June 9, 2000

Mr. Craig G. Anderson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 SR 333
Russellville, Arkansas 72801

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE ARKANSAS NUCLEAR ONE, UNIT 1, LICENSE RENEWAL APPLICATION

Dear Mr. Anderson:

By letter dated January 31, 2000, Entergy Operations, Inc. (Entergy), submitted for the Nuclear Regulatory Commission's (NRC's) review an application pursuant to 10 CFR Part 54, to renew the operating license for Arkansas Nuclear One, Unit 1, (ANO-1). 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. Specifically, the enclosed questions are from the Plant Systems Branch regarding Sections 3.3.1.1, 3.3.1.2, and 3.3.4.

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 Entergy prior to the submittal of the responses to provide clarifications of the staff's requests for additional information.

Sincerely,

/***RA***/

Robert J. Prato, Project Manager
License Renewal and Standardization Branch
Division of Regulatory Improvement Program
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosure: Request for Additional Information

cc w/encl: See next page

Mr. Craig G. Anderson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 SR 333
Russellville, Arkansas 72801

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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 Entergy prior to the submittal of the responses to provide clarifications of the staff's requests for additional information.

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REQUEST FOR ADDITIONAL INFORMATION
ARKANSAS NUCLEAR ONE, UNIT 1
LICENSE RENEWAL APPLICATION, SECTIONS3.3.1.1, 3.3.1.2, and 3.3.4.

3.1.1 Chemistry Monitoring Aging Management Program:

3.3.1.1-1 In Section 4.6, "Chemistry Control," of the LRA, the following chemistry monitoring programs are addressed: Primary Chemistry Monitoring Program, Secondary Chemistry Monitoring Program, Auxiliary Systems Chemistry Monitoring, Diesel Fuel Monitoring Program, and Service Water Chemical Control Program. For each program, provide the following information:

a. For each subprogram in the Chemistry Control Program, please provide the major parameters; e. g. , contaminants and oxygen, sampled and analyzed, the acceptable ranges and the frequency of sampling.

b. Describe how the sampling locations address stagnant or low flow areas in the systems that rely on chemistry monitoring. Include in this discussion, whether samples are taken at stagnant locations, the uses of representative samples from one location to represent several stagnant locations and the criteria used to select the representative sample, and/or the use of other means to manage aging for these areas, such as visual inspections.

c. Although each of these programs are based on EPRI guidelines, deviations from the recommendations in the guidelines may occur based on ANO-specific and/or industry experience. Please provide a more detailed description of how deviations from the guidelines demonstrate the effectiveness of these programs in managing the aging effects referenced. Focus on the last five to seven years and discuss any applicable aging not prevented by the AMPs in question. Include in this discussion, changes to the program and the reason for the changes.

3.3.1.2 Quality Assurance

Attributes of the Quality Assurance Program are described in Appendix B, Section 2.0, "Program and Activity Attributes" of the Arkansas Nuclear One, Unit-1 (ANO-1) license renewal application (LRA). This section of the application states that the Quality Assurance Program corrective actions and administrative controls apply to all aging management programs (AMP) and activities discussed throughout the LRA.

The Entergy Quality Assurance Program applies to safety related structures and components. Corrective actions and administrative (document) control for safety-related systems, structures, and components, non safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any safety related function, and those systems, structures and components relied upon to perform a function necessary to demonstrate compliance with the Commission regulations cited under 10 CFR 54.4(a)(3) are accomplished under the existing ANO-1 Corrective Action Program and ANO-1 Document Control Program.

Enclosure

These two programs apply to the corrective actions and administrative controls for the programs and activities within the scope of license renewal.

The NRC Draft Standard Review Plan (DSRP), Section A.2, "Quality Assurance for Aging Management Programs," states that 10 CFR Part 50, Appendix B (Appendix B) requirements, which apply to safety-related structures and components, are adequate to address the corrective actions, confirmation process, and administrative control elements of an AMP for license renewal. For non-safety-related structures and components, an applicant may expand the scope of its Appendix B program to include these structures and components, or may choose an alternative approach to address corrective actions, confirmation process, and administrative control.

3.3.1.2-1 The description in Appendix B, Section 2.0, of the LRA appears to be consistent with the initial approach of expanding the scope of Appendix B to cover those non-safety related structures and components within the scope of license renewal. Please clarify as to whether the ANO-1 Appendix B, Corrective Action and Document Control Programs cover all non-safety-related structures and components within the scope of license renewal? If not, what alternative approach has been developed to address these attributes?

3.3.1.2-2 The description in Appendix B, Section 2.0, of the LRA does not specifically address the inclusion of the confirmation process as an attribute of each AMP that is addressed by the ANO-1 QA Program. Identify where in the LRA is the confirmatory process each AMP addressed. If the confirmatory process is not performed under the ANO-1 QA program, provide sufficient information to allow the staff to verify (consistent with Section A.1.2.3.8, "Confirmation Process," of the NRC DSRP) that the confirmation process corrective actions have been completed and are effective. Include a discussion on how the ANO-1 confirmation process ensures the adequacy, completeness, and effectiveness of corrective actions?

3.3.1.2-3 The definition in the LRA for "Acceptance Criteria or Standards" attribute states that the acceptance criteria or standards are described for the relevant conditions to be monitored or the chosen examination methods. The NRC DSRP states in part that the acceptance criteria should ensure that intended functions are maintained under all current licensing bases (CLB) design conditions during the period of extended operation and that the program should include a methodology for analyzing the results against applicable acceptance criteria. Please describe how the ANO-1 AMR ensures that intended functions are maintained consistent with the CLB during the period of extended operation and how the results of the program are analyzed against the applicable acceptance criteria?

3.3.4 Auxiliary Systems

3.3.4.3.1 AGING EFFECTS

3.3.4.3.1-1 .Respond to the following comments relating to the discussion of corrosion mechanisms in Appendix C, Section 1.4, of the LRA, and provide supporting references, as applicable.

a. Oxygen can be a contributor but is not needed for pitting or crevice corrosion of metal. Verify that you are in agreement with this fact.

b. Appendix C, page C-10, contains a statement that “[s]tress corrosion cracking and intergranular attack require a susceptible material, a corrosive environment, and tensile stress.” Tensile stress is not needed for intergranular attack. Verify that you are in agreement with this fact.

A discussion related to stress corrosion cracking of carbon and other low-alloy steels were also included. This discussion concluded that the most common mechanism for cracking of high strength carbon and alloy steels is “aqueous chloride” cracking. This is an incorrect statement. Any steel with a tensile strength greater than 170 ksi is susceptible to stress corrosion cracking in a moist air environment. Verify that you are in agreement with this fact. In addition, verify that high strength bolting is not in use at ANO-1 in non-Class 1 applications. If high strength bolting is used at ANO-1, identify where in the LRA is the AMR for this bolting, or provide an AMR and a demonstration that the applicable aging effects will be managed consistent with the CLB for the period of extended operation for these bolts.

A. The referenced discussion contains a statement that stress corrosion cracking of stainless steels exposed to atmospheric conditions is plausible when high levels of contaminants (e.g., chlorides) are present and only if the material is sensitized. Provide a technical justification for the statement that stainless steel needs to be sensitized to contaminants, and specifically address the need for austenitic stainless steel to be sensitized to chloride for chloride stress corrosion cracking to occur. If not, provide an AMR for chloride stress corrosion cracking in austenitic stainless steel.

