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Subject: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
License Renewal Application RAI Clarifications (TAC No. MA8054)

Gentlemen:

The following discussions provide either clarifications or corrections to previous requests for additional information (RAIs) from the NRC Staff. This supplemental information responds to concerns or questions raised by the Staff during the review of the RAI responses.

Fire Protection

By letter dated August 30. 2000 (1CAN080007), Entergy Operations provided responses to RAIs concerning the fire protection system at Arkansas Nuclear One, Unit 1 (ANO-1). The following clarifications pertain to RAIs contained in the August 30, 2000, correspondence.

- RAIs 2.3.3.2-3, 2.3.3.2-5, and 2.3.3.2-7: Section 2.1.2 of the ANO-1 License Renewal Application (LRA) describes the scoping of structures, systems, and components that are required to comply with 10CFR50.48. As discussed in this section, the ANO-1 component database includes nonsafety-related components (both mechanical and electrical) that are required to meet 10CFR50.48. These components are included in the license renewal scope.

  The component database referred to in this discussion includes an "F-List" designation for nonsafety-related components that are required to meet 10CFR50.48. The F-List defines the equipment that is part of the ANO-1 current licensing basis and is required to comply with 10CFR50.48 and 10CFR50 Appendix R. The F-list, which establishes the ANO-1 current licensing basis for compliance with 10CFR50.48 for mechanical and electrical components, was the source used to identify components within the scope of license renewal that meet the criteria of 10CFR54.4(a)(3) for 10CFR50.48 components.

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Currently, the ANO-1 Safety Analysis Report (SAR) includes a description of fire protection equipment required to meet 10CFR50.48, and fire protection equipment that is installed at ANO-1 but is not required to meet 10CFR50.48. This has led to confusion regarding which equipment is required. A SAR change will be prepared to clarify the 10CFR50.48-required fire protection equipment. The source of information to make this distinction is the component database F-list. The discussion below explains why specific components identified in RAIs are not in the ANO-1 current licensing basis for 10CFR50.48.

- RAI 2.3.3.2-3: The fire protection jockey pump is not required for compliance with 10CFR50.48 because its only function is to ensure that system pressures are maintained above the minimum set point pressure of the main fire pumps, thus minimizing the cycling of the larger pumps. It is separated from the fire system pressure boundary by a check valve and is, therefore, not a pressure boundary component.

  The carbon dioxide system is not required for compliance with 10CFR50.48 because its function is strictly to minimize damage to plant property (the main turbine and exciter) in the event of a fire. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

  The fire hydrants are not required for compliance with 10CFR50.48 because they are not a primary source of fire protection needed to support safe shutdown in the event of a fire. Although some of the fire hydrants may be used as a secondary source of fire protection, fire hydrants are not credited for compliance with 10CFR50.48. The types of fires that these hydrants are intended to extinguish would not prevent safely shutting down the plant.

- RAI 2.3.3.2-5: The piping leading to the low level radwaste building fire system is not required for compliance with 10CFR50.48 because its function is strictly to minimize damage to plant property (the low level radwaste building) in the event of a fire. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

- RAI 2.3.3.2-7: The lube oil deluge system fire protection piping is not required for compliance with 10CFR50.48 because its function is strictly to minimize damage to plant property (the main turbine) in the event of a fire. The types of fires that this system is intended to extinguish would not prevent the capability of safely shutting down the plant. The lube oil storage tank fire protection piping is not required for compliance with 10CFR50.48 because the location of the tank prevents it from being involved in a fire that would impact the capability of safely shutting down the plant.

  The fuel oil sprinkler system is not required for compliance with 10CFR50.48 because its function is to minimize damage to plant property (start-up boiler room) in the event of a fire. This tank is separated from other areas of the plant by a three-hour fire barrier. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

The main feedwater pump deluge system fire protection piping is not required for compliance with 10CFR50.48 because its function is strictly to minimize damage to plant property (the main feedwater pumps) in the event of a fire. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

The basement sprinkler system is not required for compliance with 10CFR50.48 because this system is strictly to minimize damage to plant property (the turbine building) in the event of a fire. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

The fire protection piping off of FS-43 and FS-90 is not required for compliance with 10CFR50.48. The piping downstream of FS-43 provides water supply to turbine building hose stations located the east side of the structure. Their function is strictly to minimize damage to plant property for fires in this area. The types of fires that these hose stations would be utilized to combat would not prevent the capability of safely shutting down the plant. The piping segment downstream of FS-90 provides supply to sprinklers protecting a laundry area within the auxiliary building. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

The hydrogen seal oil unit deluge system fire protection piping is not required for compliance with 10CFR50.48 because its function is strictly to minimize damage to plant property (the main turbine) in the event of a fire. The types of fires that this system is intended to extinguish would not prevent safely shutting down the plant.

