September 30, 2004

LICENSEE: Entergy Operations Inc.

FACILITY: Arkansas Nuclear Station, Unit 2

SUBJECT: SUMMARY OF TELEPHONE CALL HELD ON AUGUST 24, 2004, BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND ENTERGY OPERATIONS INC., REPRESENTATIVES CONCERNING REQUEST FOR ADDITIONAL INFORMATION PERTAINING TO THE ARKANSAS NUCLEAR ONE, UNIT 2 LICENSE RENEWAL APPLICATION (TAC NO. MB8402)

On August 24, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of the Entergy Operations Inc., held a telephone conference call to discuss formal responses to the request for additional information (RAI) pertaining to the technical review for the Arkansas Nuclear One, Unit 2 license renewal application.

The conference call was used to clarify the staff's position with respect to certain responses to RAI's. On the basis of the discussion, the applicant agreed to modify and/or supplement several responses.

Enclosure 1 provides a listing of the telephone conference call participants. Enclosure 2 contains a listing of the RAI's, formal responses from the applicant, and a brief description of the status of each item. A copy of this summary was provided to the applicant for comment.

/RA/

Gregory F. Suber, Project Manager
License Renewal Section A
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-368

Enclosures: As stated

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Adams Accession no.: ML042740629

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LIST OF PARTICIPANTS
TELEPHONE CALLS WITH ENTERGY OPERATIONS, INC.
ARKANSAS NUCLEAR ONE, UNIT 2
LICENSE RENEWAL APPLICATION

AUGUST 24, 2004

Participants	**Affiliation**
Michael Stroud	Entergy Operations, Inc. (Entergy)
Alan Cox	Entergy
Reza Ahrabli	Entergy
Garry Young	Entergy
Gregory Suber	U.S. Nuclear Regulatory Commission (NRC)
Maurice Heath	NRC
James Medoff	NRC
Hansraj Ashar	NRC

Enclosure 1

REQUEST OF ADDITIONAL INFORMATION FOR
ANO-2 LICENSE RENEWAL APPLICATION

RAI 4.5-2

The use of 10 CFR 54.21(c)(1)(ii) and (iii) is appropriate for concrete containment tendon prestress time-limited aging analysis (TLAA). However, the staff needs to assess the plant-specific operating experience regarding the residual prestressing forces in the containment. Based on the analysis performed per 10 CFR 54.21(c)(1)(ii), the applicant is requested to provide the following information:

(a) Minimum required prestressing forces for each group of tendons in terms of force per tendon.

(b) Trend lines of the projected prestressing forces for each group of tendons based on the regression analysis of the measured prestressing forces (see NRC Information Notice 99-10 for additional information).

(c) Plots showing comparisons of prestressing forces projected to 40 years and 60 years of operation, with the minimum required prestress for each group of tendons.

The staff requests that the comparison curves be constructed in force per tendon as opposed to force per wire or strand since the acceptance criteria in Subsection IWL of Section XI of the ASME Code uses these units. Furthermore, as stated in NRC Information Notice 99-10 the "Calculation of the average effective wire forces in the tendon from the measured tendon force is made only to ensure that (the measured lift-off force) does not exceed 70% of the guaranteed ultimate tensile strength of the wire."

Applicant's Response

(a) The minimum required prestress wire forces for each group of tendons based on current site documentation is as follows (for 59 psig building design pressure). The listed values in terms of forces per tendon were obtained by conservative method of multiplying the values from the attached curves by the total number of wires in each tendon which is 186.

Hoop tendons	6.48 kips x186 = 1205.28 kips per tendon
Dome tendons	6.63 kips x 186 = 1233.18 kips per tendon
Vertical tendons	7.37 kips x 186 = 1370.82 kips per tendon

(b) Trend lines of the projected prestressing forces for each group of tendons are attached. Prior to implementation of ASME Section XI, Subsection IWE/IWL, ANO-2 took credit for results of the ANO-1 reactor building tendon inservice inspection, as allowed by code due to similarity of the two containments. The curves are not based on a regression analysis per Information Notice 99-10. However, Entergy did evaluate its current method against the regression analysis outlined in Information Notice 99-10 during the ANO-1 15-year surveillance. This

analysis showed that the measured tendon prestress forces are well within the projected losses when compared against the original curve data. Entergy began using a random sampling software program for tendon selection in 1999 for the ANO-1 25-year and the ANO-2 20-year surveillances in accordance with the requirements of 10 CFR 50.55a. Entergy used a design of 8% relaxation loss and a "normalized force" calculation to account for elastic losses during initial tensioning. ANO has not experienced relaxation losses greater than expected during tendon surveillances. The trending results for the three groups of tendons are provided below.

Staff's Comment

The staff requested that Entergy propose a plan or a program that would provide a valid time-limited aging analysis (TLAA) for each group of tendons in the ANO-2 containment.

Applicant's Clarification

In accordance with regulatory guide (RG) 1.35, Revision 2, the ANO-2 projected trend lines were developed from ANO-1 initial data since ANO-2 data was not available and the same containment design was used for both units. In the fall of 2000, these trend lines were used to check six ANO-2 tendons (three verticals and three hoops). The measured results were consistent with the trend lines. If future tendon examination data diverges from the expected trend, the discrepancy will be addressed in accordance with requirements of the Containment Inservice Inspection (ISI) Program (IWE/IWL) under the current licensing basis.

Notwithstanding the above, consistent with 10 CFR 54.21(c)(1)(iii), loss of tendon prestress will be managed during the period of extended operation by continued implementation of tendon inspections required by the American Society of Mechanical Engineers ASME Code Section XI IWL. In accordance with NUREG 1800, Section 4.5.3.1.3, relevant operating experience, including the experience with prestressing systems described in Information Notice 99-10, will be considered.