3.3.4.3.1-2 The following requests apply to all thirteen auxiliary systems:

a. Section 4.3 of the LRA identifies metal fatigue as a time limited aging analysis (TLAA) and states that fatigue evaluations were required in the design of the ANO -1 Class 1 components in accordance with the requirements of the applicable design codes. The discussion of cyclic loading and fatigue is limited to Class 1 piping and components. However, many of the auxiliary systems addressed in the LRA, Section 3.4, are Class 2 and 3 components and are designed to American National Standards Institute (ANSI) B31.1 and B31.7 Code requirements. Although these codes do not require an explicit fatigue analysis, they do specify allowable stress levels based on the number of anticipated thermal cycles. Identify where in the LRA is cyclic loading and fatigue of Class 2 and 3 components addressed, or provide such an analysis for the applicable components.

b. Based on the staff's experience, degradation of mechanical closures, piping systems, and bolted attachments (i.e., loss of integrity of bolted closures, cracking of welds and loosening of bolts) may potentially be caused by vibration (mechanical or hydrodynamic) loading. Appendix C, Section 9.0, of the LRA contains a discussion on the loss of mechanical closure integrity in high vibration applications such as diesel generators. However, it is not clear that cracking of auxiliary system piping welds, especially socket welds, and of ducting in a high vibration environment was considered. Such ducting is in the Auxiliary Building Heating and Ventilation System and the Control Room Ventilation System. In addition, it is not clear that loosening of bolts attaching the base of equipment, such as a fan in the Auxiliary Building Heating and Ventilation System, that is a source of high vibrations has been considered. Identify where in the LRA is high vibration of auxiliary systems piping, duct work, and bolting addressed. If not, perform an AMR of these applications or provide a technical justification for its exclusion from an AMR.

c. 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). Section 2.1.2 of the LRA, contains a statement that a few cases were identified where non safety-related components could impact safety-related functions and included associated components 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 3.4 of the LRA includes any Seismic II/I spatially-related components and piping segments ("Seismic II/I" is 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). Identify where Seismic II/I components and piping segments are specifically included within the scope of license renewal, and identify the specific AMPs that apply to these components for each applicable aging effect.

d. Several of the auxiliary systems at ANO-1 may contain piping and components exposed to underground environments. Only two of these systems (fuel oil and service water) have inspection programs listed in Table 3.4 for buried piping. However, it is unclear whether any additional components in any of the auxiliary systems are also exposed to an underground environment. For example, the P&ID for the fire protection system appears to indicate that piping is partially routed in soil or encased in concrete, but an underground environment is not identified in Table 3.4–2. Identify any buried components in any of the auxiliary systems, any applicable aging effects due to an underground environment, and the AMPs that will manage these effects of aging.

3.3.4.3.1.-3 The Emergency Diesel Generators and Alternate Ac Diesel Generator Systems, diesel generator exhaust components may be susceptible to aging effects such as loss of material from exposure to combustion products. This aging effect is not identified in Appendix C to the LRA. Include loss of material in Appendix C or provide a technical justification for excluding this aging effect as it relates to diesel generator exhaust components.

3.3.4.3.1-4 Appendix C, Section 7.0, “Effects Requiring Aging Management in Gas Environments,” contains a statement that the internal surfaces of carbon steel components exposed to gas-air and wetted by condensation are susceptible to loss of material. These carbon steel components were said to be found in the following three systems:

- Penetration Room Ventilation
- Auxiliary Building Heating and Ventilation
- Control Room Ventilation

Tables 3.4-11, 12, and 13 do not identify loss of material as an applicable aging effect for many of the carbon steel components whose surfaces are exposed to a gas-air environment in the Penetration Room Ventilation System, the Auxiliary Building Heating and Ventilation System, and the Control Room Ventilation System, respectively. Identify where in the LRA is the AMR for the loss of material for these components. If not included in the LRA, provide an AMR review for these components, or a technical justification as to why loss of material is not an applicable aging effect for these components.

3.3.4.3.1-5 Tables 3.4 -11, “Penetration Room Ventilation,” and 3.4 -13, “Control Room Ventilation,” of the LRA, contains a statement that no aging effects apply to tubing and valves of copper, brass and admiralty exposed to an external-ambient environment. However, Section 8.0 of Appendix C, contains a statement that loss of material due to general corrosion applies to these components in ambient environments if the external surface is in contact with moist air. Please identify which statement is correct. If both statements are correct, provide additional explanation to clarify the differences in the statement. In addition, identify which copper, brass, and admiralty components are subject to loss of material from general corrosion to the external surface due to contact with moist air, identify where in the LRA are the AMRs for these components or provide a technical justification for not requiring aging management due to the loss of material for these components.

3.3.4.3.1-6 Ductwork exists in the Penetration Room Ventilation, Auxiliary Building and Ventilation, and Control Room Ventilation Systems. The ductwork typically includes elastomeric isolators (such as flexible collars between ducts and fans, seals in dampers and doors), which will degrade because of relative motion between vibrating equipment, warm moist air, temperature changes, oxygen, and radiation. Degradation of an elastomer results in hardening and loss of strength. When isolators degrade, vibration and subsequent dynamic loads will be applied to the ductwork and fasteners. Please verify that the ductwork at ANO-1 contains elastomeric insulators. If so, identify where in the LRA are elastomeric insulators addressed or provide a technical justification for not requiring an AMR for these components.

3.3.4.3.1.1 Spent Fuel

3.3.4.3.1.1-1 For stainless steel components, the staff's review identified loss of material for stainless steel components in Appendix C, Section 2.0, "Effects Requiring Aging Management in Borated Water Environment," of the LRA, but not for the stainless steel components listed in Table 3.4-1 of the LRA. Identify where in the LRA is the AMR of spent fuel stainless steel components or provide a technical justification for excluding these components from an AMR.

3.3.4.3.1.2 Fire Protection

None

3.3.4.3.1.3 Emergency Diesel Generator

3.3.4.3.1.3-1 Appendix B, Section 4.21.5, "Emergency Diesel Generator Testing and Inspections," of the LRA does not identify cracking in brass and bronze in the air intake and exhaust subsystem valves as an applicable aging effect, however, Table 3.4–3 of the LRA does identify cracking as an applicable aging effect for these components. Appendix C, Section 7.3.1, "Aging Effects in Air Environment," identifies loss of material caused by several types of corrosion, but does not identify cracking as an applicable aging effect. In addition, loss of material (probably due to corrosion) is listed in Section 4.21.5 but not in Table 3.4-3 of the LRA for copper, brass, or bronze in the air intake and exhaust subsystems valves and the starting air subsystem tubing exposed to gas-air or external-ambient environments.

A. Identify an AMP for cracking in brass and bronze for the air intake and exhaust subsystem valves or provide a technical justification for excluding cracking as an applicable aging effect and correct Table 3.4-3 and the applicable text to reflect the technical justification.

B. If cracking is determined to be an applicable aging effect in an air environment, include the appropriate discussion under Appendix C, Section 7.3.1.

C. Please verify that the loss of material discussion in Appendix B, Section 4.21.5, is due to corrosion.

D. Include loss of material as an applicable aging effect in Table 3.4-3 and the applicable text for copper, brass, and admiralty in the air intake and exhaust subsystem valves and starting air subsystem tubing.

3.3.4.3.1.4 Auxiliary Building Sump and Reactor Building Drain

3.3.4.3.1.4-1 The following RAIs apply to Table 3.4-4 of the LRA:

a. Loss of material is not identified as an applicable aging effect in an external ambient environment for carbon steel, brass, bronze and admiralty components in this system. Include loss of material as an applicable aging effect and perform an AMR, or provide a technical justification as to why loss of material is not an applicable aging effect.

b. The second component commodity grouping in Table 3.4-4 is piping, valves, tanks, and bolting made of carbon steel. The environment is borated water and/or oil, with aging effects of loss of material and a loss of mechanical closure integrity. Please clarify whether the environment and aging effects apply to the external or internal surfaces, or both, for these components.

3.3.4.3.5 Alternate AC Diesel Generator

3.3.4.3.1.5-1 Appendix C, Section 3.3, “Aging Effects in Treated Water Environments,” of the LRA, identified loss of material due to pitting as an applicable aging effect for stainless steel in oxygen rich treated water environments. Appendix C, Section 6.3.2, “Lubricating Oil Environment,” also discusses this aging effect in lube oils containing oxygenated water. However, these combinations of aging effects and environments are not identified in Table 3.4-5, “Alternate AC Diesel Generator” of the LRA for stainless steel components. Perform an AMR for loss of material for these combinations of materials and environments or provide a technical justification for determining the loss of material as not being an applicable aging effect.

3.3.4.3.6 Halon

3.3.4.3.1.6-1 The only Halon System aging effects identified in Section 3.4.2, “Aging Effects Requiring Management,” of the LRA are loss of material and cracking of the discharge tube assemblies and pilot header flexible tubing and fittings due to frequent disconnecting of the equipment. However, Appendix C, Section 7.0, "Effects Requiring Aging Management in Gas Environments," Section 8.0, "Effects Requiring Aging Management in External Surface Environments," and Table 3.4–6, "Halon System," of the LRA, identify all applicable aging effects for Halon System components that require aging management. In addition, Appendix C, Section 7.3.5 contains a statement that Halon is non corrosive to materials in the Halon system. Please provide a clarification by identifying the applicable aging effects, identify the applicable components or component groups, perform an AMR, and provide a demonstration for all applicable aging effects for the Halon System. If any of the aging effects identified as applicable in Appendix C (please specifically address aging effects in Section 7 and Subsection 8.3.1 as well as any other applicable sections) and Table 3.4-6 are identified as being not applicable in the response to this request for clarification, provide a technical justification for this change in LRA information.

