

September 11, 2003

Mr. Craig G. Anderson  
Vice President, Operations ANO  
Entergy Operations, Inc.  
1448 S. R. 333  
Russellville, AR 72801

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT  
RE: REQUEST TO EXTEND ALLOWED OUTAGE TIME FOR LOW  
PRESSURE SAFETY INJECTION SYSTEM (TAC NO. MB6362)

Dear Mr. Anderson:

The Commission has issued the enclosed Amendment No. 251 to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 19, 2002, as supplemented by letter dated July 18, 2003.

The amendment extends the allowed outage time (AOT) for a single inoperable low pressure safety injection (LPSI) train from 72 hours to seven days. In addition, an AOT of 72 hours is included for other conditions where the equivalent of a single emergency core cooling system (ECCS) subsystem flow is still available to both the LPSI and high pressure safety injection (HPSI) trains. Also, an action statement is added to restore at least one of each HPSI and LPSI trains to operable status within one hour if 100 percent of ECCS flow is unavailable due to two inoperable HPSI or LPSI trains.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

**/RA/**

Bhalchandra K. Vaidya, Project Manager, Section 1  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:

1. Amendment No. 251 to NPF-6
2. Safety Evaluation

cc w/encls: See next page

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TS: NRR-058  
 \* no major changes to SE \*\*See previous concurrence

OFFICE	PDIV-1/PM	PDIV-1/LA	SRXB/SC	SPSB/SC*	OGC	PDIV-1/SC
NAME	BVaidya	DJohnson	JUhle**	MRubin	AHodgdon** <small>nlo w/changes noted</small>	RGramm
DATE	9/09/03	9/09/03	9/5/03	8/26/03	9/8/03	9/11/03

ENERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 251  
License No. NPF-6

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Entergy Operations, Inc. (the licensee), dated September 19, 2002, as supplemented by letter dated July 18, 2003, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-6 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 251, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Robert A. Gramm, Chief, Section 1  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: September 11, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 251

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

3/4 5-3

3/4 5-4

Insert

3/4 5-3

3/4 5-4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 251 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By application dated September 19, 2002, as supplemented by letter dated July 18, 2003, Entergy Operations, Inc. (the licensee), requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit No. 2 (ANO-2). The supplemental letter dated July 18, 2003, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 12, 2002 (67 FR 68734).

The proposed changes would revise TSs to extend the allowed outage time (AOT) for a single inoperable low pressure safety injection (LPSI) train from 72 hours to 7 days. In addition, an AOT of 72 hours would be included for other conditions where the equivalent of a single emergency core cooling system (ECCS) subsystem flow is still available to both the LPSI and high pressure safety injection (HPSI) trains. Also, an action statement would be added to restore at least one of each HPSI and LPSI trains to operable status within one hour if 100% of ECCS flow is unavailable due to two inoperable HPSI or LPSI trains. Specifically, the proposed changes would revise TS 3.5.2 to:

- 1) Create a new Action statement "a," that extends the AOT for a single LPSI train to seven (7) days.
- 2) Modify the existing Action statement "a" to retain the 72-hour AOT for other conditions not associated with a single LPSI train. An Action statement for an equivalent of 100% ECCS subsystem flow is being added to ensure that adequate HPSI and LPSI injections are available. This is now Action statement "b."
- 3) A new Action statement "c" has been created where 100% ECCS flow equivalent to either the HPSI or LPSI trains within both ECCS subsystems is not available, then at least one LPSI train and one HPSI train are restored to Operable status within one hour. This action is commensurate with Limiting Condition for Operation (LCO) 3.0.3.

- 4) The LCO for 3.5.2.a, 3.5.2.b, and 3.5.2.c is being changed from referencing HPSI and LPSI pumps to referencing HPSI and LPSI trains. Acronyms for LPSI and HPSI have been added.
- 5) The note for the Applicability while in Mode 3 regarding being greater than or equal to 1700 psia has been deleted as a note and the wording has been moved to the Applicability after Mode 3.
- 6) In addition, several changes have been made to reformat the TS pages. This includes moving information previously contained on the affected pages to subsequent pages, modifying the font, adding indentations to paragraphs, renumbering of unaffected actions, and other similar changes.

