May 5, 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 Reactor Systems Branch, Plant Systems Branch, Materials and Chemical Engineering Branch, and the Mechanical and Civil Engineering Branch regarding Sections 2.2, 2.3.3.1, 2.3.3.2, 2.3.3.3, 2.3.3.4, 2.3.3.5, 2.3.3.6, 2.3.3.7, 2.3.3.8, 2.3.3.9, 2.3.3.10, 2.3.4, 3.3.2.2, 3.3.2.3, 3.3.2.7, 3.3.2.8, 4.5, 4.6, and 4.7.

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 Project Directorate
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

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Docket Nos. 50-313

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REQUEST FOR ADDITIONAL INFORMATION
ARKANSAS NUCLEAR ONE, UNIT 1
SECTIONS 2.2, 2.3.3.1, 2.3.3.2, 2.3.3.3, 2.3.3.4, 2.3.3.5, 2.3.3.6, 2.3.3.7, 2.3.3.8, 2.3.3.9, 2.3.3.10, 2.3.4, 3.3.2.2, 3.3.2.3, 3.3.2.7, 3.3.2.8, 4.5, 4.6, and 4.7

2.2 PLANT LEVEL SCOPING RESULTS

2.2-1 In a letter dated November 19, 1999, the NRC staff identified several structures that comprise the ultimate heat sink. These structures include the Dardanelle Dam. During discussions with the staff, based on your interpretation of the current licensing basis for ANO-1, you ensured that actions are being taken to monitor and maintain the integrity and reliability of, among other things, the Dardanelle Dam. Upon reviewing the ANO-1 license renewal application, specifically Table 2.2-2, “List of ANO-1 Structures,” no mention of the dam is made. Identify where in the LRA is the Dardanelle Dam identified as being within the scope of license renewal or provide a technical justification for excuding the dam from the scope of the rule.

2.2-2 Table 2.2.1 lists mechanical and electrical systems at the ANO-1 site and documents which of those system have components within the scope of license renewal. The Main Chiller Cooling Water system was identified as not being with the scope of license renewal. On page 2-43 of the LRA, however, you state that main chilled water system reactor building penetrations piping and valves are also included in the scope of license renewal since they provide for reactor building isolation. Please explain this discrepancy and, if required, provide any additional information required by 10 CFR 54.21.

2.2-3 FSAR section 14.1.2.8.4 describes the operation of the atmospheric dump valves during a recovery from a complete loss of all unit AC power. Table 2.2-1, which identifies all of the mechanical and electrical systems within the scope of license renewal, indicates that the atmospheric vent system is not within the scope of license renewal. Provide a technical justification for excluding the atmospheric vent system from within the scope of license renewal.

2.3.3.1 SPENT FUEL

2.3.3.1-1 Flow diagram LRA-M-235, Sheet 1 @E6, a piping section downstream of valve SF-41 is identified as being within the scope of license renewal and subject to an AMR. However, the piping identification (i.e., size, material) for this piping is not identified. Please provide this information.

2.3.3.1-2 Identify whether the strainer F-402 (LRA-M-235 @H4) is within scope and subject to an AMR. If this strainer is subject to an AMR, provide the relevant information associated with this component to complete Table 3.4-1, “Spent Fuel System. “ Otherwise, provide a justification for its exclusion from the list of components subject to an AMR.

2.3.3.1-3 Spectacle blind M-307 (LRA-M-235, Sheet 1@E6) is identified as being within the scope of license renewal and subject to an AMR. Please provide the relevant information associated with this component to complete Table 3.4-1, "Spent Fuel System."

2.3.3.1-4 Two lines off the within-scope Borated Water Storage Tank (BWST) T-3 (LRA-M-235 Sh.1 @ H7) provide a pressure boundary function for T-3, but are not identified as being within scope for license renewal. These lines include valves CA-77 and SF-51. Verify that these lines are within the scope of license renewal and subject to an AMR and provide the appropriate information to complete Table 3.4-1, or provide a justification for their exclusion.

2.3.3.2 FIRE PROTECTION

2.3.3.2-1 The ANO-1 License Renewal Application (LRA) states that the ANO-1 component database includes structures, systems, and components (SSC's) required to meet 10 CFR 50.48 and Appendix R, Sections III.G, III.J, and III.O.

a. Identify the specific types of analyses or plant evaluations, and documentation (e.g. UFSAR, fire hazards analysis, safe shutdown analysis, safety evaluations, etc.) that were used to identify fire protection SSC's within the scope of license renewal.

b. Furthermore, state if the "fire reanalysis" referred to in LRA Section 2.3.3.4 is the same scoping methodology described above, to identify plant fire protection SSC's that are required to place the plant in a safe shutdown condition for any single fire scenario. If not, describe the "fire reanalysis" and how it was also used to identify fire protection SSC's within the scope of license renewal.

c. Define the scope of FP masonry walls that are included within the scope of LR.

d. If all walls included within the scope of IE Bulletin 80-11 are not included in the scope of LR, provide the technical justification for their exclusion.

e. During implementation of USI A-46, masonry walls that are important to safety, but not covered by IE Bulletin 80-11, were identified at a number of operating plants. If additional masonry walls important to safety were identified under the ANO1 A-46 program, are these included in the scope of LR? If not, provide the technical justification for their exclusion.