3.3.4.3.1.6-2 Table 3.4-6, "Halon System," of the LRA identifies loss of material for the gas-Halon and gas-nitrogen (internal) environments for the steel discharge tubes and the stainless steel flexible connectors. However, no aging effects are identified for the internal environments of the steel piping and carbon steel tanks. Provide a technical justification for not identifying loss of material as an applicable aging effect for steel piping and carbon steel tanks that share the same environments and materials as the steel discharge tubes and the stainless steel flexible connectors, respectively.

In addition, Table 3.4-6 of the LRA, identifies steel and carbon steel as materials used in the Halon system. Specify the kind of steel referred to in this table.

3.3.4.3.1.7 Fuel Oil

3.3.4.3.1.7-1 Appendix C of the LRA identifies oxygenated water as an environment that can causing pitting, crevice corrosion, and galvanic corrosion to brass, bronze, copper, stainless steel components leading to loss of material. Table 3.4-7 of the LRA does not identify loss of material as an applicable aging effect for these components. Verify that loss of material is an applicable aging effect for brass, bronze, copper, and stainless steel components. Provide an AMR for loss of material for each of these components, or provide a technical justification for excluding any of these components from an AMR for loss of material.

3.3.4.3.1.7-2 Appendix C, Section 6.3.1 of the LRA, identified cracking for stainless steel components exposed to fuel oil. Identify whether or not the tube side or shell side of the stainless steel heat exchanged is not exposed to fuel oil, if so perform an AMR for cracking for this component.

3.3.4.3.1.8 Instrument Air

3.3.4.3.1.8-1 Section 3.4.2, “Aging Effects Requiring Management,” of the LRA states that no aging effects were identified for the passive components in the Instrument Air System exposed to dry gases and internal building environments. This is contrary to Appendix C, Section 7.0, “Effects Requiring Aging Management in Gas Environments,” and Table 3.4-8, “Instrument Air System,” of the LRA, both of which identify aging effects requiring management. Provide a clarification by identifying the applicable aging effects, identify the applicable components or component groups, performing an AMR, and providing a demonstration for all applicable aging effects for the Instrument Air System.

3.3.4.3.1.9 Chilled Water System

None

3.3.4.3.1.10 Service Water System

None

3.3.4.3.1.11 Penetration Room Ventilation

None

3.3.4.3.1.12 Auxiliary Building Heating and Ventilation ***

3.3.4.3.1.12-1 Section 9.7.2.1 of the ANO-1 SAR, contains a statement that the internal surface of the copper tubing of the switchgear room coolers is exposed to chilled water (treated water). Appendix C, Section 3.0, contains a statement that the copper tubing may corrode and pit in a water environment. (Please note that aging occurs in a water environment and that water is treated to manage/prevent the aging. Applicants cannot take credit for chemistry control to prevent aging except as an AMP). However, Table 3.4-12 of the LRA does not listed loss of material as an applicable aging effect for the internal surface of the tubing exposed to chilled water. Identify where in the LRA is aging of the switchgear room coolers copper tubing addressed or provide a technical justification for excluding loss of material as an applicable aging effect for these components.

3.3.4.3.1.13 Control Room Ventilation System

None

3.3.4.3.2 AGING MANAGEMENT PROGRAMS

3.3.4.3.2-1 The request for additional information identified below resulted from the staff's evaluation of the Preventive Maintenance program used as an AMP to manage the loss of material and apply to components in the following systems:

- Fire Protection System
- Auxiliary Building Heating and Ventilation
- Control Room Ventilation

a. Section 3.4.3 of the LRA contains a statement that the Preventive Maintenance Program applies to the Auxiliary Building Ventilation System, the fuel oil system, and the Control Room Ventilation System. However, Table 3.4–2 of the LRA, shows preventive maintenance as an AMP for the Fire Protection System. Conversely, Table 3.4–7 of the LRA, does not show the Preventive Maintenance Program as an AMP for the Fuel Oil System. Please clarify the scope and applicability of the Preventive Maintenance Program to the systems and components in Appendix B, Section 4.15 and Tables 3.4–1 thru 3.4–13, of the LRA.

b. Please identify the parameters to be monitored or inspected for the applicable components in Table 3.4 of the LRA under the Preventive Maintenance Program. Show that these parameters are associated with the degradation of the components' intended functions. Demonstrate that the visual inspections performed during walk-downs are adequate for detecting aging effects on surfaces that may not be easily accessible.

c. Please describe how the activities in the Preventive Maintenance Program would detect aging effects before there is a loss of function for the applicable components consistent with the CLB in Table 3.4 of the LRA. Discuss the approach to sampling, if applicable, and the frequencies of the activities performed. Describe monitoring and trending activities to show that they would predict the extent of degradation and allow timely corrective or mitigative actions.

d. Please describe the acceptance criteria and methodology used to analyze results of the inspection and testing under the Preventive Maintenance Program for the applicable components in Table 3.4 of the LRA. The description of the program contains a statement that if existing preventive maintenance procedures do not have adequate inspection criteria for aging effects, but they will be updated to provide appropriate criteria before the end of the current 40-year license term. Additional information is needed for the staff to adequately assess the Preventive Maintenance Program. Identify the inspection criteria that are in question and provide a discussion that will help the staff to understand the basis for the criteria that will be developed.

e. Provide a summary description of the operating experience associated with the Maintenance Rule Program as it specifically applies to the components in Table 3.4 of the LRA, that will demonstrate that this program will effectively manage the applicable aging effects. (Refer to NEI 95-10, Revision 0, page C-8 for an example of the kind of operating history used in a demonstration.)

3.3.4.3.2-2 The request for additional information listed below resulted from the staff's evaluation of the Preventive Maintenance program used as an AMP to manage the fouling and apply to components in the following systems:

- Auxiliary Building Heating and Ventilation
- Control Room Ventilation

Respond to each of the following requests, addressing each system specifically.

a. Please describe the inspection and cleaning process used to ensure that not even a thin film of fouling, that can impact the heat transfer function (reference Appendix C, Section 10), exist on the tube surface. Include in your discussion the means, including any criteria, by which fouling is verified not to exist.

b. Please identify the frequencies for the copper tubing inspection and cleaning activities and/or how they are determined. Demonstrate that fouling of the copper tubing will be detected in a timely manner.

c. The program description contains a statement that if existing preventive maintenance procedures do not have adequate inspection criteria for aging effects, they will be updated to provide appropriate criteria before the end of the current 40-year license term. Additional information is needed for the staff to adequately assess the Preventive Maintenance Program. Identify the inspection criteria that are in question and provide a discussion that will help the staff to understand the basis for the criteria that will be developed.

d) Provide a summary description of the operating experience associated with the Preventive Maintenance Program as it specifically applies to the components in Table 3.4 of the LRA, that will demonstrate that this program will effectively manage the applicable aging effects. (Refer to NEI 95-10, Revision 0, page C-8 for an example of the kind of operating history used in a demonstration.)

3.3.4.3.2-3 The request for additional information listed below resulted from the staff's evaluation of the Oil Analysis Program used as an AMP to manage the loss of material and cracking, and apply to components in the following systems:

- Fire Protection System
- Emergency Diesel Generator
- Alternate AC Diesel Generator
- Chilled Water
- Control Room Ventilation

a. Tables 3.4-2, 3.4-3, 3.4-5 and 3.4-9, contain statements that components of several materials (e.g., carbon steel, cast iron, brass, Aluminum, admiralty, and stainless steel) are exposed to a lube oil environment, but identify cracking as an applicable aging effect only for stainless steel components. Provide a justification for excluding cracking as an applicable aging effect for carbon steel, cast iron, brass, aluminum, and admiralty.

b. Provide a summary description of the Oil Analysis Program that includes a discussion on how measuring particulate in an oil sample is used to detect a loss of material or cracking in a specific component. Describe any monitoring and trending activities that would assist in maintaining the CLB with respect to minimum wall thickness or allowable cracking, and allow timely corrective actions for components exposed to lube oil. In addition, describe any acceptance criteria, and its bases, for the oil analysis activities listed in Appendix B, Section 4.14, of the LRA. Include the method(s) used to analyze the results of the tests performed.

c. Appendix B, Section 4.14, “Oil Analysis,” of the LRA, addresses operating experience regarding excess water in the oil, but not particulates. Provide a summary description of the operating experience associated with the Oil Analysis Program as it specifically applies to the components in Table 3.4 of the LRA, that will demonstrate that this program will effectively manage the applicable aging effects. (Refer to NEI 95-10, Revision 0, page C-8 for an example of the kind of operating history used in a demonstration.) Include in your description, the operating experience associated with the presence of water and particulate in oil samples.

