



Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802
Tel 479-858-4838

Jeffery S. Forbes
Vice President
Operations ANO

2CAN090504

September 19, 2005

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

SUBJECT: License Amendment Request
To Modify Technical Specification 3.1.1.5, Minimum Temperature for
Criticality
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy) hereby requests the following amendment to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TSs). The proposed change will modify the ANO-2 TS 3.1.1.5, Minimum Temperature for Criticality. Specifically, the proposed change will raise the minimum temperature for criticality from the current value of $\geq 525^{\circ}\text{F}$ to $\geq 540^{\circ}\text{F}$. Changes are also proposed to the Action statement and Surveillance Requirements to support the increase in temperature. The change is needed to support core design.

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that this change involves no significant hazards consideration. The bases for these determinations are included in the attached submittal.

The proposed change does not include any new commitments.

Entergy requests approval of the proposed amendment by August 18, 2006. Once approved, the amendment shall be implemented within 30 days. Although this request is neither exigent nor emergency, your prompt review is requested.

If you have any questions or require additional information, please contact Dana Millar at 601-368-5445.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 19, 2005.

Sincerely,

A handwritten signature in black ink, appearing to be "JSF/DM", written over a horizontal line.

JSF/DM

Attachments:

1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)

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 MS O-7D1
Washington, DC 20555-0001

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

Attachment 1

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Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is a request to amend Operating License NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2).

The proposed change will revise the Operating License to modify the ANO-2 Technical Specification (TS) 3.1.1.5, Minimum Temperature for Criticality. Specifically, the proposed change will increase the current minimum Reactor Coolant System (RCS) lowest operating loop temperature (T_{avg}) from greater than or equal to 525°F to greater than or equal to 540°F. In addition, changes are proposed to the Action statement and Surveillance Requirements to support the increase in minimum temperature for criticality. The change is needed to support Cycle 19 core design.

Approval of the proposed change is requested by August 18, 2006 in order to support the reload activities in the fall 2006 refueling outage.

2.0 PROPOSED CHANGE

The proposed change revises ANO-2 TS 3.1.1.5 to increase the RCS lowest operating loop temperature. The current Limiting Condition for Operation (LCO) for TS 3.1.1.5 states:

"The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be $\geq 525^{\circ}\text{F}$ when the reactor is critical."

The proposed change to the LCO is as follows:

"The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be $\geq 540^{\circ}\text{F}$."

The current Action statement for LCO 3.1.1.5 is:

"With a Reactor Coolant System operating loop temperature (T_{avg}) $< 525^{\circ}\text{F}$, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes."

The proposed change to the Action statement is as follows:

"With a Reactor Coolant System operating loop temperature (T_{avg}) $< 540^{\circ}\text{F}$, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes."

Surveillance Requirement (SR) 4.1.1.5 currently states the following:

"The Reactor Coolant System temperature (T_{avg}) shall be determined to be $\geq 525^{\circ}\text{F}$:

- a. Within 15 minutes prior to achieving reactor criticality, and
- b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System T_{avg} is less than 535°F ."

The proposed SR will entirely replace the current SR. The proposed wording, which is consistent with the wording in NUREG-1432, *Standard Technical Specifications Combustion Engineering Plants*, is:

"The Reactor Coolant System temperature (T_{avg}) shall be determined to be $\geq 540^{\circ}\text{F}$ at least once per 12 hours."

Changes will be made to the ANO-2 TS Bases in accordance with the Technical Specifications (TS) Bases Control Program (ANO-2 TS 6.5.14).

3.0 BACKGROUND

The moderator temperature coefficient (MTC) relates changes in reactivity to uniform changes in moderator temperature, including the effects of moderator density changes with changes in moderator temperature. Typically, an increase in the moderator temperature causes a decrease in the core moderator density and therefore a reduction in the number of neutrons that are slowed to thermal energy and a reduction in the core reactivity.

The following ANO-2 TSs are associated, but require no change to support the proposed change to the minimum temperature for criticality:

- TS LCO 3.1.1.4 - The moderator temperature coefficient (MTC) shall be within the limits specified in the CORE OPERATING LIMITS REPORT. The maximum upper design limit shall be: (Applicability: Modes 1 and 2 with $K_{eff} \geq 1.0$)
 - a. Less positive than $+0.5 \times 10^{-4} \Delta k/k/^{\circ}\text{F}$ whenever THERMAL POWER is $\leq 70\%$ of RATED THERMAL POWER, and
 - b. Less positive than $0.0 \Delta k/k/^{\circ}\text{F}$ whenever THERMAL POWER is $> 70\%$ of RATED THERMAL POWER
- TS LCO 3.2.6 - The Reactor Coolant Cold Leg Temperature (T_c) shall be maintained between 542°F and 554.7°F (Applicability: Mode 1 above 30% RATED THERMAL POWER).

Currently, the ANO-2 TS requirement on most positive MTC is confirmed for a given core design at the minimum temperature for criticality of 523°F (525°F minus 2°F uncertainty) (TS LCO 3.1.1.5). This temperature is 20°F below the nominal temperature for going critical (545°F) and 17°F below the low T_c of 542°F (TS 3.2.6). Following approval of this change the analytical value used for determining MTC will be 538°F .

MTC becomes less positive at higher RCS temperatures and lower soluble boron concentrations. Therefore, it is easier for a given core design to meet the requirement on most positive MTC at higher RCS temperatures. For the current ANO-2 core designs, the most positive MTC occurs at the cycle's peak boron concentration, at hot zero power (HZIP) and 523°F . The basic approach to reduce the positive MTC below the TS/Core Operating Limit Report Limit (COLR) is to increase the number of burnable absorber rods in the core. The number of burnable absorber rods that would need to be added to a given core design could be reduced if the minimum temperature for criticality is increased as high as possible.