2.3.3.2-2 System filters, fire extinguishers, fire hoses, and air packs are not included within the scope of license renewal and are not subject to an AMR. As a result of the staff's experience with license renewal, the staff has found that system filters, fire extinguishers, fire hoses, and air packs (within the scope of license renewal) may be excluded, on a plant-specific basis, from an aging management review

under 10 CFR 54.21(a)(1)(ii). These components are considered within the scope of license renewal and are typically replaced based on specific performance and condition monitoring activities that clearly establish a routine replacement practice based on a qualified life component. These components may be excluded based on specific performance and condition monitoring activities provided that the applicant (1) identifies and lists in the LRA each component type subject to such replacement, and (2) identifies the applicable programs that conform to appropriate standards (e.g., for fire protection components - applicable NFPA standards and 42 CFR Part 84). Justify the exclusion of these components from the scope of license renewal and an AMR.

2.3.3.2-3 LRA Section 2.3.3.2. does not list the following fire protection SSC's within the scope of license renewal: The fire protection jockey pump (casing), shown highlighted on LRA-M-219, Sheet 1; the carbon dioxide system, listed as not being within the scope of license renewal in LRA Table 2.2-1; and the fire hydrants, which were not identified in LRA Section 2.3.3.2. These components appear to have fire protection intended functions required for compliance with 10 CFR 50.48 as stated in 10 CFR 54.4(a)(3). Provide justification for their exclusion from within the scope of license renewal.

2.3.3.2-4 LRA-M-219, Sheet 1, Note 5, states that fire pumps P6A, P6B, and P11 draw water from the service water pump bays C, A,& B respectively. LRA Section 2.3.3.10, "Service Water," states that the service water system is credited in the fire analysis because if the source of water from Lake Dardanelle is lost, the emergency cooling pond can supply the water to the intake structure for use by the fire pumps. Therefore, the source of fire water is then either Lake Dardanelle or the emergency cooling pond, which are both raw water sources. Since raw water sources are known to contain small particles of mud or debris which can clog small orifice sprinklers, NFPA 13, "Standard for the Installation of Sprinkler Systems," Section 3.7-6, provides guidance for the use of strainers for sprinkler heads below a certain orifice size. Strainers appear to be passive and long-lived and LRA Section 2.3.3.2, "Fire Protection," and LRA Table 3.4-2, "Fire Protection," do not identify strainers as a component within scope of license renewal that is subject to an AMR. State if strainers are used in the fire water system at ANO-1. If not, provide a justification based on the discussion provided above. If so, include them within the scope of license renewal and subject to an AMR or provide a justification for not including fire water system strainers within the scope of license renewal or not subjecting them to an AMR.

2.3.3.2-5 LRA Section 2.3.3.2 states that the fire water distribution system including the portion of the outside loop, sectional control valves, isolation valves, standpipes, and hose stations that are required for protection of safety-related areas are included within the scope of license renewal and are subject to an aging management review. For the portion of the outside fire protection loop within the scope of license renewal, flow diagram LRA-M-2219, Sheet 5, shows piping and valves connected to the outside fire protection loop, which are not highlighted.

a. Verify that the piping and valves which are not highlighted, are not required for the protection of safety-related areas. Furthermore discuss

how the failure of the piping and valves which are not highlighted, would not effect the capability of the portion of the outer fire water loop, required for compliance with 10 CFR 50.48, to perform its intended.

b. The standpipes have been identified in the LRA as being subject to an AMR. Describe the program that manages or detects aging of the standpipes and the criteria to determine acceptability.

2.3.3.2-6 LRA Section 2.3.3.2 states that the diesel driven fire pump, including the engine gearbox oil cooler, the jacket water heat exchanger, and the lube oil cooler are within the scope of license renewal and are subject to an aging management review. A comparison of LRA Table 3.4-2 to flow diagram LRA-M-219, Sheet 1, shows that all of the components with intended functions that support the diesel fire water pump are highlighted on the flow diagram as being within the scope of license renewal. However, they are not all listed on Table 3.4-2 as being subject to an AMR. The components highlighted which are not listed in Table 3.4-2 as being subject to an AMR include the following: intake air filter, lube oil filter, turbocharger, and starter. These components appear to be passive, long-lived components that are subject to an AMR.

a. Provide justification for the exclusion of these components that support the diesel fire pump, from an AMR.

b. Clarify if the lube oil and engine gear box oil cooler components are evaluated within the “commodity grouping” listed as cooling water, in Table 3.4-2.

2.3.3.2-7 Flow diagram LRA-M-219, Sheet 1 omits the following fire protection piping from within scope of license renewal:

- lube oil tank deluge system (D-3)
- lube oil storage tank T-26 (D-1)
- fuel oil tank sprinkler system (D-7)
- MFW pump deluge system (E-3)
- basement sprinkler system (E-3)
- piping located off of FS-43 and FS-90 (Column 2)
- hydrogen seal oil unit deluge system (F-3)
- outside firewater loop to wall sprinkler system (Column 1)

Provide justification for the exclusion of fire protection piping, for the systems listed above, from within the scope of license renewal.

