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December 22, 1992

2CAN129203

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

Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Technical Specifications Change Request Allowing an Exemption
to the Steam Generator Tube Inspection Table

Gentlemen:

Attached for your review and approval is a proposed Technical Specification (TS) change for Arkansas Nuclear One - Unit 2 (ANO-2) allowing a one time exemption from the steam generator (SG) C-3 tube inspection actions specified in TS Table 4.4-2. This change will allow the continued operation of ANO-2 with two uninspected tubes in the 'B' SG until a scheduled SG tube inspection outage beginning April 30, 1993.

A Temporary Waiver of Compliance, granted by the NRC Staff on November 27, 1992, allowed continued operation of ANO-2 for a period of up to 90 days to allow time for the submittal, processing, and implementation of a TS change to Table 4.4-2. Under the requirements of the temporary waiver, Entergy Operations agreed to submit a TS change on or before December 27, 1992, for implementation on or before February 25, 1993, that will allow a one time exemption from the C-3 tube inspection actions. This submittal fulfills Entergy Operation's commitment to submit a TS change on or before December 27, 1992.

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

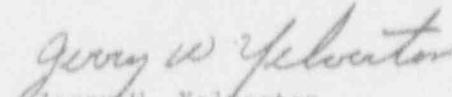
Entergy Operations requests that the effective date for this change be immediately upon NRC issuance of the amendment. Although this request is neither exigent nor emergency, your review and approval prior to February 25, 1993, is requested in order to allow the continued operation of ANO-2 after the expiration of the 90 day waiver period. Failure to implement this change prior to the February 25, 1993, expiration of the Temporary Waiver of Compliance will result in an additional plant shutdown to

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complete the inspection of two SG tubes in the 'B' SG. This additional plant shutdown is undesirable due to increased risks to the plant and public safety due to the potential for a plant upset during the shutdown, unnecessary challenges to plant safety systems during the shutdown, and the required plant conditions involving reduced Reactor Coolant System inventory.

Very truly yours,


Jerry W. Yelverton

JWY/sjf

Attachments

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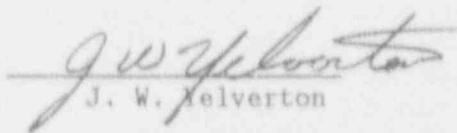
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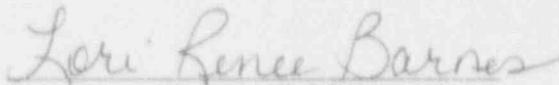
STATE OF ARKANSAS)
)
COUNTY OF Yell) SS

Affidavit

I, J. W. Yelverton, being duly sworn, subscribe to and say that I am Vice President, Operations ANO for Entergy Operations, that I have full authority to execute this affidavit; that I have read the document numbered 2CAN129203 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.


J. W. Yelverton

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 22 day of December, 1992.


Notary Public

My Commission Expires:

January 8, 1995

ATTACHMENT
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

A footnote has been added to the Arkansas Nuclear One - Unit 2 (ANO-2) Technical Specification (TS) Table 4.4-2 Steam Generator Tube Inspection which states: "A one time exemption to the C-3 inspection requirements has been granted for the 2R9 inspection of 'B' Steam Generator tubes 38-66 and 37-67 for the period of November 27, 1992, through May 30, 1993." Additionally, a superscript referring to the footnote has been added to the TS Table 4.4-2 title such that it now reads "STEAM GENERATOR TUBE INSPECTION¹."

BACKGROUND

On November 25, 1992, at approximately 1330 hours, ABB-Combustion Engineering (CE) informed Entergy Operations that two tubes (38-66 and 37-67) in the ANO-2 'B' Steam Generator (SG), were not inspected with the bobbin coil probe during the ninth refueling outage (2R9) ending October 1992. Tubes 38-66 and 37-67 were in a group of tubes under the baseplate of the GENESIS manipulator. The analysts were instructed by the analysis guidelines to identify the two tubes as "RFX" which would indicate that the tubes were to be tested, but the analyst entered the "RFX" code in the wrong location. The software subsequently interpreted that the tubes had been tested and had no degradation. The comparison programs did not flag these two tubes. This condition was discovered during the final review of the 2R9 inspection data by CE. The final CE review has been completed and no other missed tubes were identified in either steam generator.

ANO-2 TS 4.4.5.2 requires that the first sample inspection of a surveillance be categorized in accordance with the number of defective or degraded tubes. In 2R9, a 100% bobbin coil probe inspection of both SGs was planned. Additionally, 100% of the tubes of both SGs were to be inspected at the hot leg expansion transition region with the Rotating Pancake Coil (RPC) for detection of circumferential cracking. In the 'B' SG, 8289 of 8291 tubes were inspected with the bobbin coil. The 'B' SG had 132 defective tubes out of 8291, or 1.6% defective. This placed the 'B' SG in Category C-3 requiring an inspection of 100% of the tubes in 'B' SG and an additional 6% in the 'A' SG. The 'A' SG was already undergoing a 100% inspection. CE reviewed the inspection data during the outage and incorrectly determined that 100% of the tubes in both SGs, including 'B' SG tubes 38-66 and 37-67, were inspected with the bobbin coil probe.