The licensee performed an integrated review and assessment of plant operations, deterministic/design basis factors, and plant risk. The results of the study demonstrated that the proposed AOT extension would provide plant operational flexibility while simultaneously perturbing plant risk very minimally. Additionally, the licensee made a regulatory commitment to implement four compensatory measures to be put in place prior to implementing this revision to TS 3.5.2, ACTION a. This proposal will enhance overall plant safety by avoiding potential unscheduled shutdowns, providing increased flexibility in scheduling, and better optimizing the performance of maintenance and surveillance activities.

## 2.0 REGULATORY EVALUATION

The staff finds that the licensee in Section 5.1 of its September 19, 2002, submittal identified the applicable regulatory requirements. The regulatory requirements on which the staff based its acceptance are:

- 1) General Design Criteria (GDC)-34, "Residual Heat Removal," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (CFR), Part 50, requires, in part, that a system to remove residual heat be provided. The LPSI pumps, when aligned to the shutdown cooling system, provide this function.
- 2) GDC-35, "Emergency Core Cooling," requires, in part, that a system to provide abundant emergency core cooling be provided. The LPSI system, as part of the ECCS, provides a portion of this requirement.
- 3) GDC-37, "Testing of Emergency Core Cooling System," requires, in part, that the ECCS be designed to permit appropriate periodic pressure and functional testing. Compliance with these criteria for the LPSI system is unaffected by the proposed AOT change from 72 hours to 7 days.
- 4) The regulations at 10 CFR 50.36, "Technical specifications," require that licensees' TSs include LCOs, which include AOTs required for safe operation of the facility, and that the TS-specified LCOs are consistent with the assumed values of the initial conditions in the licensee's safety analysis. The U.S. Nuclear Regulatory Commission (NRC) staff and the Combustion Engineering Owners' Group (CEOG) developed improved Standard TSs (ISTS), which meet the requirements of 10 CFR 50.36(c)(2)ii and 10 CFR 50.36(c)(3).

- 5) The regulations at 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models," provide acceptance criteria and Evaluation Models.
- 6) The maintenance rule in 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," requires that a licensee assess and manage the increase in risk that may result from proposed maintenance activities.
- 7) The regulations in 10 CFR 50.90, "Application for amendment of license or construction permit," 10 CFR 50.91, "Notice for public comments; State consultation," and 10 CFR 50.92, "Issuance of amendment," describe the requirements for application of amendments to the operating license and determination of no significant hazards consideration.
- 8) The NRC staff also considered the following guidance documents in its review of the application:
  - a) NRC Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," describes a risk-informed approach, acceptable to the NRC, for assessing the nature and impact of proposed licensing-basis changes by considering engineering issues and applying risk insights.
  - b) RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," describes an acceptable risk-informed approach specifically for assessing proposed TS changes in AOTs. These RGs also provide acceptance guidelines for evaluating the results of such evaluations.
  - c) NUREG-1432, "Standard Technical Specifications - Combustion Engineering Plants," Revision 2, and NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," provide guidance in developing ISTS.

### 3.0 TECHNICAL EVALUATION

The NRC staff has reviewed the licensee's regulatory and technical analyses in support of its proposed license amendment, which are described in Sections 4.0 and 5.0 of the licensee's submittal. The detailed evaluation below will support the conclusion that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

#### 3.1 Deterministic Evaluation of TS 3.5.2 Changes

The LPSI trains serve two functions: the first is to inject large quantities of borated water into the Reactor Coolant System (RCS) during accident conditions; the second is to provide flow through the reactor core and shutdown cooling heat exchangers for shutdown cooling and heat removal during the cold shutdown. The ECCS system consists of two redundant, 100%

capacity subsystems. Each subsystem consists of the HPSI and LPSI trains, and their associated flow paths. In MODES 1, 2, and 3, with pressurizer pressure greater than or equal to 1700 psia, both ECCS subsystems are required to be operable. This ensures that 100% of the core cooling requirements can be provided in the event of a single active failure.

In the proposed TS 3.5.2, ACTION a, with one ECCS subsystem inoperable due to an inoperable LPSI train, inoperable train is required to be restored to the OPERABLE status within 7 days or be in HOT STANDBY within 6 hours, and reduce pressurizer pressure to < 1700 psia within the following 6 hours. The other LPSI train and both trains of HPSI are available to perform the required safety function.

