



Entergy Operations, Inc.  
1448 S.R. 333  
Russellville, AR 72802  
Tel 501 858 5000

2CAN060404

June 21, 2004

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Subject: Request for Additional Information Responses for  
License Renewal Application TAC No. MB8402  
Arkansas Nuclear One – Unit 2  
Docket No. 50-368  
License No. NPF-6

Dear Sir or Madam:

By letter dated May 25, 2004 (2CNA050406), the NRC requested additional information on the Arkansas Nuclear One, Unit 2 (ANO-2) License Renewal Application (LRA) within 30 days from receipt. The requests for additional information (RAIs) are from the LRA Section 2.5, Systems Scoping and Screening Results: Electrical and Instrumentation Controls (I&C) and Section 3.3, Auxiliary Systems. The responses to the RAIs are contained in the attachment.

There are no new commitments contained in this submittal. Should you have any questions concerning this submittal, please contact Ms. Natalie Mosher at (479) 858-4635.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 21, 2004.

Sincerely,

A handwritten signature in black ink, appearing to read "T. G. Mitchell".

Timothy G. Mitchell  
Director, Nuclear Safety Assurance

TGM/nbm

Attachment

A100

cc: Dr. Bruce S. Mallett  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region IV  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011-8064

NRC Senior Resident Inspector  
Arkansas Nuclear One  
P.O. Box 310  
London, AR 72847

U. S. Nuclear Regulatory Commission  
Attn: Mr. Drew Holland  
Mail Stop 0-7 D1  
Washington, DC 20555-0001

U. S. Nuclear Regulatory Commission  
Attn: Mr. Greg Suber  
Mail Stop 0-11 F1  
Washington, DC 20555-0001

Mr. Bernard R. Bevill  
Director, Division of Radiation  
Control and Emergency Management  
Arkansas Department of Health  
4815 West Markham Street, Slot 30  
Little Rock, AR 72205-3867

**Attachment to  
2CAN060404  
RAI Responses**

### Section 2.5 and 3.3 RAI Responses

**RAI 2.5-1:** Section 2.1, Table 2.1-1 of the LRA indicates that the following components are within the scope of license renewal:

- a) Uninsulated ground conductors (e.g., grounding rods, buried ground cables and cathodic protection)
- b) Phase bus[es] (e.g., isolated-phase bus, segregated and non-segregated phase bus)
- c) Transmission conductors
- d) Electrical portions of I&C penetration assemblies (e.g., electrical penetration assembly cables and connections)

However, per Table 3.6.2-1, no aging effect and no aging management program is identified for these components. Please provide a detailed description as to why an aging management review is not required.

**Response:** LRA Table 2.1-1, "Standard List of Passive Electrical Commodities," is derived from the two passive commodity groups listed in NEI 95-10, Appendix B. As described in LRA Section 2.1.2.3.1, this table lists the seven passive electrical commodity groups considered during the integrated plant assessment. Table 2.1-1 was not intended to identify components that are in the scope of license renewal at ANO-2. As noted in LRA Section 2.5, plant electrical and instrument and control systems are included in the scope of license renewal as well as electrical and instrumentation and control components in mechanical systems. In addition to the plant electrical systems, certain switchyard components required to restore offsite power were conservatively included even though those components are not relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for station blackout (10CFR50.63). Of these systems and components in the scope of license renewal, passive, long-lived components that perform an intended function are subject to aging management review. LRA Table 2.5-1 lists electrical and I&C system commodities subject to aging management review at ANO-2.

- a) Uninsulated ground conductors (e.g., grounding rods, buried ground cables and cathodic protection) are not subject to aging management review because this commodity group does not perform a license renewal intended function.

Non-insulated ground conductors do not meet any of the scoping criteria specified in 10CFR54.4. These components are not safety-related per 10CFR54.4(a)(1) and are not credited for mitigation of regulated events listed in 10CFR54.4(a)(3).