Entergy Operations requested a temporary waiver of compliance from the surveillance requirement of TS 4.4.5.2, Table 4.4-2 to allow continued operation of ANO-2 until completion of a planned SG tube inspection outage not to exceed the end of the second quarter 1993. Continued operation until the end of the second quarter of 1993 was based on our review of previous 2R8 'B' steam generator sample inspection data for tube locations 38-66 and 37-67, 2R9 specific RPC data and other adjacent eddy current tube inspections. There was no prior evidence of mechanical damage, progressive degradation or stress corrosion cracking in 'B' SG tubes 38-66 or 37-67. It is, therefore, concluded that the structural integrity of this portion of the reactor coolant system will be maintained.

On November 27, 1992, the NRC Staff granted a Temporary Waiver of Compliance for a period of ninety days to allow the preparation and implementation of this TS change. During a December 3, 1992, meeting, Entergy Operations informed the NRC Staff of our intent to inspect the SG tubes during an outage scheduled to begin on April 30, 1993.

DISCUSSION OF CHANGE

A review of the bobbin coil inspection history of the two tubes has been performed. Both tubes were inspected during 2R8 (March 1991). The eddy current testing revealed no indication on either tube, i.e., no detectable degradation. Additionally, the 2R8 data for these two tubes were reanalyzed using the 2R9 analysis guidelines and no indications were discovered. Also, the 2R9 eddy current data for the 28 tubes surrounding the two missed tubes (two rows of tubes around each of the two missed tubes) was reviewed. This review revealed only one indication in one of these 28 tubes (a 28% throughwall [% TW] indication at the #3 batwing tube support strap). This particular indication is most likely wear due to crossflow steam velocities on the horizontal portion of the tubes. One other tube of the 28 had previously been plugged for a batwing indication.

TS 4.4.5.2 states that if any selected tube does not permit the passage of an eddy current test (ECT) probe for a tube inspection, this shall be recorded and an adjacent tube shall be selected and subjected to a tube inspection. The intent of this statement is to allow tubes which may have dinged or slightly dented tube ends or sections to remain in service. While this was not the case for tubes 38-66 and 37-67 and therefore, the provisions of this portion of the specification do not apply, it is noteworthy that the TSs recognize that in some cases it would be acceptable to not inspect a tube if the surrounding tubes are inspected. ANO's surrounding tubes were inspected.

In assessing the safety significance of this issue, the inspection data from 2R8 and 2R9 for the 'B' steam generator was evaluated. The average % TW degradation at the eggcrate support plates was 41 and 34 for 2R8 and 2R9, respectively, indicating little to no growth. The average amplitude was 0.42 and 0.53 volts for 2R8 and 2R9, respectively. These two large inspections indicated that none of the flaws are significant enough to challenge the acceptance criteria in draft Reg Guide 1.121 "Basis for Plugging Degraded PWR Steam Generator Tubes." This is based on ECT data (average % TW) and successful burst testing of flaws in two tubes removed from ANO-2 in the spring of 1992. The two tubes burst at 8123 and 9810 psi for flaws of signal amplitude of 0.99 volts (41% TW) and 0.26 volts (36% TW), respectively, as compared to a Regulatory Guide limit of 3AP (4050 psi). Since the 40% TW plugging limit includes allowances for flaw growth and NDE uncertainty, and the average growth from 2R8 to 2R9 was negligible, the additional operating time for these two tubes will result in a very low probability of initiation and propagation of a significant flaw. The results of the metallurgical examination also revealed excellent correlation between bobbin coil data and actual flaw depth. This data is in agreement with industry database supporting an alternate repair criteria which defines the safety significance of axial cracks at tube support plates, as related to the signal response amplitude from the bobbin coil.

The 2R8 and 2R9 data bases were also reviewed to determine the maximum growth for both eggcrate and batwing supports. Based on the 2R8 exam of these two tubes showing no detectable degradation and applying maximum growth rates, development of a flaw in either of these tubes that would challenge Reg Guide 1.121 limits is not expected to occur before the next SG inspection.

Additionally, no concerns exist for circumferential cracking at the top of the tubesheet region of these tubes, since these tubes were examined with the RPC probe during 2R9. A conservative analysis philosophy was utilized for the 2R9 inspections. No threshold values were utilized during the data analysis process. Therefore, this condition is not considered safety significant.