3.3.4.3.2-4 The request for additional information listed below resulted from the staff’s evaluation of the Heat Exchanger Monitoring Program used as an AMP to manage the loss of material, fouling, and cracking, and apply to components in the following systems:

- Chilled Water
- Service Water

For the applicable components in Table 3.4–9 and 3.4–10 of the LRA:

a. Describe the preventive and mitigative actions and how these actions would mitigate or prevent aging degradation.

b. Identify the parameters monitored or inspected and describe how these parameters are associated with the degradation of the components’ intended functions.

c. Describe how the inspection activities would detect the applicable aging effects before the loss of function; describe any monitoring and trending activities that would assist in maintaining the CLB with respect to the applicable intended functions, and allow for timely corrective or mitigative actions for the components exposed to lube.

d. Identify any acceptance criteria, its basis, and the methodology used to analyze results of the inspection and testing activities.

e. Provide a summary description of the operating experience associated with the Heat Exchanger Monitoring Program as it specifically applies to the components in Tables 3.4-9 and 3.4-10 of the LRA, that will demonstrate that this program will effectively manage the applicable aging effects. (Refer to NEI 95-10, Revision 0, page C-8 for an example of the kind of operating history used in a demonstration.)

3.3.4.3.2-5 The request for additional information listed below resulted from the staff's evaluation of the Emergency Diesel Generator Testing and Inspection Programs used as an AMP to manage the loss of material, and apply to the components in the following systems:

- Emergency Diesel Generator
- Auxiliary Building Heating and Ventilation
- Fuel Oil

Provide a summary description of the operating experience associated with the Emergency Diesel Generator Testing and Inspection Program as it specifically applies to the components in Tables 3.4-3, 3.4-7 and 3.4-12 of the LRA, that will demonstrate that this program will effectively manage the applicable aging effects. (Refer to NEI 95-10, Revision 0, page C-8 for an example of the kind of operating history used in a demonstration.)

3.3.4.3.2- 6 The request for additional information listed below resulted from the staff's evaluation of the Auxiliary System Water Chemistry Program used as an AMP to manage the loss of material, and cracking, and apply to components in the following systems:

- Emergency Diesel Generator
- Alternate AC Diesel Generator
- Chilled Water

Respond to each of the following requests, addressing each system specifically.

a. Tables 3.4–3, 3.4–5 and 3.4–9 of the LRA list components in gas-air, gas-freon and lube oil environments as managed by the Auxiliary Systems Water Chemistry Monitoring Program. The Auxiliary System Water Chemistry Program maintains the water chemistry of primarily the Service Water System that interface with these systems and is not used for gas-air, gas-freon and lube oil environments. Discuss why the tables in question show the Auxiliary System Water Chemistry Program used for managing aging associated with gas-air, gas-freon or lube oil environments.

3.3.4.3.2-7 The requests listed below result from the Buried Piping Inspection program to manage loss of material and apply to components in the following systems:

- Fuel Oil
- Service Water

Respond to each of the following requests, addressing each system specifically.

a. In previous LRAs, the AMPs used to mitigate the effects of aging to underground piping included cathodic protection. Based on the industry experience and a review of technical material, the staff believes that cathodic protection is necessary for adequate aging of underground piping. Provide detailed operating experience that will adequately demonstrate the effectiveness of managing the aging of underground piping without the benefits of cathodic protection, or provide additional means of preventing and/or monitoring the aging of underground piping.

b. The Buried Piping Inspection program will be used to perform initial inspections when underground piping is uncovered during plant maintenance or modification. State the extent and how often underground piping is expected to be uncovered for modification and maintenance. Be sure to include the maximum period of time between inspection and a justification for the adequacy of the inspection frequency.

   If defective coating or loss of material is found, further sampling of underground piping would be warranted. Describe the method and criteria that will be used to determine the number of additional inspection sites, their locations and frequencies of inspection. Submit this information in sufficient detail to allow the staff to determine whether the approach to determining the locations and frequencies of additional inspections will provide reasonable assurance that the loss of material will be identified before the integrity of the pressure boundary of the buried piping is compromised.

c. The Buried Pipe Inspection Program demonstration contains a statement that the program *"will be effective in the future for managing aging effects since it incorporates proven monitoring techniques, acceptance criteria, corrective actions and administrative controls from existing programs and activities."* Provide a basis for the statement that the program incorporates "proven" monitoring techniques, acceptance criteria, corrective actions and administrative controls.

3.3.4.3.2-8 The requests listed below result from the evaluation of the Reactor Building Leak Rate Testing Program and apply to components in the following systems:

- Spent Fuel System
- Fire Protection System
- Auxiliary Building Sump and Reactor Building Drain
- Chilled Water

Respond to each of the following requests, addressing each system specifically.

a. Verify that each AMP in each of the rows apply to each of the aging effects in the same row unless indicated by excessive spaces and alignment of aging effects with AMPs throughout the tables in Section 3 of the LRA. Reference the last row in Table 3.4-2.

b. Provide the following information for the applicable components of Table 3.4 that use the Reactor Building Leak Test Rate Testing program:

    a. Identify the parameters to be monitored or inspected and show that these parameters are associated with the degradation of the components' intended functions.

    2. Describe how the activities would detect aging effects before there is a loss of function; describe the monitoring and trending activities; describe how thes activities would predict the extent of degradation and allow timely corrective or mitigative actions; and describe the acceptance criteria and the methodology used to analyze results of the inspection and testing.

d. Provide a summary description of the operating experience associated with the Reactor Building Leak Rate Testing Program as it specifically applies to the components in Tables 3.4-2, 3.4-4 and 3.4-9 of the LRA, that will adequately demonstrate that this program will effectively manage the applicable aging effects during the period of extended operation.

3.3.4.3.2-9 The requests listed below result from the evaluation of the Maintenance Rule Program and apply to components in the following eleven systems:

- Fire Protection System
- Emergency Diesel Generator
- Alternate AC Diesel Generator
- Halon
- Fuel Oil
- Instrument Air
- Chilled Water
- Service Water
- Penetration Room Ventilation
- Auxiliary Building Heating and Ventilation
- Control Room Ventilation

Respond to each of the following requests, addressing each system specifically.

a. Section 3.4.3 of the LRA, contains a statement that the Maintenance Rule Program will ensure piping and component integrity is maintained in the following systems: fuel oil, chill water, penetration room ventilation, auxiliary building heating and ventilation, alternate AC generator and wetted portions of the emergency diesel generator (EDG) exhaust; the other five systems are not included. However, in Table 3.4 of the LRA, the Maintenance Rule Program is credit for managing aging in all eleven systems. Clarify the scope and applicability of the Maintenance Rule Program for the eleven systems noted above and components in Appendix B, Section 4.13, of the LRA, and in Tables 3.4-1 thru 3.4-13. Provide this information on a system specific basis. Additionally, reconcile the component listings and intended functions shown in the LRA Tables 3.6-1 through 3.6-8 with those listed in the applicable Tables from 3.4-1 thru 3.4-13.

b. Appendix B, Section 4.13, dose not list the Maintenance Rule Program as an AMP for “loss of mechanical closure integrity”. However, in several sections of Table 3.4 (e.g.,Tables 3.4-3 and 3.4-9) of the LRA , the Maintenance Rule Program is credited for managing mechanical closure integrity for several components. Please provide the correct information in response to this question.

c. The LRA takes credit for the Maintenance Rule Program to manage the applicable aging effects for components in each of the systems listed above (it appears that system walk-downs are being used to managing aging internally and externally). Provide a discussion on how visual inspection performed during system walkdowns can effectively detect each of the applicable aging effects before loss of intended function.

d. Discuss the frequencies of the activities performed or describe the method used to determine the frequency in sufficient detail for the staff to assess the adequacy of the process used.

e. The operating experience and demonstration is too general and additional details are needed to provide the staff with reasonable assurance that the system walk-downs (that use visual inspection and engineering judgement to determine “unacceptable visual indications”) will be effective in managing aging during the period of extended operation. For example, has ANO-1 experienced any failures for the aging mechanisms in the auxiliary systems since the implementation of the walk-down program. Discuss how long the system walk-downs have been in place at ANO-1, describe the qualifications and training system engineers receive, qualitatively describe the types and frequency of indications found as a result of the programs, and discuss some specific findings that will help the staff assess the effectiveness of the program.

3.3.4.3.2-10 This request applies to managing loss of mechanical closure integrity in the following seven systems:

- Spent Fuel
- Fire Protection
- Emergency Diesel Generator
- Auxiliary Building Sump and Reactor Building Drains
- Alternate AC Diesel Generator
- Fuel Oil
- Chilled Water

Several AMPs have been credited with managing the loss of mechanical closure integrity in these systems. Only in one of these program, Emergency Diesel Generator Testing and Inspections Program, identifies periodic checking of the bolt torque to further ensure the integrity of the bolted closures. Include a periodic check of bolt torque for those structures and components that have loss of mechanical closure integrity as an applicable aging effect or provide a technical justification for not needing to periodically check bolt torque for each application.