Industry and plant-specific operating experience for uninsulated ground conductors do not indicate credible failure modes that would adversely impact an intended function; therefore, equipment failures due to uninsulated ground conductors are considered hypothetical. As discussed in Section 2.1.3.1.2 of the SRP and Section III.c(iii) of the Statements of Consideration (60FR22467), hypothetical failures are not required to be considered for license renewal if they are not included in the current licensing basis.

The failure of an uninsulated ground conductor will not prevent satisfactory accomplishment of any of the functions identified in 10CFR54.4(a)(1).

- b) Phase bus (e.g., isolated-phase bus, segregated and non-segregated phase bus) is included in Table 2.5-1 in the commodity labeled switchyard bus (switchyard bus for station blackout (SBO)), bus bars, and connections. This commodity group is subject to aging management review since ANO-2 utilizes non-segregated phase bus to connect the offsite AC power source (via the startup transformer) to the 4.16 kV switchgear. Phase-bus is included in LRA Table 3.6.2-1; however, no aging effects requiring management were identified for the phase-bus. Plant-specific operating experience confirms phase bus has satisfactorily performed its intended function since initial plant operation without aging effects requiring management. This is consistent with the previously approved staff position documented in NUREG-1772 (Safety Evaluation Report for McGuire and Catawba), Section 3.6.4.2.2.
- c) Transmission conductors are not subject to aging management review. This commodity group does not perform a license renewal intended function. Switchyard commodities included in the scope of license renewal for SBO recovery as defined in Interim Staff Guidance (ISG-2) utilize phase bus, insulated cable, switchyard bus, and high-voltage insulators rather than transmission conductors.
- d) Electrical portions of electrical and I&C penetration assemblies (e.g., electrical penetration assembly cables and connections) are included in Table 2.5-1 in the commodity group "Electrical cables and connections not subject to 10CFR50.49 environmental qualification (EQ) requirements." An aging management review was performed. The "Electrical cables and connections not subject to 10CFR50.49 EQ requirements" item in Table 3.6.2-1 identifies the aging effects and aging management program for non-EQ electrical and I&C penetration cables and connections.

**RAI 2.5-2:** ISG-2, NRC Staff Position on the License Renewal Rule (10CFR54.4) as it relates to the SBO Rule (10CFR50.63), states, in part, that "The offsite power systems of U.S. nuclear power plants consist of a transmission system (grid) component that provides a source of power and a plant system component that connects that power source to a plant's onsite electrical distribution system which powers safety equipment. For the purpose of the license renewal rule, the staff has determined that the plant system portion of the offsite power system that is used to connect the plant to the offsite power source should be included within the scope of the rule." Provide a detailed description (including a one-line drawing showing the path of recovery) of ANO-2's recovery path and discuss how the recovery path is in compliance with ISG-2. The discussion should also include restoration of power to each 4.16 kV safety bus. Furthermore, on the one-line drawing, please indicate the portions of the recovery path that are overhead or underground.

**Response:** The recovery path for SBO is described in LRA Section 2.5 as follows.

"Specifically the path includes the switchyard circuit breakers feeding the startup transformer, the startup transformer, the circuit breaker-to-transformer and transformer-to-onsite electrical interconnections, and the associated control circuits and structures."

The voltage regulator is also included since it is part of the interconnection between the switchyard circuit breaker and the startup transformer.

ISG-2 discussion of the offsite power path states, "This path typically includes the switchyard circuit breakers that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead or underground circuits between circuit breaker and transformer and transformer and onsite electrical distribution system, and the associated control circuits and structures." Compliance with ISG-2 is demonstrated by the fact that the equipment described in LRA Section 2.5 is the same equipment described in the ISG with the addition of the voltage regulator.