In the proposed TS 3.5.2, ACTION b, with one or more ECCS subsystems inoperable due to conditions other than "TS 3.5.2, ACTION a" above and 100% of ECCS flow, equivalent to a single OPERABLE HPSI and LPSI train, is available, the inoperable train(s) are required to be restored to OPERABLE status within 72 hours or be in at least HOT STANDBY within 6 hours, and reduce pressurizer pressure to < 1700 psia within the following 6 hours. In this case the result is that the AOT is reduced to only 72 hours.

In the proposed TS 3.5.2, ACTION c, with less than 100% ECCS flow equivalent either to the HPSI or LPSI trains within both ECCS subsystems, at least one HPSI train and one LPSI train are required to be restored to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours, and reduce pressurizer pressure to < 1700 psia within the following 6 hours.

The proposed revisions to TS 3.5.2 are consistent with NUREG 1432.

The licensee has made a regulatory commitment, as described in Section 4.0 of this safety evaluation (SE), to implement four compensatory measures in the situation when ANO-2 is at power and LPSI train maintenance activities are scheduled to extend beyond 72 hours. These compensatory measures will reduce the risks associated with the extension of LPSI AOT.

The proposed revision of extending LPSI AOT from 72 hours to 7 days to restore the inoperable LPSI train to OPERABLE status, as well as other revisions as described above, do not impact any assumptions and inputs in the safety analyses. The increased AOT will allow longer corrective maintenance (CM) at power without requiring a plant shutdown. This proposal will reduce unnecessary shutdowns and contribute to an overall enhancement of plant safety.

The NRC staff concludes that the proposed revisions to TS 3.5.2 are acceptable from a deterministic evaluation because they meet the requirements of 10 CFR 50.36; the requirements of GDC-34, -35, and -37; and are consistent with NUREG-1432.

### 3.2 PSA Evaluation of TS 3.5.2, ACTION a

The following discussion pertains to the PSA evaluation for the revisions to TS 3.5.2, ACTION a, only.

Consideration of the risk factors impacted by the extension in AOT from 72 hours to 7 days demonstrated that there is only a small increase in the average "at-power" core damage frequency (CDF) for ANO-2. An analysis was performed of the impact of the proposed LPSI

AOT extension on large early release scenarios. The licensee assessments of the three classes of events (a containment bypass, severe accidents accompanied by loss of containment isolation, and containment failure associated with energetic events in containment) were considered for these scenarios. The staff concluded that the increased unavailability of one LPSI train would result in a very small impact on the large early release probability for ANO-2, based on the ANO-2 risk evaluation with respect to the acceptance guidelines of RGs 1.174 and 1.177.

### 3.2.1 Safety Assessment for Extension of LPSI AOT to 7 Days

The licensee performed an assessment of the change in the ANO-2 CDF for allowing ANO-2 to continue at-power operation with one LPSI train out of service (OOS) for 7 days. Using the ANO-2 Internal Events Level-1 PSA model, the CDF associated with at-power plant conditions was assessed. The summary of the risk analysis provides a best-estimate evaluation using current modeling techniques, including a relative change in CDF values.

The current ANO-2 PSA model (revision 3p1) was used for the present licensee analysis. The PSA model provides only internal events at-power risk estimates. Anticipated Transients Without Scram (ATWS), Interfacing System Loss of Coolant Accidents (ISLOCAs), and external initiators such as seismic events, internal or external floods, high winds, and tornadoes are not considered in the licensee's analysis since these were not available in the above model. The licensee performed a supplemental assessment considering these issues, which is discussed later in this SE.

Although mode transition and shutdown risks were not explicitly considered by the licensee, it expects insignificant impacts in these modes. Since LPSI is chiefly a shutdown system, allowing extended maintenance outages during power operations may increase its availability during shutdown operations and will avoid unnecessary plant shutdowns due to an inoperable LPSI train in which LPSI operation is necessary.

The impact of the proposed AOT extension on Large Early Release Frequency (LERF) is not explicitly considered by the licensee, but is expected by the staff to be less than 10 percent of similar impacts on CDF based on the staff's understanding of large dry high-pressure containment conditional failure probability. In previous license applications, the licensee has estimated a base LERF value that is less than 3% of the base CDF.

For the preventive maintenance (PM) cases, no other safety-related components or systems were considered OOS by the licensee. However, test and maintenance event frequencies were left at nominal values for conservatism. When one train is OOS for PM, the licensee does not allow the other train to be in a test or maintenance condition. It is assumed that PM is planned such that plant risk is minimized consistent with the requirements of 10 CFR 50.65(a)(4). CM is defined as emergent maintenance evolution due to equipment failure. Since CM is not planned, plant risk may be elevated due to other equipment failures, common-cause failure being a prominent example.

