AMPs that are relied on to manage these aging effects:

a. Loss of material (including scaling, spalling, pitting, and erosion) from abrasion and cavitation, aggressive chemicals.

b. Cracking from elevated temperature, fatigue, freeze-thaw, reaction with aggregates, shrinkage, or settlement.

c. Cracking of equipment pad from vibratory motion or fatigue.

d. Change in material properties from aggressive chemical attack, elevated temperature (e.g., sustained exposure to temperature greater than 150 °F) irradiation embrittlement, or leaching of calcium hydroxide.

RAI 3.6-33 Tables 3.3.1-3 through 3.3.1-10, 3.3.1-12 and 3.3.1-13 list loss of material as the only aging effect for Hatch's structural steel components. Section C.1.4.1, "Structural Steel and Aluminum Components," only provides an aging effect assessment that covers loss of material and cracking. Please provide an assessment of the applicability of the following aging effects for Hatch's structural steel components and, as applicable, describe the AMPs that are relied upon to manage these aging effects:

a. Cracking of SFP liner, spent fuel rack and structural steel in the SFP.

b. Loss of material, cracking and loss of pre-tension of anchorages/embedments.

c. Loss of material of battery racks, checkered plates, expansion anchors, specialty doors, instrument line supports, instrument racks and frames and grating supports.

d. Loss of structural steel supports by corrosion exposure to boric acid wastage.

RAI 3.6-34 Does Hatch have any earthen embankments as part of its ultimate heat sink system or intake structure? As applicable, discuss the aging effects of these structures due to (a) loss of material from erosion and (b) cracking due to settlement.

RAI 3.6-35 Tables 3.3.1-1 through 3.3.1-13 of the LRA do not list fire barrier penetration seals as components requiring AMR. The staff views these fire barrier penetration seals as within scope and subject to an AMR. Describe how the aging effects for fire barrier penetration seals is evaluated and discuss the AMP used to adequately manage the effect.

RAI 3.6-36 In Sections 2.4.3 and 2.4.6 of the LRA, the drywell electrical and mechanical components are scoped as requiring AMRs. Table 7.3-1 of the Unit 1 Updated Final Safety Analysis Report (UFSAR, Rev. 17R) indicates that there are a number of penetrations (in addition to the vent line penetrations) penetrating the suppression chamber. Please provide information regarding the aging effects considered for these penetrations in both Hatch units.

RAI 3.6-37 Table 3.3.1-3 describes the intended function of all containment penetrations as a "fission product barrier." However, the main functions of these penetrations vary (i.e., personnel or equipment access, carrying steam lines or feedwater lines or electrical cables). Depending upon the function that containment penetrations perform and their location, the local environment (i.e. temperature, humidity, borated water, torus water, radiation) and loads will differ in and around these penetrations. The aging effect "loss of material" or loss of leak tightness (deterioration of the penetration seals and gaskets) will be dependent on these different environments. Please discuss these aging effects with respect to the various groups of containment penetrations subjected to similar environments.

RAI 3.6-38 Table 7.3-1 of the Unit 1 UFSAR and the description of the penetrations in Section 5.2 of the Unit 1 UFSAR indicate that there are several penetrations with bellows in addition to the bellows inside the vent pipes. Provide a discussion of the environment and aging effect considerations for these bellows including the effects of pressure and thermal movement.

RAI 3.6-39 Table 3.3.1-7 of the LRA states that the reactor building (RB) penetration function is a "fission product barrier." Hatch Unit 1 UFSAR Section 5.3.3.2 states that "penetrations of the secondary containment system are designed to have leakage characteristics consistent with secondary containment leakage requirements." If the SMP (Section A.2.5 of the LRA) is applicable to these penetrations, it is not quite clear how the leak-tightness function of the penetrations is being managed by this program. Since the leak-tightness of a number of mechanical, electrical, and access penetrations depends upon the aging effects on seals and gaskets, explain why loss of leak-tightness should not

be included in the column of "Aging Effects," in Table 3.3.1-7 of the LRA. Also, provide information as to how the leak-tight integrity of the penetrations is managed under the existing AMPs and will be managed during the period of extended operation.

