December 21, 2007

Mr. Timothy G. Mitchell
Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - APPROVAL OF EXTENSION REQUEST FOR CORRECTIVE ACTIONS RE: GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED WATER REACTORS" (TAC NOS. MC4663 AND MC4664)

Dear Mr. Mitchell:

Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors," requested that all licensees complete actions related to the GL by December 31, 2007. By letter dated November 7, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML073270060), Entergy Operations, Inc. (Entergy, the licensee), requested an extension to the completion date for its corrective actions to be taken at the Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2, respectively). In its letter, Entergy stated that actions have been taken to bring ANO-1 and ANO-2 into compliance with GL 2004-02, including replacing the sump screens with substantially larger sump strainers during the fall 2006 refueling outage for ANO-1 and during the spring 2007 refueling outage for ANO-2. However, based on recent chemical effects testing, Entergy stated that a containment buffer replacement is necessary to address chemical effects for ANO-2. By letter dated October 5, 2007, Entergy requested a license amendment to support the replacement of the containment buffering agent during the spring 2008 refueling outage. Therefore, Entergy requested an extension for ANO-2 to delay the completion of buffer replacement until restart following its spring 2008 refueling outage scheduled to begin on March 16, 2008.

Entergy has also stated that additional time is needed to complete the sump analysis for ANO-1 and to change the sodium hydroxide concentration in the solution used for controlling the pH (potential of Hydrogen) in the containment pool. Therefore, Entergy requested an extension for ANO-1 to complete these actions on the same schedule as the extension request for ANO-2 (i.e., prior to the restart of ANO-2 from its spring 2008 refueling outage).

In addition, Entergy stated that the extension will also support the completion of the analysis of downstream effects within the reactor vessel per WCAP-16793-P, “Evaluation of Long-Term Cooling Associated with Sump Debris Effects,” and the completion of the strainer certification/ qualification reports.

As stated in SECY-06-0078, proposed extensions to permit changes at the next outage of opportunity after December 2007 may be granted if, based on the licensee's request, the U.S. Nuclear Regulatory Commission (NRC) staff determines that

1. the licensee has a plant-specific technical/experimental plan with milestones and schedules to address outstanding technical issues with enough margin to account for uncertainties, and

2. the licensee identifies mitigative measures to be put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded emergency core cooling system (ECCS) and containment spray system (CSS) functions during the extension period.

SECY-06-0078 also states that for proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed mitigative measures include temporary physical improvements to the ECCS sump or materials inside containment to better ensure a high level of ECCS sump performance.

In regard to the first criterion for approving an extension, Entergy has a plant-specific plan, with milestones and schedules, to complete the GL 2004-02-required corrective actions and modifications for ANO-1 and ANO-2 prior to the restart of ANO-2 from its spring 2008 refueling outage.

The specific actions that Entergy plans to complete prior to the restart of ANO-2 include the following:

- a change to the sodium hydroxide concentration for ANO-1 no later than spring 2008;

- a change to the ANO-2 buffer from trisodium phosphate to sodium tetraborate, following the planned implementation of a license amendment currently under review by the NRC staff;

- modifications to insulation at ANO-2, including a reactor vessel head shroud insulation change, fibrous insulation removal, and calcium silicate insulation banding;

- fuel and vessel downstream effects analysis and strainer certification/ qualification reports; and

- a licensing basis update to reflect resolution of ANO-1 and ANO-2 Generic Safety Issue (GSI)-191 issues (completion of all GL 2004-02 corrective actions) within 60 days of completion of the upcoming ANO-2 refueling outage in spring 2008.