In summary, the ANO-2 Containment ISI Program in accordance with the requirements of ASME Code Section XI IWL will provide reasonable assurance that the effects of aging on the intended functions of tendons will be adequately managed for the period of extended operation in accordance with the provisions of 10 CFR 54.21(c)(1)(iii).

Additional Staff Comment

In the July 22, 2004 letter, the applicant stated its intention to perform the TLAA using 10 CFR 54.21(c)(1)(iii). The option (iii) would allow the applicant to use an aging management program for tracking the magnitudes of prestressing forces in ANO-2 containment. For this option, the staff requests that the applicant (1) address the ten elements of the program (NUREG-1801 AMP X.S1) and (2) provide a description of the process that will be used for developing prestressing force trend lines.

Item 4.5-2

> As discussed in RAI 4.5-2, and CI 4.5-1, above, the applicant's statement in Section A.2.2.4 of the LRA, "Calculation of the acceptability of the effective prestress of the containment building post-tensioning system at 60 years has been performed to show that the containment building tendon elements will be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii)," is not correct, and should be modified to reflect the resolution of CI 4.5-1. The modified Section A.2.2.4 of the LRA should include the minimum required prestressing forces as the acceptance criteria during the period of extended operation. The applicant is requested to provide the revised Section A.2.2.4.

Status

The applicant stated that ASME Section XI Subsection IWL will be used to manage the aging effects of the concrete tendons. The staff believes that for option 10 CFR 52.21(c)(1)(iii) NUREG-1801 recommends the use of NUREG-1801 AMP X.S1. This issue remains open.

RAI 4.7.3-1

In 4.7.3 (Page 4.7-2) of the LRA, the applicant concluded that the RCP flywheel is not a TLAA. The basis for this conclusion is a 1997 safety evaluation of a fatigue crack growth analysis that was presented in a Combustion Engineering Owner's Group topical report. This safety evaluation allowed the licensee to lengthen the RCP flywheel inspection period for ANO Units 1 and 2 and five other units. The fatigue crack growth analysis for ANO Units 1 and 2 is based on 4,000 RCP startup and shutdown cycles. The RCP flywheel was identified as a TLAA in the LRA for ANO Unit 1, and two other units that are identified in the topical report and that have been granted renewed licenses.

Please provide justification why the RCP flywheel is not a TLAA for ANO-2. If the RCP flywheel is a TLAA, provide the TLAA for the RCP Flywheel for ANO Unit 2, and include the justification for why 4,000 RCP startup and shutdown cycles remain bounding through the end of the extended period of operation for ANO-2. In addition, the applicant must include an FSAR Supplement summary description, in Appendix A, of the LRA for the TLAA on fatigue-induced crack growth of the ANO-2 RCP flywheel. The summary description should include a discussion on the safety margin for the acceptable flaw size, and the justification for why 4,000 RCP startup and shutdown cycles remain bounding through the end of the extended period of operation for ANO.

Applicant's Response

Response: As defined in 10 CFR 54.3, TLAAs are those licensee calculations and analyses that involve time-limited assumptions defined by the current operating term, for example, 40 years. The RCP flywheel analysis was based on an assumption of 4,000 startup and shutdown cycles. These 4,000 cycles are not a time-limited assumption defined by the current operating term. Therefore, this analysis does not meet the 10 CFR 54.3 definition of a TLAA.

RCP startup and shutdown cycles typically occur only in conjunction with RCS heatup or cooldown cycles. As indicated in LRA Table 4.3-1, the allowable number of heatup and cooldown cycles for 60 years of operation is 500. The number of RCP startup and shutdown cycles assumed in the flywheel fatigue crack growth analysis is eight times the number of RCS heatup and cooldown cycles allowed through the period of extended operation. Maintenance Rule Scoping Documents, Upper Level Documents, and ANO topical reports for the NRC regulations identified in 10 CFR 54.4(a)(3) were used to determine system functions and identify the components that perform intended functions required to accomplish those system functions. The license renewal boundary on the drawings may be defined as the boundary between the portion of the system that performs an intended function (requires an aging management review) and the portion of the system that does not perform an intended function (does not require an aging management review).

Staff's Comment

Under NRC licensing activities or regulatory activities, the NRC's evaluation covers the entire 40-year licensed period or some part of it. The applicant is using the safety margin to make a conclusion that the analysis is beyond 40 years. For the current licensed operating, Entergy cannot use an inherint margin of safety in the analysis as the basis for stating that the analysis goes beyond 40 years (and therefore does not meet the definition of a TLAA); otherwise the criterion basis behind 10 CFR 54.21(c)(1)(i) is meaningless - i.e., demonstration that the analysis for the current 40 year term remains bounding. The flywheel analysis is either applicable for the entire 40 year period (which is the case) or some part less than 40 years. The analysis is never applicable for a period greater than 40 years of licensed life.

Applicant's Clarification

As defined in 10 CFR 54.3, TLAAs are those licensee calculations and analyses that involve time-limited assumptions defined by the current operating term, for example, 40 years. The RCP flywheel analysis was based on an assumption of 4,000 startup and shutdown cycles. These 4,000 cycles are not a time-limited assumption defined by the current operating term. Therefore, this analysis does not meet the 10 CFR 54.3 definition of a TLAA.

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Status

The applicant stated that the RCP Flywheel has a qualified life of greater than 60 based on 4,000 startup and shutdown cycles. The staff maintains that the safety margin (4,000 cycles) can not be used to justify the RCP Flywheel analysis beyond the current operation term of 40 years. Additional information is required.

Arkansas Nuclear One, Unit 2

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