RAI 3.6-40 The Protective Coatings Program (A.2.3 of the LRA) is stated as one of the two AMPs for monitoring the aging effects of RB penetrations. The enhancements section (A.2.3.5 of the LRA), which would be effective during the period of extended operation, will include the inside, outside, submerged, and buried environment for the RB penetrations. Please provide information regarding how you plan to benchmark the RB penetration protective coatings program as part of the enhanced program.

RAI 3.6-41 The ISI program description in Section A.1.9 indicates that you are using or planning to use the 1992 Edition and 1992 Addenda of Subsection IWE of Section XI of the ASME Code for inspection of the containment and its penetrations. Information Notice (IN) 88-82, "Torus Shells with Corrosion and Degraded Coatings in BWR Containments," and further staff evaluation has determined that pitting corrosion occurs due to accumulation of debris and stagnant water near certain torus penetrations. For both the units at Hatch, provide a description of your current augmented inspection program (Ref. IWE-1240) for such suspect sites, including your findings in the previous inspections, and the measures you have taken to ensure the integrity of such suspect sites against potential corrosion (i.e. loss of material) for the period of extended operation.

RAI 3.6-42 IN 92-20, "Inadequate Local Leak Rate Testing," and further staff evaluations have determined that the local leak rate testing or the general visual examination of the accessible parts of two-ply bellows does not lend itself to the detection of corrosion of the bellows. Subsection IWE does not provide any requirement or acceptance criteria, except that the bellows could be examined under augmented inspection. Describe the operating experiences related to the performance of these bellows at the two units of Hatch, the methods used to detect the potential corrosion of the bellows (including that of vent line bellows), and any corrective actions that were taken.

RAI 3.6-43 The RB penetrations carrying the high energy piping are subjected to an environment more challenging than the other RB penetrations. Also, the access penetrations through the reactor building walls are subjected to a number of cycles of openings and closings. Provide information regarding the operating experience related to these penetrations and the AMP developed to address the pertinent degradation issues.

RAI 3.6-44 Assuming, as indicated in Table 3.3.1-7 of the LRA, that the SMP (summarized in Section A.2.5 of the LRA) is, and will be, used for the aging management of the RB penetrations, provide information regarding the extent of use of NEI 96-03,"Industry Guideline for Monitoring the Condition of Structures at Nuclear Power Plants," Regulatory Guide 1.163, "Performance-Based Containment Leak-

Test Program," and ACI 349.3R-1996, "Evaluation of Existing Nuclear Safety-Related Concrete Structures," in managing the aging of components of electrical, mechanical, and access penetrations (i.e. the base metal, water seals, seals and gaskets, and welds) together with the information regarding the acceptance criteria used as indication of significant aging effects.

RAI 3.6-45 Subsection IWE of Section XI of the ASME Code in conjunction with 10 CFR 50.55a, "Codes and Standards," requires the general visual (VT-1) examination of the containment penetrations 3 times in 10 years. For concrete structures, in general, ACI 349.3R-96 recommends the minimum inspection frequencies of twice in a 10-year interval. The RB penetrations are required to be essentially leak-tight. Provide information regarding the justification for using the baseline inspection interval of 5 operating cycles (7 to 10 years) for the RB penetrations as indicated in Section A.2.5 of the LRA.

RAI 3.6-46 Clarify whether the Torque Activities AMP is applicable to anchors and bolts used in the (1) intake structure, (2) yard structures, (3) main stack, (4) EDG building, and (5) control building.

RAI 3.6-47 The tables in Section 3.3.1 of the LRA do not list masonry walls as structural components requiring aging management review, although Section C.1.4.2 of the LRA identifies cracking of masonry block walls as an applicable aging effect for block walls within the RB, control building, and main stack. Discuss in detail how the licensee intends to manage the aging effects of these masonry walls and describe how the licensee's AMP for periodic inspection and surveillance of these masonry walls incorporates the insights provided in NRC IN 87-65, "Lessons Learned from Regional Inspection of Licensee Actions in Response to IE Bulletin 80-11."