Although this condition is not considered safety significant, several contingency actions are in place. These actions include the following:

- ANO-2 is currently operating at a reduced hot leg temperature of approximately 599°F in order to mitigate the consequences of Intergranular Stress Corrosion Cracking (IGSCC), a SG tube damage mechanism.
- SG tube leaks would be detected and confirmed by the main steam line N₁₆ monitors, condenser off-gas monitor, SG blowdown monitors, main steam line radiation monitors, Chemistry analysis (using argon and/or tritium), or Reactor Coolant System (RCS) inventory balance. The use of these components and methods is incorporated in the existing plant procedures for identifying and mitigating SG tube leaks.
- The main steam line N₁₆ monitors provide continuous trending capability with readouts in the Control Room and have dedicated annunciation to alert operators to increasing activity levels in the SGs which would indicate tube leakage. Other secondary radiation monitors also supply continuous trending with Control Room readout and, additionally, have procedurally controlled adjustable annunciation alarm setpoints to allow the operator to monitor existing tube leakage for any further degradation.
- ANO-2 has an administrative primary-to-secondary leakage limit of 0.1 GPM, below the specified value of 0.5 GPM for leakage through any one SG. Entergy Operations is sensitive to the potential rapid progression of tube leakage and will take the necessary measures to mitigate tube leakage in excess of 0.1 GPM confirmed leakage.
- ANO-2 operator continuing training routinely stresses identification and mitigation of SG tube leaks by way of procedure review, classroom instruction and ongoing participation in simulator scenarios.
- Shift briefings were conducted to ensure Operations personnel are aware that two tubes in the 'B' SG were not tested.

The May 30, 1993, expiration date for this exemption takes into account the anticipated performance of the planned SG tube inspection scheduled to begin on April 30, 1993. An additional 30 day contingency has been added to facilitate any forced outages which may delay the start of the planned SG tube inspection outage. Any change in schedule will be mutually agreed to by Entergy Operations and NRC.

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.

This change has no actual impact on any previously analyzed accident in the FSAR. A double-ended break of one steam generator tube is postulated as part of the ANO-2 Design Basis accident evaluation. Failure to examine these two tubes with bobbin coil eddy current does not in any way alter the consequences of this previously evaluated accident.

Of the 8291 tubes in the 'B' steam generator that were to be inspected, the two tubes not examined represent less than 0.025% of the total number. As previously discussed, these two tubes were examined with the bobbin coil probe as recently as 2R8 (spring 1991) with no detectable degradation of any type evident. Considering that only 120 of 8411 tubes in this steam generator (per TS required Bobbin Coil testing) have developed defects requiring repair (i.e., $\geq 40\%$ TW) through 2R8, delaying the examination of two tubes (out of 8291 tubes) for a maximum of seven months past 2R9 is statistically insignificant.

It should be noted that ANO-2 TSs allow for 24 months between eddy current testing of steam generator tubes, even when 100% inspection is required. The 2R8 inspection of these two tubes was completed on April 3, 1991. ANO-2 TSs would allow the tubes to be examined as late as April 3, 1993, had the 2R9 outage been scheduled this late. The actual date of the SG inspection outage has been scheduled for April 30, 1993. Therefore, the actual delay time for the examination of the two tubes, past the TS allowable 24 months, is less than 2 months. Considering the rate of degradation/propagation of axial flaws and/or batwing wear (the damage mechanisms that bobbin coil testing is likely to detect), this delay is not considered significant.

Therefore, this change does 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.

The scope of this change does not establish a potential new accident precursor. ANO's design basis accident analyses include the consequences of a double-ended break of one steam generator tube which bounds other postulated failure mechanisms. CE's experience with nuclear steam generators indicates the probability of complete severance of the Inconel vertical U-tubes is remote. The only known cause for such a failure would be a circumferential crack. Circumferential cracking has only been detected at the hot leg expansion transition region in the ANO-2 SGs. The subject two tubes were examined at the hot leg expansion transition region with the RPC for detection of circumferential cracking and were found to have no detectable circumferential defects. Therefore, the probability of a double-ended break is considered to be remote.

Defect mechanisms for which inspections were not performed on these two tubes (batwing support wear and axial cracking at support plates) would not be expected to result in double-ended rupture. The type of ruptures that could be expected from these types of defects are "fish mouth" in nature and would not likely result in a double-ended break. The consequences of "fish mouth" ruptures in either of the subject two tubes are bounded by the ANO-2 design basis accident analyses considering a double-ended break of one steam generator tube.

Since the type of accident that could be postulated to occur to ANO steam generator tubes not receiving bobbin coil eddy current testing during 2R9 is bounded by the "double-ended break" scenario already included in the design basis analyses, it is concluded that this change does 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.

As previously stated, a double-ended rupture of one steam generator tube is accounted for in the ANO-2 design basis accident analyses. Safety margins to detect and repair tube defects prior to rupture are reflected by the 40% TW plugging criteria and 0.5 GPM primary-to-secondary leakage limit stated in ANO-2 TSs. As stated in the ANO-2 TS Bases, cracks having a primary-to-secondary leakage less than the 0.5 GPM limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Considering that the two tubes in question were examined with the bobbin coil probe as recently as spring 1991 with no detectable degradation, and considering that mechanisms are in place to detect and mitigate tube leakage in a very timely manner, delaying the examination of two tubes for less than 2 months past the TS recognized 24 month inspection frequency does not significantly reduce the margin of safety.

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.