The results of the ANO-2 LPSI proposed 7-day risk analyses due to internal event contributors calculated by the licensee show that the incremental conditional core damage probability (ICCDP) value is well below the RG 1.177 guideline. Further, the delta CDF value is below the RG 1.174 value.

### 3.2.2 Tier 1 - Probabilistic Risk Assessment (PRA) Capability and Insights

The Tier 1 considerations constitute an evaluation of the impact on plant risk of the proposed 7-day LPSI AOT, as expressed by the change in CDF (delta CDF), the ICCDP, and, when necessary, the changes in LERF (delta LERF) and the incremental conditional large early release probability (ICLERP). For the proposed 7-day LPSI AOT (PM), the licensee's calculated delta CDF is  $1.08\text{E-}07/\text{yr}$ , which is within the RG 1.174 acceptance guideline of  $1.0\text{E-}05/\text{yr}$ . The ICCDP is  $3.61\text{E-}08$ , which is within the  $5\text{E-}07$  acceptance guideline value of RG 1.177. The licensee's calculated values of delta CDF and ICCDP for CM are  $1.85\text{E-}07/\text{yr}$  (delta CDF) and  $2.81\text{E-}07$  (ICCDP), respectively, both of which are within the acceptance guidelines. Adoption of the proposed AOT extension would also probably reduce the risk contribution of shutdowns, though this risk reduction is not quantified. The LERF impacts (i.e., delta LERF and ICLERP) are estimated by the staff to be proportionally smaller (by more than a factor of ten) to the CDF impacts and, therefore, are also within the RG 1.174 and 1.177 acceptance guidelines.

### 3.2.3 Tier 2 - Avoidance of Plant Risk

The avoidance of risk-significant plant configurations leads to the identification of potentially high-risk configurations that could exist if equipment, in addition to that associated with the TS AOT change, is concurrently taken OOS, or other risk-significant operational factors such as concurrent system testing or equipment testing are involved. This ensures that appropriate restrictions are placed on dominant, risk-significant configurations that could be relevant to the proposed TS AOT change. The licensee stated that they have not identified any additional constraints or compensatory actions that should be included with the proposed LPSI 7-day AOT in order to avoid planned high-risk configurations. Assessments performed in accordance with provisions of the licensee's Equipment-out-of-Service (EOOS) Model should give reasonable assurance that the risk-significance of unexpected configurations resulting from unplanned maintenance or unexpected conditions while in the risk-informed AOT are properly evaluated.

### 3.2.4 Tier 3—ANO-2 Risk Management Program

The EOOS model provides the configuration risk management tool at ANO-2 for compliance with 10 CFR 50.65(a)(4). The program provides assurance to the licensee that risk-significant plant equipment configurations are minimized when plant equipment is removed from service. This is a risk-informed assessment process to manage the risk associated with planned and unplanned plant maintenance activities. The licensee states that the program ensures that the risk-impact of OOS equipment is appropriately evaluated prior to performing a planned maintenance activity, and soon after entering an emergent maintenance condition. Procedures and guidelines have been developed that govern this process. These documents require an integrated review (both quantitative and qualitative) of maintenance activities to identify risk-significant plant equipment outage configurations. The licensee requires this review both during the work management process and for emergent conditions during normal plant operation. Appropriate consideration is given to equipment unavailability, operational activities such as testing or load dispatching, and weather conditions. This program includes provisions for performing a configuration-dependent assessment of the overall impact on risk of proposed licensee plant configurations prior to, and during, the performance of maintenance activities that result in the removal of equipment from service. The licensee reassesses risk if an equipment

failure/malfunction or emergent condition produces a plant configuration risk that has not been previously assessed. This provides an acceptable process for assessing the risk-impact of planned maintenance activities during the proposed LPSI extended AOT.