RAI 3.6-48 Table C.1.1-1, "Plant Hatch Thermal and Radiation Environments" shows expected or measured temperatures at key plant locations. With respect to the Primary Containment at Hatch, the table does not provide maximum temperatures within key containment locations. Please provide maximum recorded or observed temperatures within the Hatch primary containment (both normal and abnormal temperatures) at the primary shield wall, reactor vessel supports, main steam line cubicle (or its equivalent) and the hottest regions of the SFP concrete wall locations. As applicable, discuss the AMP for managing the aging effects of reinforced concrete components subject to a sustained high temperature environment (e.g., concrete temperature greater than 150 °F).

RAI 3.6-49 Tables 3.3.1-3 through 3.3.1-5 and 3.3.1-8 through 3.3.1-13 of the Hatch LRA do not list cracking of equipment support concrete pads as an applicable aging effect requiring AMR. Staff experience with other LRAs indicates the frequent occurrence of such cracks around anchor bolt regions. Discuss the AMP for managing this aging effect or justify your exclusion of this aging effect from the tables listed above.

RAI 3.6-50 Based on previous staff experience, degradation of piping systems (e.g., loss of integrity of bolted closures, cracking of welds and loosening of bolts) may potentially be caused by vibration (mechanical or hydrodynamic) loading. In Table 3.3.1-3, the applicant did not identify loss of preload as an aging effect for bolting in the primary containment system. Clarify whether the vibration-related aging effects (including cracking of piping welds and loosening of bolts) were considered in the aging review for the primary containment system. If these vibration-related aging effects were excluded, provide the basis.

RAI 3.6-51 The scoping requirements of 10 CFR 54.4(a)(2) include all non safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs 10 CFR 54.4 (a)(1)(i), (ii), or (iii). In Section 2.1.2.5 of the LRA, the applicant stated that the few cases where non safety-related components could impact safety-related functions were included in the scope of license renewal in accordance with the criteria of 10 CFR54.4(a)(2). Table 3.3.1-3 includes anchors and bolts, structural steel, and miscellaneous steel in non safety-related structural supports; however, it is not clear whether the scope of the primary containment system discussed in Table 3.3.1-3 of the LRA includes any spatially-related components and piping segments within the category of “Seismic II over I” (a non-seismic Category I system, structure, or component whose failure could cause loss of safety function of a seismic Category I system, structure, or component) piping. Provide clarification on this and on how the aging management programs for the non safety-related piping segments and components have been addressed. Specifically, state whether the same aging management programs discussed in LRA Table 3.3.1-3 also apply to “Seismic II over I” piping components.

RAI 3.6-52 In Table 3.3.1-8, for reinforced concrete components, cracking is not included as an aging effect. Cracking is an aging effect for reinforced concrete. Section C.2.6.1 excludes cracking as an aging effect for turbine building masonry block walls. Provide the basis for not identifying cracking of masonry block walls as an applicable aging effect for block walls within the turbine building.

RAI 3.6-53 In Section C.2.6.1of the LRA, underground duct runs and pull boxes are identified as concrete components requiring aging management review. However, these components are not listed under specific items and areas inspected to establish a base line condition as part of the SMP. Discuss the aging effects that are applicable to these components and, as applicable, describe the AMPs that can be relied upon to manage the identified aging effects.

RAI 3.6-54 Table 3.3.1-8 does not address aging management of the overhead crane, including crane rails and girders. Identify and discuss the aging effects that are applicable to these components and, as applicable, describe the AMP that can be relied upon to manage the identified aging effects.

RAI 3.6-55 Provide a discussion of your operating experience with the turbine pedestal. Industry experience has indicated occurrence of cracks in turbine pedestals as

an aging effect. Discuss your basis for not addressing this aging effect in an AMP for the turbine pedestal.

