ENTERGY

Entergy Operations, Inc.
Route 3 Box 137G
Russellville, AR 72801
Tel 501-964-8866

Jerry W. Yelverton
Vice President
Operations ANO

May 7, 1993

2CAN059301

U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Technical Specification Change Request Concerning
Arkansas Nuclear One - Unit 2 Safety Injection Tanks

Gentlemen:

Attached for your review and approval is a proposed Technical Specification (TS) change revising the Limiting Conditions for Operation, Surveillance Requirements, and Bases for the Arkansas Nuclear One - Unit 2 (ANO-2) Safety Injection Tanks (SITs). The change reduces the specified minimum SIT boron concentration; revises the associated Actions to allow one SIT to be inoperable due to boron concentration alone for 72 hours and allows one SIT to be inoperable due to any reason other than boron concentration for one hour; eliminates the sampling requirements for normal makeup from the Refueling Water Tank (RWT); changes the SIT volume increase which is not the result of addition from the RWT which requires sampling; corrects the Surveillance Requirements to be consistent with the specified Mode of Applicability; and revises the Bases for TS 3.5.1 to reflect these changes.

Reducing the specified minimum SIT boron concentration below the minimum boron concentration specified for the RWT will allow the operator to quickly restore boron concentration to the specified value, via normal makeup from the RWT, in the event the affected SIT experiences a dilution from inleakage while maintaining the accident analysis assumptions. Revising the sampling requirements will result in reducing operator burden, radiation exposure, and costs associated with the production of radioactive waste by reducing the frequency of sampling to approximately monthly. Revising the associated Action completion times places proper safety significance on returning an inoperable SIT to Operable status.

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The proposed changes have been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that the changes involve no significant hazards considerations. The bases for these determinations are included in the attached submittal.

Entergy Operations requests that the effective date for this change be immediately upon NRC issuance of the amendment. Although this request is neither exigent nor emergency, your prompt review is requested.

Very truly yours,

JWY/cws

To the best of my knowledge and belief, the statements contained in this submittal are true.

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for Logan County and the State of Arkansas, this 7th day of May, 1993.

Notary Public
My Commission Expires May 4, 2000

Attachments

cc: Mr. James L. Milhoan
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 - ANO-1 & 2
Number 1, Nuclear Plant Road
Russellville, AR 72801

Mr. Roby B. Bevan, Jr.
NRR Project Manager Region IV/ANO-1
U. S. Nuclear Regulatory Commission
NRR Mail Stop 13-H-3
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. Thomas W. Alexion
NRR Project Manager, Region IV/ANO-2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 13-H-3
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Ms. Greta Dicus
Arkansas Department of Health
Division of Radiation Control
and Emergency Management
4815 West Markham Street
Little Rock, AR 72205

ATTACHMENT

TO

2CAN059301

PROPOSED TECHNICAL SPECIFICATION

AND

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT TWO

DOCKET NO. 50-368

DESCRIPTION OF PROPOSED CHANGES

- The minimum boron concentration specified in Technical Specification (TS) 3.5.1.c has been changed from a value of 2500 ppm to a value of 2200 ppm.

- The Actions specified in TS 3.5.1 ACTION (a) have been changed and now specify the actions required if one of the four Safety Injection Tanks (SITs) boron concentration is not within the limits specified in TS 3.5.1.c.

- The Actions specified in TS 3.5.1 ACTION (b) have been changed and now specify the actions required if one SIT is inoperable due to any factor other than boron concentration.

- Surveillance Requirement 4.5.1.b has been changed to specify sampling of the affected SIT within 6 hours following a 5% indicated tank level increase that is not a result of addition from the Refueling Water Tank (RWT).

- Surveillance Requirement 4.5.1.d.1 has been changed such that the referenced Reactor Coolant System (RCS) pressure is specified as 700 psia.

- The Bases for TS 3/4.5.1 have been changed to reflect the changes in boron concentration, Action completion times, and sampling requirements.