The outside firewater loop to wall sprinkler system is not required for compliance with 10CFR50.48 because its function is strictly to minimize damage to plant property (the turbine building wall) in the event of a fire. The types of fires that this system is intended to provide exposure protection for would not prevent safely shutting down the plant.

- RAI 2.3.3.6-1: The control room Halon system consists of three subsystems. They provide fire suppression for the auxiliary control room false floor area, the auxiliary control room ceiling, and the main control room ceiling. Marinite board is used in the main control room ceiling as a barrier to contain the Halon gas upon system actuation. There are no ceiling tiles below the marinite board in this area with an intended function. The false floor in the auxiliary control room forms a barrier for the Halon subsystem in that area, however, since Halon is heavier than air, the false floor panels do not have an intended function. The ceiling tiles in the auxiliary control room ceiling form a barrier for the third subsystem. Most of the lighting fixtures in the auxiliary control room are mounted on the surface of the ceiling tiles and are not needed to retain Halon. In one isolated area, lighting fixtures recessed into the ceiling tile form a part of the Halon retention barrier.

As stated in the response to RAI 2.3.3.6-1, based on material and environment, no aging effects requiring management were identified for the marinite board, the ceiling components, or the false floor in the control room. Therefore, the control room's marinite board, ceiling components, and false floor do not require an aging management program. Periodic inspections of the marinite board and ceiling components, as part of the ANO-1 fire protection system surveillance activities, have confirmed that aging effects are not occurring.

The ANO-1 ceiling tiles, marinite board, and false floor were identified as being in the scope of license renewal solely due to 10CFR54.4(a)(3) related to 10CFR50.48. These components do not meet the criteria of 10CFR54.4(a)(1) or 10CFR54.4(a)(2).

Reactor Coolant System

By letter dated October 3, 2000 (1CAN100001), Entergy Operations provided a clarification to RAI 3.3.2.2.2.2-1(d) concerning Alloy 600 nozzles and branch connections. For further clarification, Entergy Operations has evaluated the other reactor coolant system (RCS) Alloy 600 nozzles and branch connections. The particular configuration that caused high residual and thermal stresses in the hot leg level instrument nozzles does not exist at any other RCS nozzle or branch connection.

By letter dated September 6, 2000 (1CAN090002), Entergy Operations provided responses to RAIs concerning the reactor coolant system sections of the ANO-1 LRA. The following clarifications pertain to RAIs contained in the September 6, 2000, correspondence.

- RAI 3.3.2.2.2.1-2: The Auxiliary Systems Chemistry Monitoring Program applies to the stainless steel letdown cooler tube surfaces exposed to treated water. Due to an administrative error, this program was not listed in Table 3.2-1 for this material and environment combination. Cracking is an aging effect that requires management for the cooler tubes. In addition to the Auxiliary Systems Chemistry Monitoring Program, the aging management programs for cracking are the ASME Section XI-IWB program and the Leakage Detection in the Reactor Building Program as shown in Table 3.2-1

- RAI 3.3.2.2.2-1(a): Entergy Operations' response to this RAI stated that the risk-informed approach includes provisions for examination of dissimilar metal welds that are not inspected in accordance with Examination Category B-F. For the dissimilar metal pipe welds that are not covered under B-F, the risk-informed approach included inspections in accordance with Examination Category B-J. A listing of the ANO-1 dissimilar metal welds that are examined in accordance with Examination Categories B-F and B-J is provided in the response to RAI Number 17, which was from the ANO-1 risk-informed inservice inspection pilot application (Letter from J. D. Vandergrift to the USNRC, 1CAN059902, dated May 17, 1999).

  The American Society of Mechanical Engineers (ASME) Section XI Examination Category that includes inspections of dissimilar metal piping welds was changed in the

1989 Addenda of ASME Section XI. Specifically, dissimilar metal piping butt welds and socket welds were included in Examination Category B-F of the 1989 Edition of ASME Section XI. However, references to piping were removed from Examination Category B-F in the 1989 Addenda and the requirements for inspections of dissimilar metal piping welds not covered under Examination Category B-F were moved to Examination Category B-J. ANO-1 is currently using the 1992 Edition of ASME Section XI with portions of the 1993 Addenda.