Identification and Evaluation of Time-Limited Aging Analyses (TLAAs)

RAI 4.1 - 1 Table 4.1.1-1 of the LRA lists the TLAAs applicable to Plant Hatch. Flaw growth analysis was not identified as a TLAA. Flaws in Class 1 components that exceed the size of allowable flaws defined in IWB-3500 of the ASME Code need not be repaired if they are analytically evaluated to the criteria in IWB-3600 of the ASME Code. The analytic evaluation requires the licensee to project the amount of flaw growth due to fatigue and stress corrosion cracking mechanisms, or both, where applicable, during a specified evaluation period. Identify all Class 1 components that have flaws exceeding the allowable flaw limits defined in IWB-3500 and that have been analytically evaluated to IWB-3600 of the ASME Code. Provide the results of the analyses that indicate whether the flaws will satisfy the criteria in IWB-3600 for the period of extended operation.

RAI 4.1 - 2 Table 4.1.1-1 identifies piping stress analyses that consider thermal fatigue cycles as a TLAA. The table does not identify the fatigue analyses of other reactor coolant pressure boundary components or the reactor vessel internals as TLAAs. Section 4.2 of the LRA does address the reactor pressure vessel. Identify whether any other components of the reactor coolant pressure boundary have fatigue analyses. In addition, Section C.3.2.2 of the Hatch Unit 1 FSAR indicates that a fatigue analysis of the reactor vessel internals was performed. Describe the TLAAs performed to address fatigue for reactor coolant pressure boundary components, except for the reactor vessel, that were not included in Table 4.1.1-1 and describe the TLAA performed for the reactor vessel internals. Indicate how these TLAAs meet the requirements of 10 CFR 54.21(c).

Pipe Stress

RAI 4.2 - 1 Section 4.2.2 of the LRA contains a discussion of the Plant Hatch licensing basis pipe break criteria. Part of the Plant Hatch pipe break criteria involves postulation of pipe breaks at locations where the calculated fatigue usage exceeds a specified value. The usage factor calculation used to identify postulated pipe break locations meets the definition of a TLAA as specified in 10 CFR 54.3. Provide a description of a TLAA for the pipe break criteria at Plant Hatch. Describe how the TLAA meets the requirements of 10 CFR 54.21(c).

RAI 4.2 - 2 Section 4.2.2 of the LRA contains a discussion of Generic Safety Issue (GSI) 190, “Fatigue Evaluation of Metal Components For 60-year Plant Life.” GSI-190 addresses the effect of the reactor water environment on the fatigue life of metal components. The discussion in Section 4.2.2 indicates that EPRI license renewal fatigue studies have demonstrated that sufficient conservatism exists in the design transient definitions to compensate for potential reactor water environmental effects. The staff does not agree with the contention that the EPRI fatigue studies have demonstrated that sufficient conservatism exists in the

design transient definitions to compensate for potential reactor water environmental effects. The staff identified several technical concerns regarding the EPRI studies. The staff technical concerns are contained in an August 6, 1999, letter to NEI. Although these concerns involved the EPRI procedure and its application to PWRs, the technical concerns regarding the application of the Argonne National Laboratory (ANL) statistical correlations and strain threshold values are also relevant to BWRs. In addition to the concerns referenced above, the staff has additional concerns regarding the applicability of the EPRI BWR studies to Plant Hatch. EPRI Report TR-107943, “Environmental Fatigue Evaluations of Representative BWR Components,” addressed a BWR-6 plant and EPRI Report TR-110356, “Evaluation of Environmental Thermal Fatigue Effects on Selected Components in a Boiling Water Reactor Plant,” used plant transient data from a newer vintage BWR-4 plant. The applicability of the EPRI fatigue studies to Plant Hatch has not been demonstrated. Provide the following additional information regarding resolution of the environmental fatigue issue:

a. Indicate whether the staff comments provided in the staff’s August 6, 1999, letter to NEI, which are applicable to Hatch, have been considered in the assessment of the environmental fatigue issue at Plant Hatch. Discuss how the applicable staff comments were considered in the evaluation of environmental fatigue.

b. Discuss the applicability of the component fatigue assessments in the EPRI Reports TR-107943 and TR-110356 to components in Hatch Units 1 & 2. The discussion should include a comparison of design transients, operating cycles and fabrication details for each component. Also include a comparison of the hydrogen water chemistry used at Hatch with the hydrogen water chemistry considered in the EPRI reports.