2.3.3.8 INSTRUMENT AIR

2.3.3.8-1 As indicated in the FSAR, Table 9-2, air operated valves CV-6202 and CV-6203 provide containment isolation function in the event of a LOCA. Please indicate whether the pneumatic tubing from valves SV-6202/3 which controls the air supply to these valves is within scope for license renewal and subject to an AMR.

The tubing is not highlighted as being within the scope of license renewal on diagram LRA-M-222 Sh. 1 @ F5, but may perform a pressure boundary intended function. Valves SV-6202/3 are highlighted indicating the valves are within the scope of license renewal.

2.3.3.9 CHILLED WATER

2.3.3.9-1 Emergency feed water (EFW) pumps are required for various design basis accidents. The EFW pump room unit coolers, which are cooled by chilled water, are not identified as being within the scope of license renewal. EFW pump operation under accident conditions may not be assured without adequate room cooling. Provide a justification for omitting these coolers from the scope of license renewal, or include EFW pump room coolers, and that portion of the Chilled Water system that supports the operation of the EFW pump room coolers.

2.3.3.10 SERVICE WATER

2.3.3.10-1 Lube oil drain valves Valves LO-8430A, B, and C and its associated piping are not highlighted as being within the scope of license renewal on LRA-M-209. Should these valves degrade and leak, the service water pump may not be able to perform its intended function. Include these valves and piping within the scope of license renewal and subject to an AMR, or provide a justification for excluding them from the scope of license renewal.

2.3.3.10-2 Components F-510A and B are identified as part of service water system and are identified as being within the scope of license renewal (LRA-M-209 Sheet 1 @B1). The staff, however, could not find an adequate description (e.g., material, environment) of what these components are and whether they are identified on Table 3.4-10. Please provide a description of these components and state whether they are subject to an aging management review or indicate where on Table 3.4-10 the components are identified.

2.3.3.10-3 Strainer F-118C (LRA-M-209, Sheet 1 @C4) is not highlighted as being within the scope of license renewal. Please provide a justification for the omission of this component, or submit the appropriate information to complete Table 3.4-10.

2.3.3.10-4 Flow orifices in the suction piping to each service water pump are identified as being within the scope of license renewal on LRA-M-209 Sh.1, but are not listed on Table 3.4-10 as being subject to an AMR. Verify that these components are subject to an AMR or provide a justification for their exclusion from Table 3.4-10.

2.3.3.3 EMERGENCY DIESEL GENERATOR SYSTEM

2.3.3.3-1 Subsection 8.3.1.1.7.1 of the UFSAR states that sufficient drainage is provided in the emergency diesel generator rooms to “maintain the level of flooding water

below that at which damage to the equipment will result." This drain piping may meets the scoping requirements of 10 CFR 54.4(a)(2). Identify the system or portion of system that provides drainage for the EDG rooms and identify where this system has been identified as being within the scope of license renewal in the license renewal application. If the drainage system is not considered within the scope of license renewal, provide a justification for its exclusion.

2.3.3.3-2 The following components identified as being within the scope of license renewal on flow diagrams LRA-M-217 Sheets 3 and 4, but are not included on Table 3.4-3. Table 3.4-3 lists the components subject to an AMR for the EDG system. Identify whether the following components are subject to an AMR, and if so, provide the relevant information about the components to complete Table 3.4-3. If a component is not considered subject to an AMR, provide a justification for its exclusion.

- Exhaust silencer (M-217 Sh. 3 @G7)
- Turbocharger (M-217 Sh. 3 @ E8)
- Crankcase ejector (M-217 Sh. 3 @ E7)
- Expansion joints (M-217 Sh. 3 @ G8 and Sh. 4 @ D7)

2.3.3.4 AUXILIARY BUILDING SUMP AND REACTOR BUILDING DRAINS

2.3.3.4-1 Valves located in the valve pits on LRA-M-213, Sheet 2 @C7 are identified as being within the scope of license renewal. However, drain lines associated with these valves are not included in the scope of license renewal. Section 2.3.3.4 of the LRA states that the valves and piping that isolated the DH pump rooms which are credited as part of the room pressure boundary for offsite dose calculations are within the scope of license renewal and subject to an AMR. Please provide a justification for the exclusion of these piping sections.

2.3.3.5 AAC GENERATOR SYSTEM

2.3.3.5-1 The following pipe sections (tubing) were not identified as being within the scope of license renewal. Please verify that these components do not have a system-/component-level intended function that would require them to be included within the scope of license renewal.