These changes are consistent with the requirements for the SITs specified in NUREG-1432 Combustion Engineering (CE) Revised Standard Technical Specifications (RSTS) issued in September, 1992.

BACKGROUND

The SITs are pressure vessels partially filled with borated water and pressurized with nitrogen gas. The SITs are passive components, since no operator or control action is required for them to perform their function. Each SIT is piped into one RCS cold leg via the injection lines utilized by the High Pressure Safety Injection (HPSI) and Low Pressure Safety Injection (LPSI) systems. Each SIT is isolated from the RCS by a motor operated isolation valve and two check valves in series. The motor operated valves are normally open, with power removed from the valve motor to prevent inadvertent closure prior to or during an accident. The functions of the four SITs are to supply borated water to the reactor vessel during the blowdown phase of a loss of coolant accident (LOCA), to provide inventory to help accomplish the refill phase that follows thereafter, and to provide RCS makeup for certain specific small break LOCAs.

SIT boron concentration is not easily adjusted due to the limited volume of the tank. Increasing the boron concentration within the currently specified 1 hour time period requires numerous small "drain and fill" evolutions which result in increased operator burden, or one large "drain and fill" evolution which can result in reducing the SIT pressure and volume below the minimum specified. Both of these evolutions result in the production of liquid radioactive waste which must be processed prior to release.

Periodic makeup to the SITs is required due to inventory loss from sampling activities and component leakage. Internal system leakage can dilute the affected SIT boron concentration and requires the Operator to adjust boron concentration by making up from the RWT, if sufficient volume exists to contain the amount of makeup needed, or by draining a quantity of water out of the affected SIT and then adding the proper amount of makeup from the RWT. The current TS requires sampling after a 1% level change (cumulative since last sample) when makeup is from any source.

DISCUSSION OF CHANGES

SIT Minimum Boron Concentration

The current SIT minimum boron concentration is specified at a value of 2500 ppm. This value was implemented as a result of Amendment 82 (dated March 11, 1988) to the ANO-2 TS. The value of 2500 ppm was selected as an operator convenience in that both the SIT minimum concentration and the RWT minimum concentration were specified at the same value. The accident analysis uses a minimum SIT boron concentration of 2000 ppm. Specifying a value of 2200 ppm allows the operator to quickly adjust SIT boron concentration to a higher value by addition from the RWT in the event that the SIT boron concentration is diluted by inleakage. Specifying a value of 2200 ppm also protects the accident analysis value of 2000 ppm in the event of a 5% indicated tank level increase, which could result in dilution of the affected SIT boron concentration.

TS Action Requirements

The Loss-of-Coolant Accident (LOCA) analysis assumes that the contents of one of the four SITs is lost through the postulated break. The SIT boron requirements are based on the average boron concentration of the total volume of three SITs. If the boron concentration of one SIT is not within limits, the ability to maintain subcriticality may be slightly reduced. The reduced concentration effects on core subcriticality during reflood are minor since the dominant negative reactivity contributor during this phase is voiding and Control Element Assembly (CEA) insertion. Long term reactivity control does rely upon boron concentration in the core, but the post-accident soluble boron concentration is dominated by the RWT inventory added by HPSI, and possibly LPSI. Boiling of the Emergency Core Cooling System (ECCS) water in the core concentrates the boron in the saturated liquid that remains in the core. Boron precipitation is a long term issue and is dependent upon the total soluble boron inventory added to the system during the event. As the RWT has a volume of approximately 10 times the volume of the four SITs, the boron concentration is dominated by the RWT contribution through HPSI, and possibly LPSI. A 72 hour completion time for restoring proper boron concentration in conjunction with the lower minimum boron concentration will allow the Operator sufficient time to adjust the boron concentration without draining the affected SIT below the minimum specified volume in the event that inleakage results in a boron concentration dilution. Entergy Operations believes that a 72 hour Allowable Outage Time, as specified by the NUREG-1432 CE-RSTS, to return the boron concentration to within limits places proper safety significance on this condition.