c. The staff assessed the impact of reactor water environment on fatigue life at high fatigue usage locations and presented the results in NUREG/CR-6260, “Application of NUREG/CR-5999, ‘Interim Fatigue Curves to Selected Nuclear Power Plant Components’,” March 1995. Formulas currently acceptable to the staff for calculating the environmental correction factors for carbon and low-alloy steels are contained in NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” and those for austenitic stainless steels are contained in NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue Design of Austenitic Stainless Steels.” Provide an assessment of the 6 locations identified in NUREG/CR-6260 for an older vintage BWR-4 considering the applicable environmental fatigue correlations provided in NUREG/CR-6583 and NUREG/CR-5704 reports for Hatch Units 1 and 2.

RAI 4.2 - 3 Section 4.2.3 of the LRA discusses the TLAA for non-Class 1 piping. The application indicates that the current design basis for some piping and tubing is 14,000 cycles. Identify the piping and tubing that were designed for 14,000 cycles and provide the basis for this specified number of cycles. Indicate how

the projected operating cycles were determined to be less than 14,000 for 60 years in the TLAA evaluation.

RAI 4.2 - 4 Section A.1.12.1 of the LRA describes the Component Cyclic or Transient Limit Program. The application indicates that the program "is designed to track cyclic and transient occurrences to ensure that reactor coolant pressure boundary components and the torus will remain within ASME Code Section III fatigue limits, including the effects of a reactor water environment." Provide a summary of the Component Cyclic of Transient Limit Program that addresses the elements listed below. The summary should also include a discussion of the bases for each of the elements.

a. Scope of the program that includes the specific structures and components subject to fatigue monitoring, including the location monitored for each structure or component. Provide the current CUF for each location monitored and describe the method used to estimate the current CUF and the method used to estimate the CUF at 60 years;

b. Preventive actions that will be used to mitigate or prevent fatigue degradation;

c. Parameter(s) to be monitored and the monitoring device(s) at each location monitored by the program;

d. Assurance that detection of fatigue degradation will occur before loss of the structure or component intended functions;

e. Program monitoring, trending, inspection technique, testing frequency, and sample size to ensure maintenance of structure and component intended functions;

f. The method used to compare the monitored data to the fatigue analysis of record;

g. Acceptance criteria to ensure structures and components perform their intended functions; and

h. Operating experience from similar programs or inspection techniques used by Southern Nuclear Operating Company or the industry.

Environmental Qualification of Electrical Equipment

4.4-1 Section 4.4.5 of the LRA lists various commodity types based on option (i) of 10 CFR Part 54.21 (c)(1) to demonstrate that the analyses remain valid for the period of extended operation. For each commodity type that is based on option (i), provide a summary of the thermal and radiation analyses used to illustrate the basis upon which the qualified life remains valid for the period of extended operation.

4.4-2 Section 4.4.5 of the LRA lists various commodity types based on option (ii) of 10 CFR Part 54.21 (c)(1) to demonstrate that the analyses have been projected to the end of the period of extended operation. For each of the following selected commodity types, provide the Environmental Qualification (EQ) calculations that were used to project the qualified lives to the end of the period of extended operation:

a. 4.4-2 Limitorque SB, SMB Actuators, AC Service

b. 4.4-5 General Electric F01 Electrical Penetration Assemblies

c. 4.4-6 Amphenol Type HN Plug Connectors

d. 4.4-8 States ZWM and NT Series Terminal Blocks

e. 4.4-20 Raychem Breakout/Scotchcast 9 Potting Compound

f. 4.4-26 AMP Special Ind. Insulated/Uninsulated Terminals and Splices

g. 4.4-29 Okonite Low Voltage and Medium Voltage Power and Control Cables; and Instrumentation Cables

h. 4.4-32 Okonite T-95 Insulating and No. 35 Jacketing Tapes/Cement

i. 4.4-38 Anaconda Low Voltage Power, Control, and Instrumentation Cables

j. 4.4-52 GE RHR and Core Spray Pump Motors

k. 4.4-61 Brand-Rex Low Voltage Power, Control, and Instrumentation Cables and Internal Panel Wiring

l. 4.4-76 Conax Buffalo Electrical Penetrations

m. 4.4-79 Eaton (Samuel Moore) Instrumentation and Thermocouple Cables

n. 4.4-86 Reliance Motors FNA-6856 and 6857

Containment Penetration Pressurization Cycles

RAI 4.5-1 The applicant states that it identified one containment penetration structural analysis that assumed a number of pressurization cycles for 40 years. With regard to this particular analysis, provide the following information:

a. Identify this penetration with respect to its location, environment, number of thermal and pressurization cycles that it is assumed to undergo during the current licensing term, cycles that have actually occurred up to now, and cycles that are estimated until the end of the extended period of operation.