- Pressure sensing lines (including screw cap) to valves 2PCV-7239A, 2CV-7243, and 2CV-7241A,B,C (M-2241 Sh. 4 @ F3, D3, and E/F2, respectively)
- Crank case vent line on (M-2241 Sh. 2 @ C5)
- Crankcase pressure instrument lines (M-2241 Sh. 4 @ C3)
- Piping and components that support the operation of the pre-lube oil pump control valve 2CV-7243 (M-2241 Sh. 4@ D1)

2.3.3.5-2 Several components identified on flow diagrams M-2241, as being within the scope of license renewal are not included on Table 3.4-5. This table lists the

components subject to an AMR for the AAC Diesel Generator System. Identify whether the following components are subject to an AMR, and if so, provide the relevant information to complete Table 3.4-5. If a component is not subject to an AMR, provide a justification for its exclusion.

- Removable spool (M-2241 Sh. 4 @ D/E3 and M-2241 Sh. 5 @ B5/7)
- Lubricators 2M-21A, B, C and 2M-22 (M-2241 Sh. 4 @ E/F2 and D2)
- Pump casing (M-2241 Sh. 4 @ D1)
- Governor 2M-9 (M-2241 Sh. 4 @ B1)
- Exhaust silencer 2M-12 (M-2241 Sh. 2 @ G6)
- Lube oil system filters, e.g., 2F-7119A, B, C (M-2241 Sh. 5 @ C6)
- Electric heating coil (M-2241 Sh. 5 @A6 and Sh. 1 @ E5)
- Expansion tank sight glass (M-2241 Sh. 1 @ H5)
- Vacuum breakers (M-2241 Sh. 1 @ D8)

2.3.3.6 HALON SYSTEM

2.3.3.6-1 The halon system provides fire protection for the ceiling and false floor of the ANO-1 control room as required by 10 CFR 50.48. LRA Section 2.3.3.6 states that the bottle racks, supports for the system, ceiling tiles, marinite boards, concrete walls, and concrete and false floor components which are required to enclose and allow effective use of the halon system are evaluated in Section 2.4.3, “Auxiliary Building.” Section 2.4.3 refers to a listing, contained in Table 3.6-4, of the auxiliary building passive, long-lived components and unique commodities, that are subject to an AMR. The listing in Table 3.6-4 does not list the ceiling tiles, marinite boards, concrete walls, and concrete and false floor components as being subject to an AMR.

Verify that the control room halon system supports listed in LRA Table 3.6-4, include the ceiling tiles, marinite boards, concrete walls, and concrete and false floor components referred to in LRA Section 2.3.3.6. If they are not contained in the commodity grouping identified in LRA Table 3.6-4, provide justification for the exclusion of these components from an AMR.

2.3.3.6-2 The halon smoke detectors found on LRA-M-219, Sheet 2 are not shown within the scope of license renewal. FSAR Section 9.8.2, “System Description and Evaluation,” states that the halon system distribution nozzles may be automatically actuated by the smoke detectors for the control room ceiling, auxiliary control room ceiling, and auxiliary control room floor. The halon fire detection system appears to be within the scope of license renewal per 10 CFR 54.4. Provide justification for the exclusion of these smoke detectors from within the scope of license renewal.

2.3.3.7 FUEL OIL SYSTEM

2.3.3.7-1 The following tanks have been identified as being within the scope of license renewal. Their intended functions include storing and supplying fuel oil to

various diesel driven component. For each tank, however, the piping and components that vent the tank to atmosphere in not identified as being within the scope of license renewal. For these tanks, provide a justification of the exclusion of the vent line components, or identify the components as being within the scope of license renewal and determine whether an aging management review is required.

- [AAC Diesel Fuel Oil] Day Tank 2T-11
- Emergency Diesel Fuel Tank T-57A/B
- Diesel Oil Storage Tank T-25
- Fuel Oil Day Tank T-30 A/B
- Diesel Driven Fire Pump Day Tank T-29

2.2.3.7-2 The following pipe sections (tubing) were not identified as being within the scope of license renewal. Please verify that these components do not have a system-level intended function that would require them to be included within the scope of license renewal.

- Level instrument tubing for the Fuel Oil Day Tank (M-217 Sh. 2 @ H3)
- Governor instrumentation tubing for the diesel driven fire pump (M-219 Sh.1 @ B7)

2.3.3.7-3 EDG flow diagram M-217 Sh. 1 includes a boundary point at location H3 where the EDG fuel Oil Storage System connects to Fuel Oil Day Tank T-28. The boundary point does not include a boundary valve or other isolation device that prevents the fuel oil transfer system from performing its intended function should that section of pipe become degraded. Provide a justification for not including that portion of piping between the EDG fuel oil transfer system and the fuel oil day tank.

2.3.3.7-4 Several components identified on flow diagrams M-217, 219, 2241 as being within the scope of license renewal are not included on Table 3.4-7. This table lists the components subject to an AMR for the Fuel Oil System. Identify whether the following three components are subject to an AMR, and if so, provide the relevant information to complete Table 3.4-7. If a component is not subject to an AMR, provide a justification for its exclusion.