As described in the Section 4.3.1 of Appendix B to the ANO-1 LRA, a risk-informed process was used to select piping elements for inspection. The risk-informed selection considered the probability of cracking caused by primary water stress corrosion cracking (PWSCC) or fatigue. With regard to dissimilar metal welds, BAW-2243A identified cracking at welded joints caused by PWSCC or fatigue as an applicable aging effect for stainless steel piping, Alloy 600 branch connections and piping, and stainless steel clad carbon steel piping. Therefore, the selection of locations for risk-informed inspection incorporated consideration of the same aging effects identified in the ANO-1 LRA.

- RAI 3.3.2.2.2.2-1: The ANO-1 program entitled, "Small Bore Piping and Small Bore Nozzle Inspections," discussed in Section 4.3.8 of Appendix B of the ANO-1 LRA, addresses small bore piping inspections for pipe sizes between 1-inch and 4-inch nominal pipe size (NPS) at ANO-1. A risk-informed approach was used to select piping for volumetric inspection and the inspections are performed each inspection interval. The ANO-1 program is a continuing inspection program, not a one-time inspection program. A sample population of welds has been selected for volumetric examination as discussed in Section 4.3.8 of Appendix B of the ANO-1 LRA. None of these welds are socket welds. The risk-informed method used to select piping welds for inspection is consistent with the commitment made by the Babcock and Wilcox Owners Group in Section 4.4.2 of BAW-2243A regarding additional inspection of small bore piping.

  The most risk-significant piping locations selected for the piping between 1-inch and 4-inch NPS provide a representative sample of piping that has the same material and environment combination, and the same identified aging effects as the 1-inch and smaller piping. In addition, the risk (based on probability and consequences) of failure of the 1-inch and smaller piping is bounded by the risk of failures at locations selected for inspection in the small bore piping program. Consistent with the ASME Section XI Code, 1-inch and smaller piping is exempt from surface and volumetric examinations since the consequences of leakage from these smaller pipe sizes are less than the consequences of leakage from the larger piping. Operating experience has confirmed that leakage from 1-inch and smaller piping is readily detected and corrected prior to loss of the system function. When combined with the ANO-1 Small Bore Piping and Small Bore Nozzle Inspection Program, the existing ASME Section XI visual inspection of the 1-inch and smaller piping provides the necessary aging management to address potential aging effects prior to loss of function.

The ANO-1 Small Bore Piping Inspection Program is part of the ANO-1 risk-informed inservice inspection (ISI) program. The selection of locations for inspection incorporates consideration of the same aging effects that are identified in the ANO-1 LRA for the subject piping. The ANO-1 risk-informed ISI evaluation does not involve a time-limited assumption defined by the current operating term of 40 years.

- RAI 3.3.2.3.2.2-1(b): The nozzle bore region of the ferritic pressurizer shell metal adjacent to the repaired level-sensing nozzle is volumetrically inspected periodically to ensure the integrity of the exposed ferritic steel. The Alloy 600 nozzle is not inspected volumetrically. The repaired level-sensing nozzle is a Group 1 item. The Group 3 item, spray nozzle safe-end, is inspected each interval in accordance with Examination Category B-F. Specifically, the dissimilar metal weld that connects the ferritic spray nozzle to the Alloy 600 safe-end receives volumetric and surface examination each inspection interval.

- RAI 3.3.2.6.2.2-3(b): Entergy Operations has reviewed the steam generator tube degradation information contained in NRC Information Notices 97-49 and 97-88 to determine if changes to the ANO-1 Steam Generator Tube Integrity Program were needed. Entergy Operations concluded that the ANO-1 Steam Generator Tube Integrity Program adequately addressed the tube degradation identified and that no changes to the program were needed to address these two Information Notices.

The following clarifications address Section 3.2.3 of the ANO-1 LRA concerning the pressurizer:

- Small-bore piping and small-bore nozzle inspections are addressed in Table 3.2-1 on page 3-29 of the ANO-1 LRA. Small-bore nozzles are defined as nozzles of 1-inch NPS and smaller and are listed in the table under "pressure retaining partial penetration welds, NPS less than or equal to 1-inch." BAW-2244A, Figure 2-7 provides a drawing of these nozzles.

- Loss of material on the external surfaces of the pressurizer (and all other reactor coolant system components) was identified in Table 3.2-1, page 3-25, first line, as an aging effect requiring management. The aging management program identified is the Boric Acid Corrosion Prevention Program.

- Table 3.2-1 refers to ASME Section XI, Examination Category B-P. The 1993 Addenda eliminated Examination Category B-E. Visual examinations previously performed under B-E are now covered under B-P in accordance with the 1993 Addenda. Entergy Operations adopted the 1993 Addenda with regard to pressure testing and all Examination Category B-E inspections are now addressed by Examination Category B-P.