3.3.4.3.2 Spent Fuel Pool

3.3.4.3.2-1 The Primary Chemistry Monitoring Program description contains a statement that inspections are performed when the Spent Fuel System becomes available because of routine or corrective maintenance. These inspections include checking for corrosion, deposits, structural damage, clarity of water, general cleanliness, appearance, and biological growth. This program is also credit with managing cracking of stainless steel. To determine whether these inspections help to ensure that unanalyzed cracking does not occur, the staff needs to know whether these inspections check for cracking, the techniques used, the maximum allowable time between inspections, and how many times such inspections of Spent Fuel System stainless steel components have been performed to date.

3.3.4.3.2-2 Appendix B, Section 4.21.8 of the LRA, contains a statement that together with the new program, Spent Fuel Pool Monitoring, described in Appendix B, Section 3.7, of the LRA, the Spent Fuel Pool Level Monitoring Program will provide reasonable assurance that cracking of the liner plate will be managed. However, in Section 3.4 of the LRA, only the Spent Fuel Pool Level Monitoring Program is credit with managing cracking in the liner plate. Verify that both the Spent Fuel Pool Level Monitoring and the Spent Fuel Pool Monitoring Programs are need to manage cracking of the liner plate or provide a technical justification as to why only the Spent Fuel Pool Level Monitoring Program will adequately manage cracking during the period of extended operation.

3.3.4.3.2-3 The Spent Fuel Pool Level Monitoring Program and the Spent Fuel Pool Monitoring Program can detect cracking in the spent fuel liner plate only after it becomes through-wall. Because material loss and cracking (but not through-wall cracking) can occur and remain undetected, the staff believes that a one-time volumetric inspection be performed just prior to the period of extended operation of selected susceptible locations on the liner plate to ensure that significant cracking or loss of material has not occurred. Include a one time inspection as part of ANO-1 AMP for cracking of the spent fuel pool liner plate or provide a technical justification as to why it is not needed. If a one time inspection is added, identify the acceptance criteria and the proposed locations for the one-time inspection.

3.3.4.3.2-4 Define what constitutes an “unacceptable drop in the pool level” and provide the basis for this value.

3.3.4.3.2-5 The following questions relate to ASME Section XI inspection activities relating to the Spent Fuel Pool.

a. The system description contained a statement that the IWD visual inspections was performed during system pressure tests in accordance with NRC-approved versions of ASME Section XI. Provide a description of the inspection results in sufficient detail to allow the staff to evaluate the effectiveness of this program to manage loss of material in spent fuel system carbon steel bolting.

b. The LRA contains a statement that VT-3 visual examinations are performed in accordance with NRC approved versions of ASME Section XI. Provide a description of the inspection results in sufficient detail to allow the staff to evaluate the effectiveness of this program to prevent loss of mechanical closure integrity.

c. The aging management program IWD Inspections, described in Section 4.3.3 of Appendix B to LRA, include the VT-3 examination to determine the general mechanical and structural condition of components. But the ASME Code Section XI, 1992 Edition, 1993 Addenda for Pressure Testing, ISI-IWD Program, does not include the VT-3 visual examinations for the system leakage test of the pressure retaining components, these examinations are included in the ASME Section XI ISI-IWB. Verify that Appendix B, Section 4.3.3, should be referring to IWB, not IWD, or provide an explanation for this discrepancy.

3.3.4.3.2-7 Appendix B, Section 4.5, “Boric Acid Corrosion Prevention” contains a statement that the program has been successful in “ensuring the proper identification, evaluation, and repair of boric acid leakage. Leakage is being reported not only on the reactor coolant system components, but also on other systems that contain borated water. This program has helped in the reduction of unidentified reactor coolant system leakage.” Has the Boric Acid Corrosion Prevention Program fail to identify incidents of early leakage (i.e, RCS level taps). If so, describe these incidents and any improvements to the program to prevent future failures to identify early leakage.

Please described specific experience in applying the program to spent fuel pool carbon steel bolting and other carbon steel components at ANO-1, so the effectiveness of the program can be evaluated.

3.3.4.3.2 Fire Protection

3.3.4.3.2-1 Appendix B, Section 4.8.4, of the LRA contains a statement that aging management program and activities provide a method for verifying operability of Fire Suppression Sprinkler System components. Although sprinkler heads are included among the fire protection components subject to an AMR in Section 2.3.3.2, Table 3.4-2, of the LRA, no reference is made to the sprinkler heads or to the Fire Sprinkler System Surveillance Program. Explain why this program is not addressed in Table 3.4-2 .

Section 2.3.3.2, also contains a statement that the Fire Suppression Sprinkler System is within the scope of license renewal and subject to an AMR. Appendix B, Section 4.8.4, to the LRA states that the fire suppression system surveillance provides a method for verifying the operability of the Fire Suppression Sprinkler System components and that the deluge spray system is flushed quarterly. However, the acceptability of automatic wet-pipe sprinkler systems in some portions of the turbine building containing lube oil piping, and in some areas of the auxiliary building including the cable spreading room was not discussed. Discuss how operability of the deluge spray system is determined in these areas.

3.3.4.3.2-2 Appendix B, Section 4.8.3, “Fire Suppression Water Supply System Surveillance,” to the LRA, describes periodic surveillance tests of Fire Protection System components. Section 4.8.3 contains a statement that the deluge spray system is flushed quarterly. However, the acceptability of the automatic wet-pipe sprinkler systems located in some portions of the turbine building containing lube oil piping, and in some areas of the auxiliary building including the cable spreading room, was not discussed. For these areas discuss the criteria used for determining that the Deluge Spray System is operable; and discuss the surveillance procedure and criteria used to verify that a wet pipe sprinkler system required for compliance with 10 CFR 50.48, remains operable throughout the extended period of operation. These include pressurization and flow testing of portions of the system.

a. Fire suppression Water Supply System Surveillance is not credited with managing the “loss of mechanical closure integrity” in Appendix B, Section 4.8.3, of the LRA. However, Table 3.4-2 does credit this program for managing the loss of mechanical closure integrity for several components. Verify that the Fire Suppression Water Supply System Surveillance Program is used to manage the loss of mechanical closure integrity or provide a technical justification as to why it is not needed to manage this aging effect.

b. Describe the scope (i.e., physical boundaries of each of these pressurization and flow tests, for each of the surveillance activities), the operating parameters measured during and/or after each of the periodic surveillance tests listed, the acceptance criteria and its bases, and the method(s) for analyzing results of the surveillance tests.

c. Describe how the loss of material and fouling of the Fire Protection Heat Exchanger is detected by the Fire Suppression Water Supply Surveillance. Is the Fire Protection Heat Exchanger in the ANO-1 Generic Letter 89-13 Program?

d. Section 4.8.3 of Appendix B, to the LRA, under Operating Experience and Demonstration contains the following statement:

> *Inspections of the underground cement-lined cast iron piping have shown negligible corrosion degradation. The above ground carbon steel pipe is inspected during repair or replacement of fire water components. There have been replacements of components and piping in the small-bore carbon steel piping due to internal corrosion. Based on this experience, these [as described in the Fire Suppression Water Supply System Surveillance Program] surveillance activities will continue to provide assurance that aging effects will be adequately managed.*

Addition information is needed relating to the operating experience of the Fire Suppression Water Supply System Surveillance Program to demonstrate the effectiveness of the AMP to manage the aging effects during the period of extended operation. Provide more information about the timing and extent of the inspection of the underground piping that provides reasonable assurance that the program is currently and will continue to adequately manage the effects of aging during the period of extended operation. Discuss the reason for the inspection, were repairs needed, did the surveillance program identify the need for repairs. Are inspections performed periodically, and if so, should these inspection activities of the underground piping be part of the aging management activities, if not, justify why not. Because inspection activities are relied upon to demonstrate the effectiveness of this program, then the staff believes that inspection(s) should be part of the AMP, if not, justify why not.

The inspections performed during repair and replacement of fire water components are described in the program description of the Fire Suppression Water Supply System Surveillance. Correlate the repairs and replacements to the surveillance program activities. Has the Fire Suppression Water Supply System Surveillance identified the need for repairs and replacement activities, if not, then what activities were used to identified the need for repairs and replacements and why are they not part of the AMP. What can be said about the operating experience relating specifically to Fire Suppression Water Supply System Surveillance Program that demonstrates its effectiveness to manage the aging during the period of extended operation.