If one SIT is inoperable, for a reason other than boron concentration, the probability of injecting the contents of three SITs into the core during a LOCA is significantly reduced. Due to the severity of the consequences should a LOCA occur in these conditions, the 1 hour completion time to open the SIT isolation valve, remove power to the isolation valve operator, or restore the proper water volume or nitrogen cover pressure ensures that prompt action will be taken to return the inoperable SIT to Operable status. Entergy Operations believes that this completion time places proper safety significance on maintaining the required SIT contents available for injection in the event of a postulated LOCA.

If the SIT cannot be restored to Operable status within the associated completion time, the plant must be brought to a mode in which the Limiting Condition for Operation does not apply. To achieve this status, the plant must be brought to at least Mode 3 within 6 hours and pressurizer pressure reduced to < 700 psia within 12 hours. Operating experience has shown these time limits to be reasonable for reaching the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Sampling Requirements

Normal SIT makeup is from the RWT. With implementation of this TS change, the specified RWT boron concentration of 2500 - 3000 ppm will be within the range specified for the SIT. Normal makeup can not result in placing the SIT boron concentration outside of the specified range of 2200 - 3000 ppm. Allowing additions from the RWT to be exempted from the sampling requirement results in reducing the SIT sampling activities and simplifies SIT inventory control.

SIT volume is indicated in the Control Room as a percentage of tank level. Specifying the volume increase requiring verification of boron concentration as a percentage of tank level presents this limit in a form consistent with the available indication. The following calculation demonstrates the effect on the SIT boron concentration of a 5% indicated tank level increase containing no boron:

C_1 = 2200 ppm Initial concentration in SIT equal to proposed minimum value
V_1 = 1413 ft^3 Initial SIT volume at specified minimum indicated tank level (80.1%)
C_2 = 0 ppm Boron concentration of assumed volume increase
V_2 = 80.75 ft^3 Cumulative volume increase corresponding to 5% indicated tank level
V_3 = 1493.75 ft^3 Final SIT volume following addition
C_3 = Final SIT boron concentration after dilution

$$C_1V_1 + C_2V_2 = C_3V_3$$

$$(2200 \text{ ppm})(1413 \text{ ft}^3) + (0 \text{ ppm})(80.75 \text{ ft}^3) = C_3(1493.75 \text{ ft}^3)$$

$$C_3 = 2081.1 \text{ ppm}$$

After an indicated tank level increase of 5%, containing no boron, the final concentration of the SIT remains above the safety analysis value of 2000 ppm, assuming that the affected SIT contained the minimum specified volume and the revised minimum specified boron concentration prior to the level increase. Using the same methodology, a potential dilution, consisting of water containing no boron, resulting in a volume increase from the minimum specified volume of 1413 ft^3 to the maximum specified volume of 1539 ft^3 would result in a final boron concentration of 2019.9 ppm boron, still above the value assumed in the accident analysis.

Sampling a SIT results in the generation of a quantity of radioactive waste. Approximately 12 gallons, 0.1% indicated tank level, is flushed through the sample lines to ensure that a representative sample is taken. This waste water must then be processed through the radwaste demineralizers and filters prior to release. The expected reduction in sampling activities will result in a decrease in the amount of radioactive waste generated, the costs associated with processing this waste, and the radiation exposure received by the personnel involved in processing the waste generated.

Applicability of 700 psia and Surveillance Requirement of 700 psig

The applicability of TS 3.5.1 is specified as Modes 1, 2, and 3 (when RCS pressure is >700 psia). The Surveillance Requirement in TS 4.5.2.d.1 requires verification that the SIT isolation valve automatically opens when RCS pressure exceeds 700 psig. The Surveillance Requirement does not ensure operability of the SIT at the specified applicability of RCS pressure >700 psia.