- Due to an administrative error, Table 3.2-1, page 3-30, indicated that for pressurizer bolting less than or equal to 2 inches in diameter, the ASME Examination Category was B-G-1. The correct Examination Category is B-G-2.

Auxiliary Systems

By letter dated June 22, 2000 (1CNA060007), the Staff requested a correction to Table 3.4-7. Table 3.4-7 incorrectly listed cast iron as not requiring aging management. Cast iron does rely upon coatings to manage the loss of material aging effect and therefore, is subject to the Maintenance Rule Program described in Appendix B of the ANO-1 LRA on page B-73.

By letter dated September 12, 2000 (1CAN090004), Entergy Operations provided responses to RAIs concerning the Section 3.0 of the ANO-1 LRA. The following clarifications pertain to the auxiliary systems and steam and power conversion RAIs contained in the September 12, 2000, correspondence.

- RAI 3.3.4.3.1-1(c): There are no stainless steel components in the reactor building sump and drain system or the spent fuel pool system that are exposed to concrete except the two that are discussed in this RAI and in RAI 3.3.4.3.2.4-3 of the September 12, 2000, correspondence.

- RAI 3.3.4.3.1-2(a): In the last paragraph of the response, the reference to the ASME qualified piping should have been to ANSI B31.1 and B31.7-qualified piping.

  In the second paragraph of the response, the thermal fatigue threshold that was used to evaluate systems potentially susceptible to fatigue was operating temperatures in excess of 220°F for carbon steel, and operating temperatures in excess of 270°F for austenitic stainless steel.

  These values are based on recommendations in the EPRI Fatigue Management Handbook, TR-104534. Based on a review of the site-specific ANO-1 aging management review reports, the most limiting component identified that was in the scope of license renewal was the steam generator secondary sampling system, which is part of the reactor building isolation system discussed in Section 2.3.2.7 of the ANO-1 LRA. Based on a conservative assessment of operating procedures for this system, the piping could be exposed to approximately 3,500 cycles over the proposed 60 years of operation. This is well below the 7,000 cycle fatigue design criteria.

- RAI 3.3.4.3.1-2(b), 3.3.4.3.2-1(b)/(e), and 3.3.4.3.1-6: Sealant materials are within the scope of license renewal when they are part of components or commodities that are within the scope of license renewal and when they are important in maintaining the integrity of the component or commodity. For ventilation system components within the scope of license renewal, preventive maintenance activities are used to manage sealant aging effects. Sealants are routinely examined by inspections performed in accordance with preventive maintenance procedures, usually on a semi-annual frequency. For example, preventive maintenance activities include inspections such as visual inspection for damage and indications of leakage, including leaking seals or gaskets, cracks or breaks, excessive corrosion, evidence of overheating, or other deterioration. These inspections would identify significant changes in material properties (cracking, deterioration) as well as leaks, loss of material, etc. The intent of these inspections is to ensure that the function of the system is maintained. Since the aging effects for sealant materials take a long time to become serious enough to impact the function of the system, use of visual inspections is sufficient. When deterioration of sealant materials are found, corrective action is taken prior to loss of function.

- RAI 3.3.4.3.1-2(b), 3.3.4.3.2-10, and 3.3.4.3.2.5-1: The high vibration components in the fuel oil system (Table 3.4-7) are the emergency diesel generator, the alternate AC diesel generator, and the fire protection diesel. These components are subject to potential loss of mechanical closure integrity due to loss of preload. The aging management programs credited are the Emergency Diesel Generator Testing and Inspections, the Alternate AC Diesel Generator Testing and Inspections, and the fire protection diesel inspections. In addition to the descriptions of these programs in Appendix B of the ANO-1 LRA, each of these programs includes periodic teardown and inspection of many components and subsequent re-assembly and torquing of bolts. This addresses loss of preload for those components. Also, during performance testing of the diesels, vibration monitoring is performed that would identify significant loss of preload that could lead to loss of function. Other inspections for leaks, loose fasteners, etc., would also help ensure that loss of mechanical closure integrity is addressed prior to loss of function. These inspections are conducted in accordance with the manufacturer's recommendations.

- RAI 3.3.4.3.1-2(c): The entire text of the first paragraph of the response should have read, "No, seismic Category II/I spatially–related components or piping segments are part of the auxiliary systems within the scope of license renewal as discussed in Section 3.4 of the ANO-1 LRA."

- RAI 3.3.4.3.1.8-1: In Table 3.4-8, loss of material is identified as an aging effect for the instrument air system. Galvanic corrosion was considered an aging mechanism that could result in loss of material. The Instrument Air Quality program keeps the system dry to prevent this aging effect.