3.3.4.3.2-3 Appendix B, Section 4.8.5, "Fire Water Piping Thickness Evaluation," to the LRA, describes periodic examination and evaluation of pipe wall thickness changes in the Fire Water System. Please provide the following additional information:

a. Table 3.4–2 of the LRA identifies the Fire Water Piping Thickness Evaluation for managing loss of material in cast iron and carbon steel materials. However, in Appendix B, Section 4.8.5, "Fire Water Piping Thickness Evaluation," of the LRA contains a statement that the program also applies to piping made of stainless steel. Verify that the Fire Water Piping Thickness Evaluation is used to manage the loss of material for stainless steel or provide a technical justification for not using this AMP to manage the loss of material in stainless steel.

b. Appendix B, Section 4.8.5, "Fire Water Piping Thickness Evaluation," of the LRA does not describe the ultrasonic scanning coverage methods used for Fire Protection System piping. Provide addition description of the method used, include in this description the use longitudinal wave ultrasonic, the use of grid point measurements, and specifics relating to scan coverage with respect to the overall size, population, and shape of the pitting degradation (describe the ultrasonic coverage methods for ensuring that a loss of material due to pitting will be appropriately detected and characterized).

c. Appendix B, Section 4.8.5, "Fire Water Piping Thickness Evaluation," of the LRA contains a statement that the frequency and locations of ultrasonic examinations are determined by the system engineer, based previous and nearby inspections and elapsed time. Describe the method used to determine the time between examinations including the objective, basis and method used to determine the elapse time. Describe the bases and extent of sampling (locations examined) and expansion criteria, with respect to the total population of applicable components. Discuss the acceptance criteria, the basis for what is and what is not an acceptable loss of material. Describe the method(s) for analyzing results of the ultrasonic examinations.

d. Ultrasonic thickness examinations have indicated that pitting corrosion of Fire Protection System piping is an ongoing degradation mechanism at ANO-1, and that piping repairs have been made because of excessive pipe wall thinning. Please discuss how many (qualitatively) of the repairs have been initiated because of the Fire Water Piping Thickness Evaluation Program in contrast to failure detection, actual leakage due to failure of the piping.

3.3.4.3.2-4 Appendix B, Section 4.6.5, “Service Water Chemical Control,” to the LRA, describes sampling and analysis activities of the service water system. Please provide the following additional information:

a. Appendix B, Section 4.6.5, Service Water Chemical Control of the LRA, contains a statement that biocides are continuously injected to control biological activity in this raw water system. State whether these biocides, based on the chemical species present, contribute to corrosion or cracking.

b. The “Operating Experience and Demonstration” does not discuss the history of the fire protection system piping with respect to the aging effects managed by the Service Water Chemistry Control Program. A general description of the operating history of the system is needed. In addition, discussion as to whether or not the need for repairs and replacements have been detected primarily by the applicable AMPs. If not, what initiated these maintenance activities? Have there been failure not detected by the AMP, and if so, have the credited AMPs been adjusted to prevent future undetected failures?

3.3.4.3.2 Emergency Diesel Generator

3.3.4.3.2-1 Table 3.4-3, “Emergency Diesel Generator System,” of the LRA indicates that fouling is an aging effect that can potentially affects the pressure boundary of the lube oil subsystem heat exchangers. However, Appendix C, Sections 4.3.3 and 10.2.2 of the LRA states that fouling is not associated with loss of pressure boundary. In addition, during a telecommunication on June 6, 2000, you stated that fouling is not an aging mechanism that can lead to the loss of pressure boundary. Verify that Table 3.4-3, page 3-63 is incorrect, or provide a discussion relative to fouling and the loss of pressure boundary specific to this application.

3.3.4.3.2-2 Appendix B, Section 4.21.5 of the LRA, contains a statement that the Emergency Diesel Generator Testing and Inspections Program provides a means of detecting cracking and loss of material in these subsystems that have progressed to the point of leakage. The staff’s concern is that significant loss of material or cracking may remain undetected beyond the loss of intended function, and the existing program is relying on failure detection to manage aging. Demonstrate that the effects of aging will be manage consistent with the CLB during the period of extended operation without the loss of intended function, or provide additional aging management activities, as necessary, to prevent the loss of the intended function(s).

3.3.4.3.2-3 Appendix B, Section 4.21.5 of the LRA, identifies six maintenance actions used to manage aging effects. Identify the frequencies of these actions, which are performed monthly and which are performed during the 18-month inspection.

3.3.4.3.2 Auxiliary Building Sump and Reactor Building Drain

3.3.4.3.2-1 Table 3.4–4 of the LRA summarizes the Auxiliary Building Sump and React Building Drain System AMR. Please provide the following additional information:

a. Table 3.4–4 of the LRA shows that internal surfaces of carbon steel piping, valves, bolting, and external valve parts are exposed to treated water and borated water. However, Appendix C, Section 2.0 of the LRA states that carbon steel components exposed to borated water are lined with stainless steel or Plastite® to protect them from direct contact with borated water. Please identify the lining material used in carbon steel components of the auxiliary building sump and reactor building drain system. If lining material is not used, provide a specific basis for why the applicable aging management programs in Table 3.4–4 of the LRA (for carbon steel components internally exposed to borated water) are sufficient to manage loss of material and a loss of mechanical closure integrity.

b. Stainless steel, brass, bronze, and admiralty components exposed internally to a treated or borated water environment may be susceptible to loss of material from general corrosion or pitting under certain conditions such as elevated oxygen, halogen or sulfate levels exacerbated by stagnant or low-flow conditions. Discuss how the AMPs which apply to the components made from these materials adequately manage this aging effect.

d. Carbon steel components in the Auxiliary Building Sump and Reactor Building Drain System that are exposed internally to raw water may be susceptible to loss of material from general corrosion or pitting under certain conditions such as elevated oxygen, halogen or sulfate levels exacerbated by stagnant or low-flow conditions. Discuss how the AMPs, which apply to the components made from these materials, adequately manage this aging effect.

3.3.4.3.2-3 Appendix B, Section 4.5, “Boric Acid Corrosion Prevention,” to the LRA, describes corrosion prevention due to leakage relating to the Auxiliary Building Sump and Reactor Building Drain System. Please provide the following additional information:

a. Please verify whether any of the components of the Auxiliary Building Sump and Reactor Building Drain System are actually buried or encased in concrete so that their external surfaces are exposed to environments not listed in Table 3.4–4 of the LRA.

b. Describe specific operating experience relating to boric acid corrosion in the Auxiliary Building Sump and Reactor Building Drain System. Include a discussion on any enhancements to the program that may apply to the Auxiliary Building Sump and Reactor Building Drain System, and provide any information that shows this program will adequately manage aging in the Auxiliary Building Sump and Reactor Building Drain System.

3.3.4.3.2-4 Appendix B, Section 4.8.7, “Reactor Coolant Pump Oil Collection System Inspection,” of the LRA, describes inspection activities used to maintain the integrity of the Reactor Coolant Pump Oil Collection System as it relates to the Auxiliary Building Sump and Reactor Building Drain System. Please provide the following additional information:

a. In Appendix B, Section 4.8.7, to the LRA, you stated that the Reactor Coolant Pump Oil Collection System Inspection is visual. The scope of the inspection includes accessible piping of the Auxiliary Building Sump and Reactor Building Drain System. Please describe the extent of inaccessible piping and how the inaccessible piping of the Auxiliary Building Sump and Reactor Building Drain System that is exposed to an oil environment or an environment of borated water from component/system leakage will be inspected or evaluated.

b. Please discuss the parameters monitored during the Reactor Coolant Pump Oil Collection System Inspection to determine the presence of corrosion and to characterize the nature of any degradation.

c. Please describe how the activities in the Reactor Coolant Pump Oil Collection System Inspection Program would detect aging effects before there is a loss of intended function for the applicable Auxiliary Building Sump and Reactor Building Drain System components in Table 3.4–4 of the LRA.

3.3.4.3.2-5 Appendix B, Section 4.3.7, “Augmented Inspection” of the ASME Section XI Inservice Inspection, describes inspection activities used to maintain the Auxiliary Building Sump and Reactor Building Drain System. Please provide the following additional information

a. Table 3.4–4 of the LRA shows that the ASME Section XI ISI - Augmented Inspections Program is used to manage loss of material, cracking, and loss of mechanical closure integrity for stainless steel, brass, bronze and admiralty piping and valves in the Auxiliary Building Sump and Reactor Building Drains System. Verify that the Augmented Inspections Program is used to manage the loss of mechanical closure integrity because the program description in Appendix B, Section 4.3.7, only identifies loss of material and cracking.