The current version of the ANO-2 TS was compared with the initial issue of the ANO-2 TS. The difference in applicability pressure and surveillance requirement pressure exists in the initial issue. In comparing the ANO-2 TS to NUREG 0212 Combustion Engineering Standard TS (CE-STS), it was noted that the CE-STS listed the applicability as 700 psia and verification of valve opening as 700 psia. The rest of the initial issue of this specification is consistent with the CE-STS.

A review of documentation relating to the ANO-2 TS revealed no specific reason for the pressure discrepancy. The ANO-2 Safety Evaluation Report (SER), however, in section 6.3.2 and 7.6.1 does make a definite statement that the SIT isolation valves open by interlock action at "700 pounds per square inch gauge." From this it appears that the psig in the TS was a cognitive decision, not a typographical error. It can be surmised that the value of 700 psig was used as it is consistent with the ANO-2 installed SIT instrumentation, which reads out in psig, rather than with the pressurizer instrumentation, which reads out in psia. The requirement to verify that the SIT isolation valves open when RCS pressure exceeds 700 psig does not ensure the applicability requirement of > 700 psia (685 psig) is met. This discrepancy is not considered to be a safety concern as the analyses for both small and large break LOCAs are based on the SIT operating pressures specified in TS 3.5.1.d (between 600 and 624 psig). To avoid confusion, the value of 700 psig in the Surveillance Requirement should be changed to 700 psia. This is consistent with the installed RCS pressurizer instrumentation and the Applicability for this specification.

Bases

The changes to the Bases for TS 3.5.1 clarify the intent of the changes previously discussed. Specific changes discuss the change in minimum boron concentration, the changes in SIT sample requirements, and the changes in completion time for Actions (a) and (b).

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

An evaluation of the proposed change has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards considerations using the standards in 10CFR50.92(c). A discussion of these standards as they relate to this amendment request follows:

Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

The SITs are passive components and are not considered to be accident initiators, therefore, these changes do not involve a significant increase in the probability of an accident previously evaluated. The proposed value for minimum SIT boron concentration is bounded by the current accident analysis assumed value of 2000 ppm and does not result in a significant increase in the consequences of an accident previously evaluated.

The SIT boron requirements are based on the average boron concentration of the total volume of three SITs. With one SIT inoperable due to boron concentration outside of the specified limits, the entire volume of the affected SIT is still available for injection in the unlikely event of a LOCA. Although the ability to maintain subcriticality may be slightly reduced, the reduced concentration effects on core subcriticality during reflood are minor. Boiling of the ECCS water in the core concentrates the boron in the saturated liquid that remains in the core. Boron precipitation is a long term issue and is dependent upon the total soluble boron inventory added to the system during the event, a quantity that is dominated by the RWT contribution through HPSI, and possibly LPSI. The proposed 72 hour completion time allows the Operator sufficient time to restore an affected SIT boron concentration to within limits while maintaining the specified nitrogen overpressure and tank volume requirements and therefore, does not result in a significant increase in the consequences of an accident previously evaluated.

Allowing 1 hour to restore an inoperable SIT to OPERABLE status for any reason other than boron concentration removes any uncertainty associated with the completion time of "immediately" in the current specification. This requires restoration of SIT cover pressure, volume, or isolation valve position within one hour to assure SIT availability for injection in the unlikely event of a LOCA and therefore, does not result in a significant increase in the consequences of an accident previously evaluated.