b. Provide a summary of the structural analysis, including the parameters and boundary conditions considered, to demonstrate the acceptability of using backing rings.

c. Are there other penetrations, in either unit, which can be identified as having the same characteristics from the standpoint of the cumulative usage factor (CUF)?

RAI 4.5-2 The Hatch containment drywell, torus, vent lines, penetrations, penetration bellows (including vent line bellows), and dissimilar metal welds in bellows undergo undefined numbers of thermal cycling (during reactor mode changes and transients), pressurization pulses during the SRV discharges, and pressure cycles during leak rate testing. The usage factors related to these components depend upon the number of thermal and pressurization cycles assumed in the current licensing basis (CLB), cycles actually experienced until now, and the estimated cycles until the end of the extended period of operation. Provide the following information, for both of the Hatch units, to justify the exclusion of these components from the TLAA.

a. A table showing the number of thermal and pressurization cycles and their ranges for each of the six component types (or commodity groups, if applicable), described above, corresponding to those cycles assumed in the CLB analyses, cycles experienced thus far, and cycles estimated to occur up to the end of the extended period of operation.

b. Provide the CUF corresponding to the estimated cycles in the CLB, the number of cycles experienced thus far, and the estimated number of cycles to occur up to the end of the extended period of operation.

RAI 4.5-3 List all containment penetrations with pipe-to-penetration welds.

RAI 4.5-4 For the containment penetrations with pipe-to-penetration welds, provide a justification as to why TLAAs were not performed considering the pressurization cycles and cyclic thermal expansion of the attached piping.

Reactor Vessel

RAI - 4.6-1 Sections 4.6.3 and A.1.17.1of the LRA discuss ultrasonic inspection of the Hatch RPV circumferential welds. Section A.1.17.1,"The Reactor Pressure Vessel Monitoring Program," indicates that Hatch will use an approved technical alternative in lieu of ultrasonic testing of RPV circumferential shell welds. The technical alternative is discussed in the staff's final SER, dated July 28, 1998, of the BWR Vessel and Internals Project BWRVIP-05 Report, "BWR RPV Shell Weld Inspection Recommendations," September, 1995. Section A.4.5 of Report BWRVIP - 74, "BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines," indicates that the SER conservatively evaluated BWR RPV's to 64 effective full power years (EFPY), which is 10 EFPY greater than what is realistically expected for the end of the license renewal period. Since this was a generic analysis, the applicant must provide plant-specific information to demonstrate that the Hatch beltline materials meet the criteria specified in the report and operator training and procedures will be utilized during the license renewal term to limit the frequency for cold over-pressure events. To demonstrate that the vessel has not been embrittled beyond the basis for the technical alternative and that cold over-pressure events are not likely to occur during the license renewal term, the applicant must provide: (1) a comparison of the neutron fluence, initial RT_{NDT}, Chemistry Factor, amounts of copper and nickel, delta RT_{NDT} and Mean RT_{NDT} of the limiting Hatch circumferential weld at the end of the renewal period to the 64 EFPY reference case in Appendix E of the staff's SER, (2) an estimate of conditional failure probability of the RPV at the end of the license renewal term based on the comparison of the Mean RT_{NDT} for the limiting Hatch circumferential weld and the reference case, and (3) identify procedures and training that will be utilized during the license renewal term to limit the frequency of cold over-pressure events to the amount specified in the staff's SER.