The program described in Appendix B, Section 4.3.7 of the LRA lists lines from the reactor building sump, penetration 68 piping and components, the decay heat pump room drain valves, and penetrations 10, 47, 58 and 64. Confirm that all piping and valves of the listed materials in the Auxiliary Building Sump and Reactor Building Drains System are encompassed by the items listed above. State to which buildings the penetrations apply.

b. Appendix B,Section 4.3.7, of the LRA, contains a statement that the methods used for augmented inspections are described in previous ASME Section XI sections. This is not clear, a specific description of the methods used for augmented inspections is needed, or more specific references that will allow the staff to assess the methods used. For example, it is unclear which of the NDE methods specified for ASME Class 1, 2 or 3 components will be applied to piping and valves in the Auxiliary Building Sump and Reactor Building Drains System. Please describe the specific examinations that will be performed and discuss why these examinations are effective at detecting the appropriate aging effects.

c. Discuss operating experience specific to the applicable valves and piping in the Auxiliary Building Sump and Reactor Building Drains System. Provide a general assessment of the effectiveness of the program as it relates to the operability and availability of Auxiliary Building Sump and Reactor Building Drain System. Describe any detection of crack or loss of material that resulted in corrective actions and any failures caused by cracking or loss of material that were not detected by the Augmented Inspection Program. Discuss any changes to the program brought about by operating experience.

3.3.4.3.2-6 Appendix B, Section 4.17, “Reactor Building Sump Closeout Inspection,” describes inspection activities used to maintain the Auxiliary Building Sump and Reactor Building Drain System. Please provide the following additional information

a. Appendix B, Section 4.17, of the LRA, contains a statement that the Reactor Building Sump Closeout Inspection Program manage loss of material for the carbon steel components and cracking for stainless steel components due to borated water. This section also contains a statement that the scope of the Reactor Building Sump Closeout Inspection program applies to the reactor building sump, the area surrounding the sump, the screening materials, and the equipment and structural components inside the sump. Table 3.4-4 of the LRA limits the components in this program to stainless steel screens in the Auxiliary Building and Reactor Building Drain System that are exposed to borated water, treated water, raw water, and oil. It is not clear that carbon steel components or any components other than the stainless steel screens are included in the Reactor Building Sump Closeout Inspection. Please clarify the scope of the program and the components included. Identify where in the LRA is the aging management review for cracking and loss of material for the carbon steel and stainless steel components.

b. Table 3.4-4 of the LRA contains a statement that the loss of material and cracking of the stainless steel screens are monitored under the reactor building sump closeout inspection. Appendix B, Section 4.17, contains a statement that visually inspection will be used to detect corrosion of carbon steel components and cracking in stainless steel components. It is unclear whether visual examination will be adequate to detect these aging effects before the function of the screens is compromised. If volumetric inspection techniques are excluded, explain how visual inspections will detect cracking before loss of intended function.

c. Please describe monitoring and trending activities under the Reactor Building Sump Closeout Inspection program and show that they would predict the extent of degradation and allow timely corrective or mitigative actions for the applicable components in Table 3.4–4 of the LRA. If there are none, explain why. Describe the acceptance criteria and the methodology used to analyze results of inspection and testing.

d. Discuss any past corrective actions made to the Reactor Building Sump that resulted in program enhancements. Describe any component repairs or replacements that were necessitated as a result of past reactor building sump closeout inspections.

3.3.4.3.2 Alternate AC Diesel Generator

3.3.4.3.2-1 Describe the inspections performed and how these activities are intended to detect the applicable aging effects. Describe the acceptance criteria and their technical basis. Identify where in the LRA is the AMR for the potential loss of preload for Alternate AC Diesel Generator bolting, if not, provide a technical justification for excluding the need to manage the loss of preload or provide an AMR.

3.3.4.3.2-2 Appendix B, Section 4.13, “Maintenance Rule,” cites that the Maintenance Rule Program applies to the components in Tables 3.6 -1, “Reactor Building,” through 3.6 - 8, “Bulk Commodities.” However, the Maintenance Rule Program is referenced as an AMP in most of the tables in Section 3.3, Section 3.4 (including Table 3.4-5, “Alternate AC Diesel Generator System”), and Section 3.5. Clarify this discrepancy.

3.3.4.3.2 Halon

3.3.4.3.2-1 Appendix B, Section 4.8.6, “Control Room Halon Fire Systems Inspection,” describes inspection activities used to maintain the Control Room Halon Fire Systems. Please provide the following additional information:

a. Section 2.3.3.6, Halon, of the LRA references SAR Section 9.8.2, to describe components and structures credited for Halon fire protection. These documents do not sufficiently describe the Halon System or its operation. However, from review of P&ID M–219, sheet 2, it appears that much of the HHalon System piping and components are not pressurized with nitrogen or Halon gases. Table 3.4–6, Halon System of the LRA outlines aging effects and AMPs for the Halon, nitrogen, and external-ambient environments only. Please provide information about the AMPs for the portions of the Halon System that are not constantly filled with Halon or nitrogen gas.

b. Table 3.4–6, "Halon System," of the LRA identifies the Control Room Halon Fire System Inspection to prevent loss of material internal to the parts of the Halon system where the internal fluid is nitrogen or Halon. Appendix B, Section 4.8.6, of the LRA states that the purpose of this inspection is to assure that the frequently manipulated components of the Halon system are free from the effects of aging. Please clarify how this activity addresses the internal aging effects of the components as stated in Table 3.4–6 of the LRA and how it will assure detection of aging effects before the loss of intended functions.

c. Appendix B, Section 4.8.6, of the LRA describes the method for Halon system inspections. Specifically mentioned is verifying nitrogen pressure, weighing Halon cylinders to determine whether loss of Halon has occurred (system leakage) and component inspections. However, Halon weight checks only indicate the integrity of the pressure boundary of the pressurized portion of the Halon system. Additionally, frequently manipulated components are inspected for aging effects but you do not; specifically state the components inspected. Please discuss the specific inspection methodology, and aging management activities for portions of the system that are not normally pressurized or the basis for not managing the effects of aging.

d. Appendix B, Section 4.8.6, of the LRA states that inspections are performed in accordance with plant procedures, but does not identify the specific procedural requirements that demonstrate that degradation of components will be detected and corrective actions will be taken in a timely manner. Please provide this information.

e. Appendix B, Section 4.8.6, of the LRA states that acceptance criteria are provided in the Halon System inspection procedure for Halon weight and for gas pressures. Please identify any additional acceptance criteria from the Halon system inspection procedure related to loss of material, and the bases for these criteria that demonstrate the component functions will be maintained under all CLB design conditions. If no additional acceptance criteria have been established, please explain how the acceptance criteria identified in Appendix B, Section 4.8.6, of the LRA, will assure that necessary evaluations and corrective actions will be taken in response to all applicable aging effects.

f. Appendix B, Section 4.8.6, of the LRA states that previous inspections have identified loss of nitrogen or Halon pressure and loss of Halon gas, primarily due to removal of gauges for calibration, installation of test gauges, and to seal leakage in the cylinder control heads. Describe any other types of degradation that have occurred, other than gas leakage past cylinder control head seals, to Halon system components.

3.3.4.3.2 Fuel Oil

3.3.4.3.2 Appendix B, Section 4.21.5, “Emergency Diesel Generator Testing and Inspection,” describes inspection activities used to maintain the Emergency Diesel Generator Fuel Oil Systems. Please provide the following additional information:

a. Table 3.4–7 identifies five programs to address the aging effects in the fuel oil components. However, it does not explicitly state in the description of one of these programs, Emergency Diesel Generator Testing and Inspection in Appendix B, Section 4.21.5, of the LRA, that the program can be used for managing aging effects in the Fuel Oil System components. In its evaluation of this program, the staff assumes that it is equally applicable to the Fuel Oil System components. Please confirm whether this assumption is valid.

b. Visual inspect for fuel oil leaks is performed once every 18 months per the ANO-1 Technical Specification 4.6.1. This inspection can only identify the loss of material that had progressed to the point of leakage. Failure detection is not an acceptable AMP. Therefore, inform the staff whether you considered inspection of selected susceptible locations on the internal surface of the carbon steel components of the fuel oil system to ensure that significant loss of material is not occurring, or provide a technical justification for not needing inspection activities.

c. Discuss operating experience specific to the components of the Emergency Diesel Generator Fuel Oil Systems. Provide a general assessment of the effectiveness of the program as it relates to the operability and availability of this system. Identify any aging and/or failures detected after the implementation of the Diesel Fuel Oil Monitoring Program. Discuss any changes to the program brought about by operating experience.

d. The current Diesel Fuel Monitoring Program was developed based on the past operating experience involving diesel fuel at ANO-1. The past experience included problems with water in the fuel, particulate contamination, and biological fouling. Describe any experience related to the loss of preload for Diesel Fuel Oil System bolting.

e. The application contains a statement that structural and component walk-downs are performed periodically, and the frequency of such walk-downs depends on the structure or component being inspected. However, the frequency at which the external surfaces of carbon steel components are inspected is not provided. Identify the maximum time between structural and component walk-downs to allow the staff to assess if the material loss on the external surface of the carbon steel components would be detected before the integrity of the pressure boundary is compromised.

f. Discuss operating experience specific to the applicable component groups managed by the Diesel Fuel Monitoring Program. Provide a general assessment of the effectiveness of the program as it relates to the operability and availability of Diesel Fuel Oil System. Describe any detection of loss of mechanical closure integrity, fouling, or loss of material that resulted in corrective actions and any failures caused by loss of mechanical closure integrity, fouling, or loss of material that were not detected by the program. Discuss any changes to this program brought about by operating experience.

g. Past failures detected by the Diesel Fuel Oil System are discussed, but a general assessment of the effectiveness of the program as it relates to the operability and availability of Diesel Fuel Oil System is not. In addition, there is no discussion on the effectiveness of the program to detect aging before failure occurs. Please include any changes to this program brought about by operating experience.