SIT volume is indicated in the Control Room as a percentage of tank level. Specifying the volume increase requiring verification of boron concentration as a percentage of tank level

presents this limit in a form consistent with the available indication. Normal SIT makeup is from the RWT which has a boron concentration range of 2500 to 3000 ppm. As the normal water source for makeup to the SITs is within the proposed range of specified SIT concentration, the probability for dilution of a SIT below the minimum specified concentration is minimized. Sampling the affected SIT within 6 hours after a 5% indicated tank level increase from sources other than the RWT will identify whether inleakage or makeup has caused a reduction in boron concentration which would challenge the accident analysis value of 2000 ppm. The maximum specified boron concentration for both the RWT and the SITs remains at the currently specified value of 3000 ppm. A potential dilution, consisting of water containing no boron, resulting in a level increase from the minimum specified volume of 1413 ft^3 to a volume of 1493.75 ft^3, a 5% indicated tank level increase, would result in a final boron concentration of 2081.1 ppm boron, still above the value assumed in the accident analysis. Since the accident analysis value assumptions are not challenged by this change, there is no significant increase in the consequences of an accident previously evaluated.

Changing the Surveillance Requirement specified value from 700 psig to 700 psia assures operability of the SIT isolation valve automatic circuitry in the required Mode of Applicability.

Therefore, the changes do not involve a significant increase in the probability or consequences of any accident previously evaluated.

Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

Because the proposed changes do not change the design, configuration, or method of operation of the plant, they do not create the possibility of a new or different kind of accident. The proposed changes revise the administrative controls associated with the SITs, and are bounded by the existing LOCA analysis. The SITs are passive components and are not considered to be accident initiators, therefore, these changes do not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety.

Reducing the specified SIT minimum boron concentration to 2200 ppm does not involve a change in the accident analysis value of 2000 ppm, which remains bounding.

The lower minimum concentration and the 72 hour completion time will not require the operator to drain the affected SIT below the minimum specified level prior to filling the SIT with a higher concentration boron source following a dilution event to return the affected SIT boron concentration to within limits. This maintains the entire specified volume of the SIT available for injection even though the boron concentration may be below the specified value. Since the boron requirements assumed in the accident analysis are based upon the average boron concentration of the total volume of three SITs, the consequences of the boron concentration outside of the specified range are less severe than they would be if the entire specified volume of one SIT were not available for injection. The proposed 72 hour completion time allows the Operator sufficient time to restore an affected SIT boron

concentration to within limits while maintaining the specified nitrogen overpressure and tank volume requirements.

Allowing a 1 hour completion time to return a SIT that is inoperable for any reason other than boron concentration assures that prompt action will be taken to open the SIT isolation valve, or restore the proper water volume or nitrogen cover pressure to return the inoperable SIT to Operable status. This completion time minimizes the exposure of the plant to a LOCA in these conditions, allows the operator sufficient time to evaluate and correct the cause of the inoperability, and removes the ambiguity associated with the completion time of "immediately."

SIT volume is indicated in the Control Room as a percentage of tank level. Specifying the volume increase requiring verification of boron concentration as a percentage of tank level presents this limit in a form consistent with the available indication. Normal SIT makeup is from the RWT which has a boron concentration range of 2500 to 3000 ppm. As the normal water source for makeup to the SITs is within the proposed range of specified SIT concentration, the probability for dilution of a SIT below the minimum specified concentration is minimized. Sampling the affected SIT within 6 hours after a 5% indicated tank level increase from sources other than the RWT will identify whether inleakage or makeup has caused a reduction in boron concentration which would challenge the accident analysis value of 2000 ppm. The maximum specified boron concentration for both the RWT and the SITs remains at the currently specified value of 3000 ppm. A potential dilution, consisting of water containing no boron, resulting in a level increase from the minimum specified volume of 1413 ft^3 to a volume of 1493.75 ft^3, a 5% indicated tank level increase, would result in a final boron concentration of 2081.1 ppm boron, still above the value assumed in the accident analysis.

The change in the Surveillance Requirement specified value from 700 psig to 700 psia assures the operability of the SIT isolation valve automatic circuitry in the required Mode of Applicability.

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

Therefore, based upon the reasoning presented above and the previous discussion of the amendment request, Entergy Operations has determined that the requested change does not involve a significant hazards consideration.