- RAI 3.3.4.3.2-8(a): Footnote 1 under Section 3.3.4 of the ANO-1 LRA refers to a preventative program. Aging effects with this footnote are prevented by the referenced program or activity, as opposed to programs that identify the aging effect and then initiate corrective actions prior to loss of function.

- RAI 3.3.4.3.2-9(b): In the Maintenance Rule Program described in Appendix B of the ANO-1 LRA, loss of mechanical closure integrity should have been included in the list of aging effects managed by the program.

- RAI 3.3.4.3.2-9(c) and (d): ANO-1 is currently on an 18-month refueling cycle.

- RAI 3.3.4.3.2.2-2(b): The physical boundaries for the pressurization and flow tests for the fire protection system are provided in the attached drawings (LRA-M-219 and LRA-M-2219). The boundaries are marked only for the portions of the system that are in the scope of license renewal. Other portions of the system are pressurized during the pressurization and flow tests, but these are not in the scope of license renewal.

- RAI 3.3.4.3.2.2-3(b): The ultrasonic (UT) examinations under the Fire Water Piping Thickness Evaluation are performed using a combination of UT methods including full wall, grid, and point. The preferred method is the full wall scan since it utilizes automated UT equipment. This provides a 100% wall thickness profile for the selected area. If the automated equipment cannot be used, the grid method may be used. The point method is not normally used except to pinpoint the exact area of a suspected defect.

- RAI 3.3.4.3.2.2-3(c): The acceptance criteria for the Fire Water Piping Thickness Evaluation is based on ensuring that the applicable pipe code minimum wall thickness is maintained. The UT acceptance criteria are conservatively set based on consideration of code requirements. Examination results that do not meet the acceptance criteria are provided to design engineering for further evaluation and corrective action. The evaluation by design engineering includes a determination of compliance with code requirements and a consideration of degradation prior to the next inspection. More frequent inspection may be specified. Since 1998, when the Fire Piping Thickness Evaluation Program began, approximately 12 UT inspection results showed indication of piping degradation that required engineering evaluation. All of these areas were determined to be acceptable for continued operation, but each of these locations was specified for continued monitoring. Trending is not done since each evaluation considers expected degradation until repair or replacement or until the next inspection.

- RAI 3.3.4.3.2.2-3(d); The three instances of fire protection system pipe leaks identified in this RAI response were all due to localized pitting. The nondestructive examination of the affected areas indicated that the degradation was not generalized pipe wall thinning and that the intended function of the system was not lost. Corrective actions for these leaks included development and implementation of the Fire Water Piping Thickness Evaluation Program. The last of the three leaks was found after implementation of the program. It also involved localized pitting that was not generalized wall thinning and did not result in loss of system function. All three of these leaks have been taken into consideration for subsequent inspections of the system piping. Since 1998, when the Fire Piping Thickness Evaluation Program began, approximately 12 UT inspection results showed indication of piping degradation that required engineering evaluation. All of these areas were determined to be acceptable for continued operation, but each of these locations was specified for continued monitoring. In summary, the fire protection system pipe wall thickness monitoring has identified degradation in local areas of the system. Based on these findings, piping has been determined to be acceptable for continued operation, but continued monitoring is being required. Loss of function due to these aging effects has not occurred and the monitoring program will provide continued assurance that aging effects will not lead to a loss of function.

- RAI 3.3.4.3.2-4(b): Corrosion coupons are located in the service water system. The service water system and fire protection systems both take suction from the same water source.

- RAI 3.3.4.3.2.3-2: In addition to the discussion contained in the response to this RAI, other inspections of the emergency diesel generator are conducted as part of the testing and inspection program. For example, several components (e.g., air start components, exhaust manifold, lube oil cooler, etc.) are removed or disassembled and inspected at frequencies specified by the manufacturer (usually on an 18-month schedule). In addition, the emergency diesel generator is performance tested, which includes vibration, temperature, and pressure monitoring, and inspected for signs of leakage or degradation. These inspections are performed in accordance with manufacturer's recommendations. The inspection and testing program does not rely on failure detection to manage aging.

- RAI 3.3.4.3.2.5-1: In addition to the discussion contained in the response to this RAI, other inspections of the alternate AC diesel generator are conducted as part of the testing and inspection program. For example, several components (e.g., air start components, fuel oil pump components, engine covers, breather assembly, etc.) are removed or disassembled and inspected at frequencies specified by the manufacturer (usually on an 18-month schedule). In addition, the alternate AC diesel generator is performance tested, which includes vibration, temperature, and pressure monitoring, and inspected for signs of leakage or degradation. The identification of leakage or degradation is addressed in accordance with manufacturer's recommendations prior to loss of system function. The inspection and testing program does not rely on failure detection to manage aging.