4.0 TECHNICAL ANALYSIS

The minimum temperature for criticality is used in the reload analyses as the limiting temperature at which the core design is verified to satisfy the limit on most positive MTC specified in the TS/COLR. The minimum temperature for criticality is one of many input parameters used in the reload design analytical calculation that confirms the core design satisfies the MTC specification. The specific value of the minimum temperature for criticality is not important; what is important is maintaining the current limit on most positive MTC. Sufficient burnable absorber rods will be incorporated into the core design to insure that the current TS/COLR limit on most positive MTC will continue to be satisfied at the increased minimum temperature.

The proposed TS change on minimum temperature for criticality does not impact the NRC approved analytical methods used to determine core operating limits.

The proposed change increases the minimum temperature for criticality. The MTC will continue to be verified over the appropriate temperature range. The reactor protective instrumentation will continue to function within its normal operating range and the reactor pressure vessel will remain above the minimum RT_{NDT} limits. Operation of the pressurizer will also continue to be within its normal range.

The phrase "when the reactor is critical" will be deleted from the LCO. The phrase is redundant to the current Applicability that requires the LCO to be applicable when K_{eff} is greater than or equal to 1.0 (i.e., the reactor is critical).

The current SR does not require that the minimum temperature for criticality be monitored after criticality is achieved unless the temperature drops below 535°F. The proposed addition of a frequency to monitor the temperature after the reactor is critical is consistent with the frequency in SR 4.2.6, which requires RCS cold leg temperature to be monitored at least once per 12 hours. The 12 hour frequency takes into account the indications and alarms that are continuously available in the Control Room to the Operator. This change is consistent with the Revised Standard TSs for CE Plants contained in NUREG-1432.

The elimination of the requirement to monitor temperature within 15 minutes prior to achieving criticality is acceptable because it is standard operating practice to verify TSs are satisfied prior to entering the Mode of applicability. The current Mode of applicability is Mode 1 and 2 with K_{eff} greater than or equal to 1.0 (i.e., the reactor is critical). Therefore, prior to entering Mode 2 and becoming critical, the minimum temperature for criticality limit (540°F) has to be met. In addition, administrative controls are currently in place to verify the temperature every 15 minutes during the approach to criticality. The approach to criticality is a very focused, methodical, and deliberate activity. Overall plant response and reactivity changes are closely monitored by the Operations staff.

The elimination of the requirement to check temperature at least once per 30 minutes when the reactor is critical and the RCS T_{avg} is less than 535°F is no longer applicable with the proposed change. If RCS T_{avg} were to fall below the TS limit of 540°F, the Action statement would require restoration of the temperature to within its limit or a shutdown of the reactor.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

A change is proposed to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TSs) to increase the minimum temperature for criticality from the current value of 525°F to 540°F. The changed value results in changes to the Action statement and to the Surveillance Requirements (SRs) associated with the TS Limiting Condition for Operation (LCO). The current SR that requires the temperature be verified to be within the limits of the LCO within 15 minutes prior to reaching criticality and monitoring at least once per 30 minutes when the reactor is critical if the temperature drops below 535°F will be eliminated. The SR is being modified to ensure RCS temperature is $\geq 540^{\circ}\text{F}$ at least once per 12 hours.

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met. Entergy has determined that the proposed change does not require any exemptions or relief from regulatory requirements, other than the TS, and does not affect conformance with any General Design Criterion (GDC) differently than described in the Safety Analysis Report (SAR).

5.2 No Significant Hazards Consideration

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

There are no accident analyses that dictate the minimum temperature for criticality. The minimum temperature for criticality is not an accident initiator. It is used in the reload analyses as a limiting temperature at which the core design is verified to satisfy the limit of the positive moderator temperature coefficient (MTC) specified in the ANO-2 TS and Core Operating Limits Report (COLR). The minimum temperature for criticality is one of many input parameters used in the reload design analytical calculation that confirms the core design satisfies the MTC TS and COLR.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change to increase the minimum temperature for criticality does not result in any plant design changes. In addition the minimum temperature at which the reactor is taken critical is not an accident initiator. The nominal average reactor

coolant system temperature during an approach to criticality is several degrees higher than the limit proposed for the minimum temperature for criticality.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

The increase of the minimum temperature for criticality in conjunction with the use of a sufficient number of burnable absorber rods, which will be incorporated into the core design, will ensure the current TS limits, as reflected in the COLR, for the most positive MTC will continue to be satisfied.

The current transient analysis results are bounding and remain applicable.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.3 Environmental Considerations

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Attachment 2

2CAN090504

Proposed Technical Specification Changes (mark-up)

REACTIVITY CONTROL SYSTEMS

MINIMUM TEMPERATURE FOR CRITICALITY

LIMITING CONDITION FOR OPERATION

3.1.1.5 The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be ≥ 525 ~~540°F when the reactor is critical.~~

APPLICABILITY: MODES 1 and 2#*.

ACTION:

With a Reactor Coolant System operating loop temperature (T_{avg}) < 525 ~~540°F~~, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.5 The Reactor Coolant System temperature (T_{avg}) shall be determined to be ≥ 525 ~~540°F~~; ≥ 540 °F at least once per 12 hours.

- a. ~~Within 15 minutes prior to achieving reactor criticality, and~~
- b. ~~At least once per 30 minutes when the reactor is critical and the Reactor Coolant System T_{avg} is less than 535°F.~~

With $K_{eff} \geq 1.0$.

* See Special Test Exception 3.10.5.