In regard to the second criterion for approving an extension, Entergy has stated that the following modifications, mitigating measures, compensatory measures, and/or favorable

conditions are in effect at ANO, minimizing the risk of degraded ECCS and CSS functions during the extension period:

1. Entergy stated that ANO-1 and ANO-2 have in place new strainers with a smaller opening size and larger surface area to accommodate the debris generated by a loss-of-coolant accident (LOCA). The new strainers have 1/16-inch diameter perforations and a surface area of approximately 2715 square feet for ANO-1 and 4837 square feet for ANO-2. The previous sump screens had surface areas of approximately 200 square feet each. In addition to providing a substantially increased surface area for debris filtration, Entergy stated that the new strainers provide increased margin against fiber bypass and excessive wear on downstream components caused by debris in the water.

2. Entergy stated that the majority of the fiberglass and calcium silicate insulation in the ANO-1 steam generator cavities was replaced with reflective metallic insulation during a recent steam generator replacement outage, and that additional fiberglass was removed and additional calcium silicate insulation was banded more securely during the subsequent refueling outage.

3. Entergy stated that, in response to Bulletin 2003-01, “Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors,” ANO-1 and ANO-2 have implemented the following compensatory measures to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions:

   - training conducted for licensed operators presenting the mechanisms and potential consequences of sump clogging;
   - procedural guidance within the emergency operating procedures on symptoms and identification of sump blockage;
   - emergency operating procedures directing refilling of the refueling water tank upon switchover to sump recirculation;
   - containment cleanliness assured by procedural controls that apply after each containment entry and prior to plant startup from an outage;
   - foreign material exclusion assured by procedural controls that apply after each containment entry and prior to plant startup from an outage;
   - containment foreign material exclusion procedural controls that apply to inspection, operation, maintenance, and outage activities;
   - procedural guidance that ensures that containment drainage paths are unblocked; and
   - procedural guidance that ensures sump cleanliness and integrity.

4. Entergy stated that engineering procedures are in effect to ensure that (1) through the engineering change process, materials (including insulation, coatings, and other potential sources of post-accident debris) that are introduced into containment are identified and evaluated to determine if they could adversely affect the sump recirculation function, and (2) configuration control of insulation and coatings inside containment is maintained.

The NRC staff believes that Entergy has a reasonable plan for ANO-1 and ANO-2 that should result in the completion of final GSI-191 modifications and evaluations that ensure strainer function with adequate margin for uncertainties. Further, the NRC staff has concluded that Entergy has put mitigation measures in place at ANO-1 and ANO-2 to adequately reduce risk for the requested extension period. However, after discussing the extension request by phone with the licensee on December 17, 2007, the NRC staff concluded that linking completion of corrective actions on ANO-1 to the outage schedule for ANO-2 is inappropriate. The licensee agreed and proposed revised extensions for ANO- 1 corrective actions. The NRC staff found the licensee's proposed due dates acceptable and expeditious, which is consistent with the high priority placed on completing corrective actions for GL 2004-02. Therefore, consistent with SECY-06-0078, it is acceptable for Entergy to complete the specific corrective actions described above according to the following schedule:

- Completion of the planned outage-related modifications specified above for ANO-2 (i.e., buffer replacement and insulation modifications) prior to the restart of ANO-2 from its upcoming refueling outage scheduled to begin on March 16, 2008.

- Completion of the buffer concentration change for ANO-1 by the end of April 2008.

- Completion of analyses for downstream effects in the reactor vessel and strainer head-loss reports by the end of April 2008.

- Completion of final strainer certification/qualification calculations and licensing basis updates for GSI-191 by the end of June 2008.

While the NRC staff accepts the revised completion dates above as a reasonable allowance for contingencies regarding completion of remaining activities to address GL 2004-02, the NRC staff expects Entergy to place a high priority on completing remaining actions and updating the licensing basis for ANO-1 and ANO-2 as soon as possible.

Should Entergy elect to begin the ANO-2 refueling outage more than 30 days after March 16, 2008, Entergy will need to provide the NRC additional justification for the further delay in the completion of the planned outage-related modifications specified above for ANO-2.

If you have any questions or comments regarding this approval, please contact Alan Wang at 301-415-1445.

Sincerely,

/RA/

Thomas G. Hiltz, Branch Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-313 and 50-368

cc: See next page

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Sincerely,

/RA.

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