- RAI 3.3.4.3.2.7(f): The only heat exchanger in the diesel fuel oil system is associated with the alternate AC diesel generator. The aging effect of fouling for this heat exchanger is prevented by the Diesel Fuel Monitoring Program and is monitored by the Alternate AC Diesel Generator Testing and Inspections. The fuel oil temperature is monitored during performance testing to ensure any degradation is identified and corrected prior to a loss of function.

- RAI 3.3.4.3.2.9-2: The minimum thickness will be maintained to assure seismic qualification. Seismic qualification ensures the piping can accommodate simultaneous seismic loads and internal pressure loads.

- RAI 3.3.4.3.2.10-1(c): Due to the recent replacements of piping and better chemistry, the need for inspection of the service water piping has decreased. Inspections continue to be performed but at a reduced frequency on the new piping. After replacement of much of the large bore carbon steel service water piping, the margin to minimum pipe wall thickness has improved. In addition, recent improvements to the Service Water Chemistry Control Program have reduced corrosion rates in the system as discussed in RAI 3.3.4.3.2.10.1(g).

- RAI 3.3.4.3.2.10-1(f): The reference to "safety analysis assumed flows" in the response to this RAI refers to the minimum required flow values used in the safety analyses under the ANO-1 current licensing basis. The minimum required flows are adjusted to account for measurement uncertainty and for potential degradation between tests. These adjusted values are the acceptance criteria for the service water system flow tests.

- RAI 3.3.4.3.2.10-2: See above RAI 3.3.4.3.2.9-2 clarification.

The following clarification addresses Section 3.4 of the ANO-1 LRA concerning the fire protection system.

- Biofouling of the fire protection lines is managed by the Service Water Integrity Program that includes injecting biocides, performing visual inspections, and performing system flushes. The service water system and the fire protection system take suction from the same source.

The following clarification addresses Section 2.3.3.9 of the ANO-1 LRA concerning the chilled water system.

- LRA Section 2.3.3.9 did not provide SAR references for the chilled water system description. The chilled water system used for non-emergency reactor building cooling is discussed in SAR Section 6.3. SAR Section 9.7.2.1 discusses the chilled water system used for auxiliary building electrical equipment room cooling. The auxiliary building electrical equipment rooms referred to in ANO-1 LRA Section 2.3.3.9 are the switchgear rooms, the battery rooms and the electrical equipment rooms. The cooling coils for each of these rooms are shown on drawing LRA-M-221, sheet 2.

<u>Steam and Power Conversion</u>

- RAI 3.3.5-14(b): This RAI questioned Section 2.3.1 on page C-13 concerning stagnant or low flow conditions. In a subsequent conversation with the NRC, the Staff requested that we justify why a one-time inspection of areas with these conditions is not warranted. Operating experience at ANO has not identified any problems that would warrant a one-time inspection to confirm the adequacy of the chemistry programs. This experience includes inspections of systems and components during maintenance activities that occur routinely. These inspections have not identified aging effects other than those identified in the ANO-1 LRA and the adequacy of the chemistry programs has been confirmed by these maintenance-related inspections.

- RAI 3.3.5-14(e): Table 3.4-7 should have credited the Preventive Maintenance Program as one of the aging management programs for the diesel fuel oil tanks. This program described on page B-76 of the ANO-1 LRA includes inspection of the diesel fuel oil tanks for loss of material.

Structures

By letter dated September 7, 2000 (1CAN090003), Entergy Operations provided responses to RAIs concerning the structural sections of the ANO-1 LRA. The following clarifications pertain to the structural RAIs contained in the September 7, 2000, correspondence.

- RAI 3.3.6-3: 10CFR54.21(a)(1)(i) states that structures and components subject to an aging management review shall encompass those structures and components that perform an intended function, as described in 10CFR54.4, without moving parts or without a change in configuration or properties. Hinges, locks, and closure mechanisms perform their intended function with moving parts and change in configuration. Therefore, they are in-scope but not subject to an aging management review. However, the existing preventive maintenance program and technical specification surveillances ensure the intended functions of the personnel hatches are maintained. This is consistent with the approach taken in the Oconee License Renewal Application, which was approved by the NRC as documented in NUREG-1723.

- RAI 3.3.6-4(a): The equipment and personnel hatches are furnished with flexible seals. These seals are tested and replaced at a specified frequency. The seals are not long-lived, passive components and do not require an aging management review. The existing Preventive Maintenance Program and Leak Rate Testing ensure condition of these seals are monitored and their intended functions are maintained. Currently, the seals are replaced every 12 years or more often based on condition.