- Expansion joints (M-217 Sh. 2,3 @ H2, G8)
- Flexible coupling connecting the filter to the system flow (M-219 Sh.1 @ A7 and M-2241 Sh.3 @ D4,E4)
- Sight glass on day tank T-29 (M-2241 Sh.3 @ A8)
- Orifice (2FO-7195 on M-2241 Sh. 3 @ D6)

2.3.4 Steam and Power Conversion Systems

2.3.4-1 In Drawing No. LRA-M-206, Sheet 1, Location F6 (Steam Generator Secondary System), the tubing and valve (No. MS-2652), which connect instrument Nos. PT2652, HS2652 to the steam generator, are not highlighted as within the scope

of license renewal. The tubing and valve appear to serve as a pressure boundary. Verify that the tubing and valve are within the scope of license renewal and subject to an AMR and provide the appropriate information to complete Table 3.5-1, or provide a justification for their exclusion.

2.3.4-2 In Section 2.3.4.1 (Main Steam), EFW turbine steam supply piping, but not EFW turbine casing, is identified as a component within the scope of license renewal. Verify that the EFW turbine casing is within the scope of license renewal and subject to an AMR and provide the appropriate information to complete Table 3.4-1, or provide a justification for its exclusion.

2.3.4-3 As shown in Drawing No. LRA-M-206, Sheet 2 , a small portion of the Emergency Feedwater Initiation and Control (EFIC) system is included within the scope of license renewal. Provide a justification as to why the rest of the EFIC system is excluded from the scope of license renewal.

2.3.4-4 Identify, if any, filters, orifices, or expansion joints in the main steam system (Section 2.3.4.1) are within the scope of license renewal. State specifically as to whether or not they serve a pressure boundary function.

2.3.4-5 Justify the exclusion of the demineralizer of the condensate storage and transfer system (Section 2.3.4.4) from the scope of license renewal. The demineralizer appears to serve as a pressure boundary for the condensate storage system.

2.3.4-6 Identify, if any, filters, mechanical expansion joint, orifice, and strainers in the condensate storage and transfer system (Section 2.3.4.4) are within the scope of license renewal.

3.3.1.4.4 BORIC ACID CORROSION PREVENTION

3.3.1.4.4-1 Appendix B of LRA “Aging Management Programs and Activities”, Section 4.5 “Boric Acid Corrosion Prevention” states under “Aging Effects” that this program has been identified as managing the loss of material of bolting that could eventually result in loss of preload for bolted connections. Provide rationale as to why the program is not credited to manage aging effect of loss of material in reactor vessel head due to any coolant leakage from control rod drive penetrations or other vessel head penetrations.

3.3.1.4.4-2 Does the the site Quality Assurance Program pursuant to 10 CFR 50, Appendix B address the “confirmation” element of all the AMP describe under Appendix B.

3.3.1.4.9 ASME Section XI Inservice Inspection

Are there components or structures within the inservice inspection boundary that are either inaccessible or cannot be examined in accordance with the applicable Code due to geometry and/or physical constraints? If there are, please provide a summary to address the following elements for <u>inaccessible</u> areas:

a. Preventive actions that will mitigate or prevent aging degradation;
b. Parameters monitored or inspected relative to degradation of specific structures and component intended functions;
c. Detection of aging effects before loss of structure and component intended functions;
d. Monitoring, trending, inspection, testing frequency, and sample size to ensure timely detection of aging effects and corrective actions;
e. Acceptance criteria to ensure structure and component intended functions; and
f. Operating experience that provides objective evidence to demonstrate that the effects of aging will be adequately managed.

3.2.2 REACTOR COOLANT SYSTEM PIPING AND LETDOWN COOLERS

3.3.2.2.2-1 Table 4-1 of BAW-2243A, "Demonstration of the Management of Aging Effects for the Reactor Coolant System Piping" identifies aging management programs (AMPs) to manage the aging effects of RCS piping component groupings. The components are grouped in accordance with their types, materials of construction and aging effects. Table 3.2-1 of the license renewal application (LRA) lists AMPs at ANO-1 to manage the aging effects in its RCS piping and letdown cooler components. Comparing both tables, the staff finds that several AMPs recommended in Table 4-1 of the topical report are not included in Table 3.2-1.

a. Identify the American Society of Mechanical Engineers (ASME) Section XI, Examination Categories for dissimilar welds, small bore piping, and cast austenitic stainless steel (CASS).

b. Identify the augmented inservice inspection (ISI) plan for high pressure injection (HPI)/make up (MU) branch connections and thermal sleeves in response to GL 85-20, "Resolution of Generic Issue 69: High Pressure Injection/Make-up Nozzle Cracking In Babcock and Wilcox Plants."

c. Provide revised Tables 3.2-1 in order to correct the discrepancies.

3.3.2.2.2-2 Table 2.3-2 of the LRA contains the ANO-1 response to the Renewal Applicant Action Items identified in the staff's safety evaluation concerning B&W Owners Group (B&WOG) Report BAW-2243. BAW-2243 addresses the reactor coolant system piping. In its safety evaluation, the staff indicated that a license renewal applicant would have to provide additional details regarding a one-time augmented volumetric inspection of the Alloy 82/182 clad flowmeter section of the hot leg. Table 3.2-1 of the LRA indicates that the hot leg flowmeter assembly will be managed by the Alloy 600 program. The Alloy 600 program is described in Appendix B, Section 4.1 of the LRA. The program discussion does not specifically address the flowmeter section of the hot leg. Provide the plan and program to perform a volumetric inspection of the carbon steel from the exterior of the flowmeter assembly element to determine gross structural integrity, as stated in Section 4.4.1 of the BAW-2243A.