3.3.4.3.2 Instrument Air

3.3.4.3.2-1 Appendix B, Section 4.11, “Instrument Air Quality,” describes sampling and testing activities used to maintain the Instrument Air Systems. Please provide the following additional information:

a. Appendix B, Section 4.11 to the LRA states that air testing is performed in accordance with plant procedures, but does not identify the frequency and locations of testing to monitor instrument air quality, nor any trending activities. Please provide this information.

b. Appendix B, Section 4.11 to the LRA states that the results of periodic testing have verified that the instrument air quality is currently being maintained, and concludes that this provides reasonable assurance that aging effects will be properly managed.

3.3.4.3.2 Chilled Water

3.3.4.3.2-1 Discuss operating experience specific to the Chilled Water Systems and AMPs used. Provide a general assessment of the effectiveness of the programs as they relate to the operability and availability of Chilled Water System. Describe any detection of aging that resulted in corrective actions and any failures that were not detected by the AMPs. Discuss any changes to the AMPs brought about by operating experience.

3.3.4.3.2-2 Table 3.4–9 of the LRA, identifies Appendix B, Section 3.7, "Wall Thinning Inspection," as applicable to carbon steel piping, valves, thermowells, tanks and pumps in the Chilled Water System. However, the Wall Thinning Inspection Program only identifies the carbon steel components of two reactor building penetrations (numbers 51 and 59) as being applicable to the Chilled Water System. Please clarify the scope of the Wall Thinning Inspection with respect to Chilled Water System carbon steel components.

Appendix B, Section 3.7 of the LRA contains a statement that nondestructive examinations will be performed on susceptible component locations, but does not described the methods, the specific frequency of examinations, or sampling locations. Please describe the NDE methods/techniques that will be used to manage loss of material, i.e., localized and general corrosion, on applicable Chilled Water System components. Provide a discussion on the frequency of inspection and identify the maximum time allowed between inspections. In addition describe the means and the bases that will be used to determine the sampling populations.

3.3.4.3.2-3 Appendix B, Section 3.3, of the LRA, contains a statement that the Heat Exchanger Monitoring Program will inspect heat exchangers to the extent required to ensure seismic qualification is maintained. The safety-related systems and components for which this program manages aging effects are also listed. It includes the Service Water System, the Control Room Ventilation System and the Emergency Feedwater System. No reference is made to the Chilled Water System. Please clarify the scope and applicability of the Heat Exchanger Monitoring Program as it applies to the components included in the Chilled Water System as shown in Table 3.4–9 of the LRA.

3.3.4.3.2 Service Water

3.3.4.3.2-1 Appendix B, Section 4.19, "Service Water Integrity," describes testing, visual examination, thickness mapping, and chemical control activities used to maintain the Service Water Systems. Please provide the following additional information:

a. Appendix B, Section 4.19, "Service Water Integrity," of the LRA contains a statement that several performance monitoring tests (flow, heat transfer, etc.), visual examinations and thickness mapping activities, and chemical controls are used to manage loss of material, cracking, and fouling. Additionally, Table 3.4–10 of the LRA lists the Service Water Integrity Program for all environments, materials, commodity groups, and aging effects. It is unclear which of the activities (performance monitoring, thickness mapping, visual inspections, and chemical controls) apply to each of the commodity groups/materials/aging effects. Specifically state to which of the materials and components each of the activities in the Service Water Integrity program are targeted.

b. Describe the specific performance parameters used for the flow tests, heat exchanger tests, and pump and valve/sluice gate tests applied to each component in the Service Water System as part of the Service Water Integrity Program. Verify that all of these performance tests are targeted to manage fouling (and not loss of material or cracking) and describe how the parameters monitored will ensure the intended function of each component tested. In addition, state the frequencies and sampling parameters of each tests, and describe any trending associated with the tests that would predict the extent of fouling.

c. Describe the nondestructive examination methods/techniques used for piping wall thickness mapping as part of the Service Water Integrity Program. List the components and materials to which these examinations apply. In addition, describe the bases and extent of sampling (locations examined), and expansion criteria, with respect to the total population of applicable components. Finally, describe how monitoring or trending of inspection data results in the timely detection of aging effects that might compromise the intended pressure boundary function of piping in the service water system.

d. List the components subject to visual inspection as part of the Service Water Integrity program and describe the type of visual inspections used in relation to the applicable aging effect they are intended to manage.

e. Visual inspections of safety-related components, (e.g., valves, sluice gates and heat exchanger tubing) is used to manage cracking. Describe how a visual inspection can detect cracking before the pressure boundary function of these components is compromised.

f. Acceptance criteria for all performance monitoring, wall thickness mapping, visual inspections and chemistry control activities are in site procedures. Please describe these acceptance criteria and any methods for analyzing the results of the stated activities against industry standards. Describe corrective actions that would occur prior to compromising the intended function of each component in the service water system.

g. Discuss operating experience specific to the Service Water Systems and AMPs including the Service Water Integrity, and ASME Section XI-IWC and IWD used. Provide a general assessment of the effectiveness of the programs as they relate to the operability and availability of Service Water System. Describe any detection of aging that resulted in corrective actions and any failures that were not detected by the AMPs. Discuss any changes to the AMPs brought about by operating experience.

3.3.4.3.2-2 Appendix B, Section 3.3, of the LRA, contains a statement that the Heat Exchanger Monitoring Program will inspect the heat exchangers to the extent required to ensure seismic qualification is maintained and that this program addresses cracking and loss of material. However, Table 3.4–10 of the LRA indicates that the heat transfer function is affected by fouling and fouling will be managed by the Heat Exchanger Monitoring Program. Please clarify the purpose and scope of the Heat Exchanger Monitoring Program as it applies to the components shown in Table 3.4–10 of the LRA.

3.3.4.3.2 Penetration Room Ventilation

3.3.4.3.2-1 Table 3.4–11, “Penetration Room Ventilation System,” of the LRA identifies Penetration Room Ventilation System Testing Program as one of the programs that prevents loss of material to the exhaust stack in the external-ambient environment. However, a discussion of the Penetration Room Ventilation System Testing Program could not be found in the LRA. Please describe the system testing performed to manage the effects of aging consistent with the information provided in Appendix B to the LRA, and the information requested in the auxiliary systems RAIs.

3.3.4.3.2 Auxiliary Building Heating and Ventilation

None

3.3.4.3.2 Control Room Ventilation

3.3.4.3.2-1 Table 3.4–13 of the LRA identifies the Control Room Ventilation Program as the AMP used to manage loss of material on the internal surface of the carbon steel bodies of the evaporators. However, Appendix B, Section 4.21.3 of identifies fouling on the external surface of the cooling coil tubes as the only aging effect managed by the Control Room Ventilation Program. Please identify the AMP used to manage the loss of material on the internal surface of the carbon steel bodies of the evaporators. Describe this program consistent with the information provided in Appendix B to the LRA, and the information requested in the auxiliary systems RAIs.

3.3.4.3.2-2 Table 3.4-13 identifies the Oil Analysis Program as the program used to manage loss of material for both carbon steel compressor and condenser (heat exchanger) bodies exposed to lubricating oil. However, Appendix B, Section 4.14, of the LRA, which describes this program, includes the control room ventilation compressor but not condenser within its scope. Please identify the AMP used to manage the loss of material for the condenser body. Describe this program consistent with the information provided in Appendix B to the LRA, and the information requested in the auxiliary systems RAIs..

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