- RAI 3.3.6-7(b): To clarify the last sentence of the response to RAI 3.3.6-7(b) in the September 7, 2000 correspondence, during the maintenance rule structural inspection, in-leakage was observed in the ANO-1 tendon access gallery (see response to RAI 3.3.6-6 in correspondence dated September 7, 2000). Cracks in concrete components in other below-grade locations did not exhibit signs of water in-leakage during the structural inspection, however, in-leakage has been observed at other times in below-grade locations within the plant. In-leakage at ANO-1 has not been significant. There are no applicable aging effects for the concrete exposed to ground water from in-leakage.

- RAI 3.3.6-7(d): No operating experience was identified supporting the aging of water stops due to ground water environment. The ground water chemistry was not considered aggressive during plant construction and there is no indication that the ground water chemistry has significantly changed. Accordingly, due to the absence of aggressive ground water at ANO-1, there are no aging effects applicable for ground water on water stops for ANO-1.

- RAI 3.3.6-10: Concrete structures were designed and constructed in accordance with ACI 318-63, "Building Code Requirements for Reinforced Concrete," and its relevant ACI standards and ASTM standards. This resulted in accessible and inaccessible concrete with high cement content, low water-cement ratio, and proper curing. Thus, the concrete has low permeability and a high resistance to aggressive chemical solutions. As noted in the clarification of RAI 3.3.6-7(d) above, ground water was not aggressive during plant construction and there is no indication that ground water chemistry has significantly changed. This was supported by ground water testing data that was collected from the site on May 6, 1996.

- RAI 3.3.6-11: As described in ANO-1 SAR Sections 2.6.7, 2.7.2, and 5.1.10K, structures within the scope of license renewal are located on either bedrock or compacted fill. ANO-1's structures are not susceptible to settlement, as settlement would have occurred during or immediately following construction of the structures. In addition, within ANO-1 there are no porous concrete sub-foundations. As stated in ANO-1 LRA Section 3.6.2, ANO-1's concrete structures were designed and constructed in accordance with ACI 318-63 and ACI 301 resulting in concrete with a high cement content, low water-cement ratio and proper curing. In addition to evaluating settlement as a potential aging mechanism associated with the aging effect cracking, ANO-1's aging management review of concrete components and commodities also considered the following aging effects and associated aging mechanisms:

Aging Effect	Aging Mechanism
Loss of Material	• Freeze-Thaw • Abrasion and Cavitation • Elevated Temperature • Aggressive Chemicals • Corrosion of Embedded Steel Reinforcing
Cracking	• Freeze-Thaw • Reaction with Aggregates • Shrinkage • Elevated Temperature • Radiation • Fatigue
Change in Material Properties	• Leaching of $Ca(OH)_2$ • Aggressive Chemicals • Elevated Temperature • Radiation • Creep

- RAI 3.3.6-13: Typical deficiencies that have been identified by IWF inspections include missing jam nuts, inappropriate gap tolerances, broken tack welds on nuts and incorrect spring can settings. Deficiencies found during IWF inspections are evaluated and corrected in accordance with the ISI and site corrective action programs. Boric acid leaks are reported to the boric acid corrosion prevention coordinator for evaluation and corrective action determination. From the deficiencies recorded during the IWF inspections and the boric acid leakage reports there has been no loss of intended function identified for supports or adjacent structures due to boric acid leakage. The site programs ensure boric acid leaks are reported, evaluated and corrected to maintain intended function of the supports and adjacent structures.

- RAI 3.3.6-15: During the Maintenance Rule Program's structural baseline inspection, a small area of exposed rebar was found in the northwest corner of the intake structure's exterior wall. The exposed rebar was a result of mechanical damage rather than a result of concrete aging. The slight rusting observed was determined to not challenge the intended function of the concrete/rebar. This minor mechanical damage did not affect the load bearing capacity of the structure.

- RAI 3.3.6-16: The reference to NUREG-1557 is an administrative error, and should have been a reference to NUREG-1705. As provided in the response to RAI 3.3.6-16 in the September 7, 2000, correspondence, the ANO-1 Maintenance Rule Program performs a structural evaluation of the intake structure every five years as suggested by Regulatory Guide 1.127. In addition, similar to inspection guidelines presented in Regulatory Guide 1.127, the inspection of the ANO-1 intake structure conducted under the Maintenance Rule Program utilizes a detailed checklist to assess concrete surfaces and other structural components and commodities. As also stated in ANO-1 LRA Appendix B, Section 4.21.1, the emergency cooling pond and surrounding structural components (i.e., embankments, spillway) are visually inspected along with sounding for pond level. In general, the monitoring of the emergency cooling pond meets Regulatory Guide 1.127 guidance for inspecting water-control structures associated with the ANO-1 emergency cooling water system.