3.3.2.2.2.1-1 In the final safety evaluation report (FSER) for BAW-2243A, the staff approved the ASME Section XI, examination categories B-M-1 and B-M-2 (as supplemented by the evaluation procedure described in Section 4.2 of BAW-2243A) for valves in the letdown line and the pressurizer spray line block valve fabricated from CASS. There are discrepancies between the FSER, Table 3.2-1 and Section 3.2.2 of the LRA. Describe the ANO-1 examinations for managing the aging effects for the valves in sufficient detail to allow the staff to evaluate the examinations consistent with the FSER for BAW-2243.

3.3.2.2.2.1-2 In Table 3.2-1 of the LRA, the AMPs for the letdown coolers include Section XI, Examination Category B-P, and leakage detection in reactor building. Since leakage could result in boric acid reaching the outer surface of the reactor pressure vessel causing loss of material, identify whether the boric acid corrosion prevention program is necessary for managing cracking, loss of material, and loss of mechanical closure integrity for the letdown coolers. In addition, identify whether the bolting and torquing activities program is necessary for managing the above mentioned aging effects. If the boric acid corrosion prevention and the bolting and torquing programs are not determined to be necessary for managing applicable aging effects, provide a justification for this conclusion.

3.3.2.2.2.2-1 Table 2.3-2 of the LRA contains the ANO-1 response to the renewal applicant action items identified in the staff's safety evaluation concerning B&W owners group (B&WOG) report BAW-2243A. BAW-2243A addresses the reactor coolant system piping. In its safety evaluation, the staff indicated that a license renewal applicant would have to provide additional details regarding its augmented inspection program for small bore piping. In addition, Table 2.3-4 contains the ANO-1 response to the renewal applicant action items addressed in the staff's safety evaluation concerning BAW-2244A. BAW-2244A addresses the pressurizer. An augmented inspection program for the pressurizer small bore piping nozzles and safe ends was also identified as a renewal applicant action item. The augmented inspection program addressing the action items from both topical reports is described in Appendix B, Section 4.3.8 of the LRA. For the reactor coolant system piping and the pressurizer small bore piping nozzles and safe ends, provide the following:

a. The technical basis for not including lines less than 1" NPS in the sample inspections.

b. Discuss the effectiveness of volumetric examination in finding, for example, a fatigue crack; and depending on the effectiveness of the volumetric examination, identify any other examination techniques that may be used for the augmented inspections.

c. Indicate whether small bore Alloy 600 piping will receive a one-time volumetric examination, and provide a schedule for performing the examination.

d. Discuss the results of previous inspections performed on the small bore or Alloy 600 piping, nozzles and safe ends.

3.3.2.3 PRESSURIZER

3.3.2.3.2-1 In the FSER for BAW-2244A, "Demonstration of the Management of Aging Effects for the Pressurizer," the staff identified pressurizer components that may be susceptible to cracking. The LRA may not have considered all pressurizer components that are subject to an aging management review (AMR), and may not have AMPs to manage the applicable aging effects. Determine if the following components are subject to an AMR. If so, identify the, the applicable aging effects, the AMPs for managing each aging effect; and provide a demonstration that the effects of aging will be maintained consistent with the CLB for the period of extended operation. If not provide a justification for excluding these component from an AMR.

- tripod legs attached to the pressurizer vessel
- stainless steel nozzle forgings
- surge nozzle to stainless steel safe-end joint
- ensure that the update to Table 3.2-1 includes any changes or additions in response to this item.

3.3.2.3.2.2-1 In the LRA for ANO-1 the applicant states that they will continue to implement the monitoring program for Alloy 600 and Alloy 82/182 locations in the ANO-1 pressurizer. In addition, the applicant indicated that the susceptibility model for ranking the Alloy 600 and Alloy 82/182 components in the pressurizer is based on the same Electric Power Research Institute (EPRI) susceptibility model that was used to rank Alloy 600 CRDM penetration nozzles in B&W designed reactor vessels. The model was described in topical report BAW-2301. This model is based on comparing the time it would take an axial crack to initiate and grow to 75% throughwall relative to the time it would take the worst case axial crack detected at D.C. Cook Unit 2 to grow to 75% throughwall. The worst case axial crack detected at D.C. Cook Unit 2 in 1994 was 43% throughwall. A more detailed description of how the cracking at D.C. Cook Unit 2 is used in the susceptibility model calculations is given in the NEI letter to the staff dated December 11, 1998 (i.e., Letter from D. Modeen, Director of Engineering, Nuclear Generation Division, NEI, to G.C. Lainas, Acting Director of Engineering, Office of Nuclear Reactor Regulation, U.S.N.R.C.), "Responses to NRC Requests for Additional Information on Generic Letter 97-01."