### 3.2.5 PSA Model Quality

The ANO-2 Individual Plant Examination (IPE) model was developed by ANO-2 Safety Analysis Design Engineering personnel with support from Science Applications International Corporation (SAIC), now Data Systems & Solutions (DS&S), other Design Engineering groups, and Operations. As part of the IPE development process, an expert panel review was performed on the results. This panel was composed of experienced personnel from these groups. In addition, ERIN Engineering and Research Incorporated (ERIN) performed an external review of the IPE model and results. The ANO-2 PSA model has been updated several times since completion of the IPE to maintain it consistent with the as-built/as-operated plant, to incorporate improved thermal hydraulic results, and to incorporate PSA methodology improvements. The updates have involved a cooperative effort including both licensee personnel and PSA consultant support. In each of the updates, an independent review of the revisions to the PSA model is performed. The PSA model and results have been maintained as plant calculations or engineering reports. As part of each major update, in order to ensure adequacy of the updated model, an internal review of PSA model results is performed by utilizing an expert panel. The panel is typically composed of experienced personnel from various plant organizations, including Operations, System Engineering, Design Engineering, Safety Analysis, and PSA. In addition the CEOG conducted a peer review of the ANO-2 model in February of 2002. The results of this review, however, have not been issued to date. However, the NRC staff has reviewed the results of the current ANO-2 PSA model as part of the benchmarking of the ANO-2 Significance Determination Program Notebook. This review was conducted by the staff and its contractors at the ANO-2 site during the week of November 26, 2001. Also, the staff performed a review of the risk assessment, primarily the human reliability analysis and fire risk analysis methods that were considered as part of its review of the risk impact of the ANO-2 extended power uprate. This review included a site visit on December 18 and 19, 2001. These staff reviews did not identify any issues that would directly impact this license amendment application.

### 3.2.6 External Events

The licensee's PSA model does not address the risk associated with external events, including seismic events, internal fires, and other external events (i.e., high winds, external flooding, and accident involving nearby industries, transportation and military facilities). Nor does the model address the risk associated with several other risk contributors, namely ATWS scenarios, ISLOCAs, and High and Medium Energy Line Breaks (HELBs and MELBs). The licensee performed qualitative analyses to assess the risk impacts of these non-modeled events for extending the current LPSI AOT. The licensee considers these analyses to be qualitative, since they are relatively simplistic and not based on comprehensive and detailed fault tree/event tree models. The licensee's intent of these methods and results was to provide an order-of-magnitude assessment of the risk associated with these risk contributors.

The licensee's methodology is essentially the same as that used for license amendment application for the ANO-2 Emergency Diesel Generator (EDG) AOT extension submitted to the NRC staff by letter dated May 22, 2003. The EDG AOT extension (from 3 to 14 days) was

approved by the NRC in License Amendment No. 249, dated August 8, 2003. Differences in the methodology are due to differences in the risk issues associated with extending the EDG vs. LPSI AOTs. The methodology was previously described in the licensee's May 22, 2003, letter; thus, the discussion below focuses on the licensee-perceived differences in the use of this methodology for the present LPSI AOT relaxation submittal.

Removing one LPSI train from service does not affect the risk associated with any of the external events listed above, according to the licensee. This conclusion is based on the following observations:

- 1) The LPSI system has two safety functions:
  - a) The LPSI emergency core cooling mode provides RCS makeup during the injection phase of a large break Loss of Coolant Accident (LBLOCA) and
  - b) The LPSI shutdown cooling mode provides a means of cooling the RCS during shutdown conditions.
- 2) None of the non-modeled events (including external events) causes or involves a LBLOCA. Thus, degradation of the LPSI emergency core cooling function due to the removal of one LPSI train from service does not affect the risk associated with any of the non-modeled risk contributors.
- 3) The safe end state for most of the non-modeled events is the Hot Standby (HSB) condition. Thus, degradation of the LPSI emergency core cooling function due to the removal of one LPSI train from service affects only those non-modeled events that require entry into the Shutdown Cooling (SDC) mode as a safe end state.
- 4) The licensee considers the HSB condition to be the safe end state for all but a few accident scenarios. This position is consistent with NUREG-0933, "A Prioritization of Generic Safety Issues," Item A-31: "RHR [Residual Heat Removal] Shutdown Requirements (Revision 1)," statement that "The safe shutdown of a nuclear power plant following an accident not related to a LOCA [Loss of Coolant Accident] has been typically interpreted as achieving a "hot-standby" condition (i.e., the reactor is shut down, but system temperature and pressure are still at or near normal operating values)...." The ANO-2 PSA model is consistent with this position. This position also applies to accidents not included in the ANO-2 PSA model. Thus, entry into the SDC mode is not generally required for successful mitigation of any of the non-modeled events, including external events. A licensee review of each of the non-modeled risk contributors was performed using insights from the ANO-2 IPE of External Events (IPEEE) results, where available, in order to assure that this general rule applies to each of the non-modeled risk contributors. The effect of each non-modeled event in causing either a LBLOCA or a Steam Generator Tube Rupture (SGTR) event, both of which require the use of LPSI, were considered.
- 5) A licensee review of the external events indicates that none inherently requires entry into the SDC mode for successful mitigation. All can be modeled as a special transient event that is already included in the ANO-2 PSA model. Specific licensee observations for each of the non-modeled risk contributors are as follows:

- a) A fire event is assumed to cause a transient that involves the failure of a specific set of components. None of these failures directly causes a LBLOCA or a SGTR. The ANO-2 IPEEE fire risk analysis assumed that the HSB condition was a safe end state; thus, LPSI failures do not appear in any of the fire risk analysis cutset results for any fire initiator. Hence, the effect of removing one LPSI train from service has essentially no impact on the assessed fire risk. Due to this, the licensee did not make a detailed fire risk assessment.
- b) A seismic event is also categorized by the licensee as a special transient event. No seismic event smaller than the 0.3g Review Level Earthquake (RLE) was identified to result in a LBLOCA or SGTR. Thus, no seismic event within the scope of the ANO-2 IPEEE study is expected to require entry into the SDC mode. The licensee has concluded that, given a seismic event large enough to result in a LBLOCA or SGTR would probably also disable the LPSI system or systems that support it, the effect of removing one LPSI train from service has essentially no impact on the seismic risk. The staff finds that this impact would be extremely small.
- c) Similar arguments, as above, can be justified for internal floods and other external events (i.e., high winds, external flooding, and accidents involving nearby industries, transportation, and military facilities). None result in a LBLOCA or SGTR event and all could be modeled as special transient events. Thus, the staff judges that the effect of removing one LPSI train from service would have extremely small impact on the risk of other external events.
- d) Similar arguments, as above, can be made for the risk impacts of HELB and MELB, with similar arguments regarding the very low impact on LPSI unavailability.
- e) The remaining risk contributors not included in the licensee's PSA/PRA model, namely the ATWS and ISLOCA events, require additional consideration.

### 3.2.7 ISLOCA

The licensee's IPE identified three ISLOCA scenarios:

- 1) LPSI system injection line failures,
- 2) SDC suction line failures, and
- 3) Reactor Coolant Pump (RCP) seal cooler failures.

The first two situations contribute to core damage significantly, according to the licensee, only if either involves the loss of RCS inventory outside of the containment building. Without mitigation, if RCS inventory is lost outside of containment, core damage will occur regardless of LPSI availability. For these events, if the break is isolated, the RCS will repressurize and a LPSI train is not required to mitigate either of the events. The last scenario does not result in a LBLOCA and, as such, does not require the LPSI ECCS mode. Since the HSB condition is a safe end state, the LPSI SDC mode is not required for this event. Thus, the licensee concludes

that removing a LPSI train from service at power does not significantly increase the risk associated with an ISLOCA, because the LPSI train is not needed to mitigate any of these ISLOCA events. The staff finds this conclusion acceptable, based on the results of the licensee's qualitative evaluation.

### 3.2.8 ATWS

The licensee performed a scoping level analysis of the ANO-2 ATWS event as part of the ANO-2 IPE submitted to the NRC staff by letter dated August 28, 1992. This analysis assumed that successful termination of the ATWS event required entry into the SDC mode. An insight from this analysis is that the proposed extension of the LPSI AOT will impact the plant risk due to an ATWS.

The licensee's nominal ATWS CDF is estimated to be  $1.59E-06/r\text{-yr}$ , which was reported to the staff by letter dated May 22, 2003.

The effect of removing a LPSI train from service on the ATWS contribution to CDF was assessed by adjusting the Long Term Cooling event probabilities in the ATWS event tree logic. The LTC event accounts for the failure of the shutdown cooling function following an ATWS event.