Consistent with ISG-2 for SBO recovery, the boundary between the transmission system (grid) offsite power source and the plant system components is the 22kV/4.16kV startup transformer. The 22kV switchyard circuit breaker (B0126) that feeds the startup transformer at ANO-2 is the offsite power connection point to the transmission system that is the boundary point described in ISG-02 (first switchyard breaker). Medium-voltage insulated cable, installed in underground duct bank, runs between the switchyard breaker B0126 and the startup transformer voltage regulator. Switchyard bus connects breaker B0126 and the voltage regulator to the medium-voltage insulated cables. Medium-voltage insulated cable, installed in underground duct bank, runs between the startup transformer voltage regulator and startup transformer #3. Switchyard bus connects the voltage regulator and startup transformer #3 to the medium-voltage insulated cables. High-voltage insulators, which are utilized with the switchyard bus, are included in the scope of license renewal for the SBO recovery path. Startup transformer #3 is connected to the 4.16kV safety busses with non-segregated phase bus.

Instrument and control cables for switchyard breaker B0126, the voltage regulator, and the startup transformer are also included in the scope of license renewal for this recovery path. These cables are included in the "Electrical cables and connections not subject to 10CFR50.49 EQ requirements" program listed in LRA Table 3.6.2-1.

The attached sketch diagrams the offsite power path from the switchyard grid connection to the 4.16kV safety busses. Overhead and underground portions of the circuit are identified. Refer to the ANO-2 Safety Analysis Report Figures 8.2-2, 8.3-1, 8.3-3, and 8.3-23 for additional details.



**RAI 2.5-3:** Section 4.4 of the LRA states "...in-scope EQ components will continue to perform their intended function(s) for the period of extended operation...." The applicant is requested to define the term "in-scope EQ."

**Response:** In-scope EQ components refer to EQ components within the scope of license renewal in accordance with 10CFR54.4. All electrical components in the EQ program are in the scope of license renewal.

**RAI 3.3-6:** LRA Tables 3.3.2-3, 3.3.2-4 and 3.3.2-7 identify carbon steel bolting in auxiliary systems as subject to loss of mechanical closure integrity and the bolting and torquing activities aging management program is credited with managing this aging effect. Note E is applicable to these components and this note states that this is consistent with NUREG-1801 material, environment, and aging effect but a different aging management program is credited. LRA aging management program B.1.2, bolting and torquing activities, indicates that this program relies on industry recommendations for comprehensive bolting maintenance based on EPRI TR-104213. EPRI report TR-104213 is also referenced in the Generic Aging Lessons Learned (GALL) XI.M18 bolting integrity aging management program. For those auxiliary systems with carbon steel bolting associated with Note E, clarify if the credited bolting and torquing activities combined with other inspections required by the system walkdown are consistent with the GALL aging management program XI.M18 bolting integrity, including periodic inspection of closure bolting for indication of loss of preload with subsequent loss of mechanical closure integrity. If not consistent, identify specific exceptions to the GALL aging management program and the technical justification for the exceptions.

**Response:** The program described in NUREG-1801, Section XI.M18 covers all bolting within the scope of license renewal including safety-related bolting, bolting for nuclear steam supply system component supports, bolting for other pressure retaining components, and structural bolting. It includes periodic inspection of closure bolting for many aging effects, including loss of preload, cracking, and loss of material. Cracking of non-Class 1 stainless steel bolting is not an aging effect requiring management and loss of material is managed by other programs listed in the LRA. Thus, the plant specific Bolting and Torquing Activities Program, used only to manage loss of mechanical closure integrity, is not comparable to the aging management program XI.M18 of NUREG-1801. In Appendix B of the LRA, the ten attributes of the program were provided to allow for its assessment independent of NUREG-1801 Section XI.M18.

The System Walkdown Program adequately manages loss of material for closure bolting as described in LRA Section B.1.28. The Bolting and Torquing Activities Program and System Walkdown Program also manage loss of mechanical closure integrity for closure bolting as described in LRA Sections B.1.2 and B.1.28. Visual inspections of bolting for loss of material and loss of mechanical closure integrity in the System Walkdown Program are adequate to assure that the closure bolting can perform its intended function since loss of material (and ultimately loss of mechanical closure integrity) for external surfaces is a long term aging effect that would be observed well before aging progressed to the point of loss of intended function. The Bolting and Torquing Activities Program assures that proper torque values are applied to bolted closures such that loss of mechanical closure integrity as a result of loss of preload due to high temperatures or significant vibration does not occur.