The staff has accepted the EPRI model as an acceptable approach for monitoring the Alloy 600 and Alloy 82/182 components in the PWR CRDM penetration nozzles and other vessel head penetration nozzles. The applicant indicated that they would apply this model to the Alloy 600 and Alloy 82/182 components in the pressurizer and that the Alloy 600 reference item used for the crack initiation and growth modeling is the pressurizer instrumentation nozzle. This nozzle was determined to have a throughwall crack in 1990. With respect

to how the EPRI model will predict the susceptibility of Alloy 600 and Alloy 82/182 pressurizer components to cracking:

a. Provide further clarification about how the cracking detected in the Alloy 600 instrumentation nozzle in 1990 (the reference item for the modeling of the pressurizer components) is used to arrive at a susceptibility ranking for the remaining Alloy 600 and Alloy 82/182 components in the ANO-1 pressurizer. State whether application of the EPRI model to the Alloy 600 and Alloy 82/182 pressurizer components requires any adjustment in the EPRI model based on the cracking of the ANO-1 pressurizer instrumentation line in 1990. Also include the basis for why it is acceptable to apply the EPRI model to the Alloy 600 and Alloy 82/182 pressurizer components.

b. Using the proposed pressurizer Alloy 600 model, indicate whether any of the Alloy 600 or Alloy 82/182 components in the pressurizer are predicted to have crack growth to 75% throughwall within or before the period of extended operation. If so, provide the schedule for conducting volumetric inspections of these components.

3.3.2.7 REACTOR COOLANT PUMP

3.3.2.7.2.2-1 In Section 3.2.7 of the LRA, the applicant stated that the aging effects applicable to seal water heat exchangers are cracking and loss of material of the inner tube, which carries the primary reactor water. The aging management programs (AMPs), identified by the applicant in Table 3.2-1 of the LRA, include primary water chemistry monitoring, ASME Section XI inservice inspection (ISI), and leakage detection in reactor building. The inner tube of the heat exchangers maintains the reactor coolant pressure boundary, and the outside surface of the tube is exposed to treated water from the intermediate cooling water system. Table 3.2-1 does not reference the auxiliary system water chemistry monitoring program as one of the AMPs for the seal water heat exchangers. Describe how cracking of the outside surface of the heat exchangers inner tube is managed.

3.3.2.8 CONTROL ROD DRIVE MECHANISM PRESSURE BOUNDARY

3.3.2.8.2.2-1 The applicant identifies four AMPs for control rod drive mechanism (CRDM) pressure boundary components. These include ASME Section XI ISI, the leakage detection in reactor building, primary water chemistry monitoring, and bolting and torquing activities. Since leakage could result in boric acid reaching the outer surface of the reactor pressure vessel and could cause loss of material, identify whether the boric acid corrosion prevention program is necessary for managing the the loss of material for the CRDM pressure boundary components. If not, provide a justification for excluding loss of material due to boric acid corrosion as an aging effect for the CRDMs.

3.3.2.8.2.2-2 The CRDM motor tube housings provide the reactor coolant pressure boundary for the CRDMs during service. The housings, which are made from stainless steel or Alloy 82/182 clad low-alloy steel, are filled with borated water during service. Possible PWSCC and fatigue failure of the housings is managed by the applicant through the primary water chemistry monitoring program. However, the coolant in the housing is relatively stagnant and its local chemistry may not be effectively controlled by the primary water chemistry system. Identify whether there are any locations in the CRDM pressure boundary system where the water chemistry may not meet acceptance criteria because of accumulation of contaminants and radiolytic oxygen. One such instance, is described in Palisades inspection report 50-255/99012 (DRP). Cracks were observed in the vicinity of the "J" welds which attach the seal housing tube to the autoclave flange. If such area of contaminant accumulation exist, discuss whether aging management of the affected components is necessary, and whether any programs are in place to detect or to mitigate the aging effects. If not, provide a justification for excluding cracking due to contaminant accumulation as an applicable aging effect for the CRDM motor tube housings.

4.5 CONCRETE REACTOR BUILDING TENDON PRESTRESS

4.5-1 Loss of reactor building (RB) prestress has been identified in the Arkansas Nuclear One, Unit 1 (ANO-1) LRA as a time-limited aging analysis (TLAA). It is evaluated in Section 4.5 of the LRA. Section 4.5 of the LRA states that "ANO-1 is completing a calculation of the final effective tendon prestress based on additional information on concrete creep from existing creep tests and results of the tendon surveillance testing." This calculation is expected to confirm projections on the relaxation of the tendons and will show that the tendons will be acceptable for the period of extended operation. This type of analysis would be consistent with a TLAA performed in accordance with 10 CFR 54.21(c)(1)(ii). The application also that the ASME Section XI Inservice Inspection Program, IWL Inspections will be adequate to manage the effects of aging on the intended function for the period of extended operation. This is followed by a statement in LRA Section 4.5 that the "implementation of this program dispositions this time-limited aging analysis in accordance with 10CFR54.21(c)(1)(iii)." Therefore, it is not clear which approach is being taken to address the TLAA for loss of tendon prestress.