The licensee-estimated instantaneous CDF (r/yr) for ATWS for PM was  $1.84E-06$ , while that for CM was  $1.88E-06$ . The licensee's estimates for ICCDP were  $4.7E-09$  (PM) and  $5.5E-09$  (CM), which are well within the RG 1.177 guideline. The licensee's estimates for ICCDP also meet the RG 1.177 acceptance guideline for ICLERP. The licensee's estimates for annual average delta CDF were  $1.4E-08/r\text{-yr}$  (PM) and  $3.7E-09/r\text{-yr}$  (CM), which are well within the RG 1.174 guideline. The licensee's annual average delta CDF estimates also meet the RG 1.174 acceptance guideline for delta LERF.

### 3.2.9 Licensee Satisfaction of at-Power Compensatory Measures

The EOOS model provides the licensee's configuration risk management program (CRMP) program tool for compliance with 10 CFR 50.65, particularly with respect to paragraph (a)(4). The program provides assurance that risk-significant plant equipment configurations are precluded or minimized when plant equipment is removed from service. A detailed description of the CRMP was provided to the staff by application dated September 19, 2002. The licensee has not identified any high-risk configurations associated with the proposed AOT extension. However, when at power, the licensee states that the following actions will be taken prior to taking a LPSI train OOS for maintenance purposes. These actions will not be taken unless entry into the AOT is expected to extend beyond the current 72-hour AOT.

- 1) All safety injection tanks will be verified to be operable.
- 2) All emergency feedwater (EFW) sources will be verified to be operable.
- 3) Operations will perform a briefing with the appropriate maintenance personnel in attendance to discuss the impact associated with unavailable components and flow paths. The brief will also include consideration of the actions that would need to be taken to return the affected LPSI train to functional use should the need arise.

- 4) Parts and tools will be pre-staged when appropriate to minimize outage time. Generally, the LPSI AOT will not be entered unless these actions are satisfied.

However, it should be recognized that unforeseen circumstances may arise that prohibit complying with these actions.

It is standard operational licensee practice to verify redundant train operability along with the required support systems prior to removing any TS components, regardless of the length of time a TS component is removed from service. If the redundant LPSI train is not operable, the maintenance activity will not be performed.

In all cases, maintenance activities are managed and assessed as required by the licensee's risk management program and 10 CFR 50.65(a)(4). When practical, valves are placed in their optimum position and maintenance activities are efficiently scheduled.

### 3.2.10 Conclusion - Probabilistic Safety Evaluation of TS 3.5.2, ACTION a Changes

On the basis of above discussion of the licensee's risk-informed assessment, the NRC staff finds that the proposed extension of the LPSI AOT at ANO-2 from 72 hours to 7 days is acceptable because the increase in plant risk is small and consistent with the acceptance guidelines of RG 1.174 and RG 1.177.

### 3.3 Evaluation of Other Administrative Changes

The several proposed changes as described below are administrative revisions such as reformatting, rearranging, relocating, rewording, renumbering, and deletions.

- 1) Acronyms for LPSI and HPSI have been added.
- 2) The note for the Applicability while in Mode 3 regarding being greater than or equal to 1700 psia has been deleted as a note and the wording has been moved to the Applicability after Mode 3.
- 3) In addition, several changes have been made to reformat the TS pages. This includes moving information previously contained on the affected pages to subsequent pages, modifying the font, adding indentations to paragraphs, renumbering of unaffected actions and other similar changes.

These TS changes do not give rise to a safety issue. Therefore, the NRC staff finds them acceptable

## 4.0 REGULATORY COMMITMENTS

Attachment 2 to the licensee's supplemental letter dated July 18, 2003, contained one regulatory commitment which includes a list of four compensatory measures. The commitment identified by the licensee is shown in Table 1 below.

Table 1

List of Regulatory Commitments

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE- TIME ACTION	CONTINUING COMPLIANCE	
When at power and LPSI train maintenance activities are scheduled to extend beyond 72 hours the following actions will be taken: 1. All safety injection tanks (SITs) will be verified operable. 2. All emergency feedwater (EFW) sources will be verified operable. 3. Operations will perform a brief with the appropriate maintenance personnel in attendance to discuss the impact associated with unavailable components and flow paths. The brief will also include consideration of the actions that would need to be taken to return the affected LPSI train to functional use should the need arise. 4. Parts and tools will be pre-staged when appropriate to minimize outage time.		X	

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program. The above regulatory commitments do not warrant the creation of regulatory requirements (items requiring prior NRC approval of subsequent changes).

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is

no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (67 FR 68734, November 12, 2002). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: September 11, 2003

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