- RAI 3.3.6-18: Relief requests are submitted by the applicant and approved by the Staff. The references made to the IWL aging management program and the IWF aging management program do not imply inclusion of out-dated or unapproved relief requests during the period of extended operation. Rather, it addresses the IWL and IWF programs defined by ASME Section XI per requirements of 10CFR50.55(a) and alternatives (relief requests) approved by the Staff.

- RAI 3.3.6-19: Relief requests are submitted by the applicant and approved by the Staff. The reference made to IWE aging management program does not imply inclusion of out-dated or unapproved relief requests during the period of extended operation. Rather, it addresses the IWE program defined by ASME Section XI per requirements of 10CFR50.55(a) and alternatives (relief requests) approved by the Staff.

- RAI 3.3.6-20: IWL aging management program for the extended period of operation is the ASME Section XI, Subsection IWL program per requirements of 10CFR 50.55(a).

- RAI 3.3.6-22: IWF aging management program for the extended period of operation is the ASME Section XI, Subsection IWF program per requirements of 10CFR 50.55(a).

- RAI 3.3.6-23(a) and (b): As indicated in ANO-1 LRA Table 3.6-3, in addition to IWF inspections, the Boric Acid Corrosion Prevention Program is credited for managing loss of material due to boric acid wastage for the reactor vessel support skirt. Referring to ANO-1 LRA Section 3.6.1.1 (last paragraph), the aging management review of the reactor vessel support skirt included associated threaded fasteners (i.e., anchor bolts and shear pins). This aging mechanism is also addressed in Section 3.6.4.1 of the ANO-1 LRA pertaining to non-boron treated fasteners. Referring to Table 3.4-1, the Boric Acid Corrosion Prevention Program is credited for managing aging effects for bolting associated with the spent fuel system. Referring to Tables 3.6-4 (page 3-117) and 3.6-8 (page 3-128), the Maintenance Rule Program and ISI-IWF Inspections (as appropriate) are credited for managing aging effects for threaded fasteners, including those near the spent fuel pool and RCS.

The aging management review of stainless steel pipe lugs and tubing clips included the associated threaded fasteners. The threaded fastener commodity groupings, "Pipe Lugs" and "Tubing Clips" in Table 3.6-8 of the ANO-1 LRA (pages 3-129 and 3-130), were intended to include associated stainless steel threaded fasteners in raw water. As indicated in the table, the aging management programs managing stainless steel threaded fasteners in raw water are the Maintenance Rule Program, IWF Inspections, and the Service Water Chemical Control Program.

(b) As stated in Section 3.6.4.4 of the ANO-1 LRA, based on walkdowns in response to NRC Bulletins 79-02 and 79-14, less than a one percent deficiency rate was found at support anchorage points. During the 1997 structural walkdown conducted under the Maintenance Rule Program, no significant local degradation of the concrete around anchors, including grout pads, was identified. In regard to concrete anchors, loss of anchor capacity is caused by loss of material or cracking of the concrete, which is managed by the Maintenance Rule Program.

- RAI 4.5-1: Currently, monitoring and trending, and acceptance criteria are controlled by a site-specific procedure titled "ANO 1 & 2 Containment Building Tendon Surveillance and Concrete Inspection." The procedure implements the requirements of ASME Section XI, subsection IWL and 10CFR50.55(a).

- RAI 4.6-1(a): Pressure cycling due to integrated leak rate tests is applicable to cumulative fatigue. The loads associated with the leak rate testing were considered during plant design and implicitly accounted for by selecting a bounding number of thermal cycles (i.e., 500) for the fatigue evaluation. Thermal fatigue loads considered in the liner design are described in ANO-1 SAR Section 5.2.1.4.7.3. As stated in the response to RAI 4.6-1(c) in the September 7, 2000 correspondence, the loading conditions for the main feedwater and main steam mechanical penetrations are the same as those defined in ANO-1 SAR Section 5.2.1.4.7.3 for the liner plate.

- RAI 4.6.1(b): Existing ANO-1 site outage reports reflect the number of heat-up and cooldown cycles for the plant. The number of cycles to date is less than 115. The number of heatup and cooldowns has decreased significantly since the early years of plant operations. The site outage reports showed that within the last 10 years, ANO-1 has experienced an average of approximately one heatup and cooldown per year. Thus, assuming three heatup/cooldown cycles per year through the extended period of operation, is conservative.

Should you have any further questions, please contact me.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 2, 2000.

Very truly yours,

Jimmy D. Vandergrift
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