If the TLAA is performed in accordance with 10 CFR 54.21(c)(1)(ii), provide the following:

a. the minimum required prestressing force value (MRV) for each group,

b. the predicted lower limit (PLL) prestressing force for each group of tendons (per NRC R.G. 1.35.1),

c. a plot comparing the measured prestressing forces obtained from each inspection and the PLL,

d. trend lines of the measured prestressing forces for each group of tendons (per IN 99-10, the trend lines will be developed using a regression analysis

considering individual tendon lift off forces rather than the average lift off forces for each group of tendons),

e. extension of the PLL and trend lines for 60 years, and

f. description of corrective actions if item e above is unsuccessful.

If the TLAA is performed in accordance with 10 CFR 54.21(c)(1)(iii), the staff considers certain attributes to be significant for adequate management of the aging effects. These include:

a. Identification of parameters monitored.

b. Documentation of prestressing monitoring activities and trending of results.

c. Definition of acceptance criteria.

d. Identification of corrective actions when the acceptance criteria are not met.

e. Inclusion of plant specific and applicable industry operating experience.

In addition, provide a summary of the documentation which forms the basis for the FSAR section addressing the tendon prestress calculations corresponding to the end of the 40-year service life.

4.6 REACTOR BUILDING LINER PLATE FATIGUE ANALYSIS

4.6-1 LRA Section 4.6 describes the TLAA for fatigue of the reactor building liner plate and penetrations for ANO-1. The applicant concludes that the design-basis fatigue analysis remains valid for the extended period of operation, and that it meets the criteria of 10 CFR 54.21(c)(1)(i).

The staff has determined that additional technical information is needed in the LRA, Section 4.6, to substantiate the conclusion. Therefore, the staff requests the following additional information:

a. For the liner plate, describe how pressure cycling due to integrated leak rate tests has been included in the calculation of cumulative fatigue usage, and define the number of cycles assumed in the design-basis calculation and the projected number of cycles through the extended period of operation. Describe the basis for the projection through the extended period of operation.

b. Describe the basis for concluding that the number of heatup-cooldown cycles assumed in the design-basis (500) envelopes the number of such cycles projected through the extended period of operation. What is the projection based on plant operating experience to date?

c. For each liner plate penetration within the scope of this TLAA, define all transient pressure and temperature events considered in the design-basis calculation, define the number of occurrences assumed for design, and define the projected number of occurrences through the extended period of operation. Describe the basis for the projection through the extended period of operation.

d. For the feedwater and main steam line penetrations, identify the evaluation boundary between the liner plate and the piping. Also describe the TLAA that addresses any part of the penetration not included in the liner plate TLAA.

e. Provide the basis for the statement that the design of the RB penetrations meets the general requirements of ASME Section III for thermal cycling. Show that this statement is applicable to the feedwater and steam line penetrations.

4.7 AGING OF BORAFLEX IN SPENT FUEL POOL RACKS

4.7-1 The LRA, Section 4.7, describes the TLAA for the degradation of Boraflex, which is currently used in Region I of the ANO-1 spent fuel storage racks as a neutron absorber. In response to Generic Letter (GL) 96-04, you committed to continued monitoring and analysis of the Boraflex degradation at ANO-1. The LRA, Section 4.7, states that the existing coupon monitoring program will be continued, as required, into the extended license period. In addition, monitoring of the spent fuel pool silica levels and perform silica evaluations will also be continued into the period of extended operation. These evaluations are based on the EPRI RACKLIFE system or its equivalent. Projected Boraflex performance will be assessed to confirm that a 5% subcriticality margin will be maintained as required.

Your response to GL 96-04 states that long term and accelerated test location coupon specimens are periodically removed and inspected and that “the inspections provide an indication of the general condition of the Boraflex, including gross or unusual degradation.” Long term coupons are tested approximately every five years, while accelerated coupons are tested after each refueling. In addition, monitoring of the spent fuel pool silica levels, silica evaluations based on the EPRI RACKLIFE system or its equivalent, and assessment of the projected Boraflex performance to confirm a 5 percent subcriticality margin will continue through the next evaluation period. These assessments will be performed each cycle prior to fuel receipt.

In order to complete the evaluation of this TLAA, the staff requests the following information:

a. Clarify that the frequency of the inspection and testing as discussed above will be the same for the extended license period.

b. Are there sufficient long-term and accelerated coupons to continue the existing monitoring program through the end of the extended license period? If not, by what other means will indications of actual Boraflex degradation be obtained?

c. Describe the physical conditions that are observed during the inspection of the sampling coupons. Do they include inspections for discoloration, hardness and reduction of thickness? If not, what conditions are observed that are directly related to the degradation of the Boraflex?

d. Boraflex panel degradation can be characterized by gap formation and a decrease in areal boron density. Clarify how these parameters are monitored by the ANO-1 program. If not, provide the technical bases for not monitoring these parameters.

e. Provide the results of current trending analyses that have been obtained by use of the RACKLIFE code. Do these results demonstrate that the 5% subcriticality margin of the spent fuel racks will be maintained for the extended period of operation? If not, describe the corrective actions that will be implemented to ensure that the 5 percent subcriticality margin will be maintained through the extended period of operation.

Arkansas Nuclear One
Docket No. 50-313

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