RAI - 4.6-2 The staff's SER, contained in a letter to Carl Terry dated March 7, 2000, discusses the staff's concern related to RPV failure frequency for axial welds and the BWRVIP's analysis of the RPV failure frequency of axial welds. The SER indicates that the RPV failure frequency due to failure of the limiting axial welds in the BWR fleet at the end of 40 years of operation is below 5×10^{-6} per reactor year, given the assumptions on flaw density, distribution and location described in the SER. Since the BWRVIP analysis was generic, the applicant must provide plant-specific information to demonstrate that the Hatch beltline materials meet the criteria specified in the report and operator training and procedures will be utilized during the license renewal term to limit the frequency for cold over-pressure events. To demonstrate that the vessel has not been embrittled beyond the basis for the staff and BWRVIP analyses, the applicant must provide: (1) a comparison of the neutron fluence, initial RT_{NDT}, Chemistry Factor, amounts of copper and nickel, delta RT_{NDT} and Mean RT_{NDT} of the limiting Hatch axial weld at the end of the renewal period to the reference cases in the BWRVIP and staff analyses and (2) an estimate of conditional failure probability of the RPV at the end of the license renewal term based on the comparison of the Mean RT_{NDT} for the limiting Hatch axial welds and the reference case. If this comparison does

not indicate that the RPV failure frequency for axial welds is less than 5 x 10^{-6} per reactor year, provide a probabilistic analysis to determine the RPV failure frequency for axial welds.

RAI - 4.6-3 The BWRVIP analysis in BWRVIP-74 was a bounding analysis for Charpy USE. For BWR/4 RPVs this analysis indicates that at 54 EFPY the Charpy USE in the transverse direction would be at least 45 ft-lb and the Charpy USE for the non-Linde 80 submerged arc welds (SAWs) would be at least 43 ft-lb. Since this was a generic analysis, the applicant must provide plant-specific information to demonstrate that the Hatch beltline materials meet the criteria specified in the report at the end of the license renewal period. The applicant must provide the information specified in Tables B-4 and B-5 of EPRI-113596.

RAI - 4.6-4 Provide peak neutron fluences at the inside surface of the RPVs. Provide your methodology for determining the neutron fluence and include the calculational procedure, cross sections, neutron sources, approximations, and use of dosimetry, if applicable.

Main Steam Isolation Valves Operating Cycles

RAI 4.7 - 1 In Section 4.7 of the LRA, the applicant stated that the operating cycles of the main steam isolation valves (MSIVs) are assumed to be 2050 cycles for 40 years in the Plant Hatch Updated Final Safety Analysis Report (FSAR). The applicant also indicated that cycling of the valve will lead to wear of the valve disc and valve seat that will accumulate over time. On this basis, the applicant identified MSIV operating cycles as a TLAA. The applicant further indicated that this kind of wear due to operation of the valve will lead to performance degradation, discoverable through TS leakage monitoring testing. Excessive leakage would lead to refurbishment or repair of the valve seat and disc, as necessary. The applicant dispositioned that TLAA through Criterion (iii) of 10 CFR 54.21(c)(1).

Under this disposition option, demonstrate that the effects of aging on the component intended functions will be adequately managed consistent with the CLB for the period of extended operation. In addition, the FSAR supplement for the facility must contain a summary description of the programs and activities for managing the effects of aging and the evaluation of the TLAA for the period of extended operation.

Sufficient information was not provided as described in 10 CFR 54.21(c)(1)(iii). Identify all the components that may be subjected to the effects of wear aging/cyclic fatigue (e.g., valve disc, valve seat, stem, diaphragm, positioner). Also, discuss all the applicable effects of aging (e.g., excessive leakage, exceeding TS-specified valve closure time) on the MSIVs intended functions. In addition, to ensure that the effects of aging will be adequately managed, provide sufficient information related to the referenced testing and maintenance/repair program, including objectives of the testing, parameters monitored or inspected, frequency of testing, detection of aging effects, acceptance criteria, corrective action, and operating experience to demonstrate that the program will effectively

manage the applicable aging effects. Furthermore, revise Sections A.4.1 and A.4.1.1 of the LRA to include a summary discussion of the MSIV operating cycles TLAA, in accordance with 10CFR 54.21(c)(1) (iii).

cc:

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