



**Entergy  
Operations**

Entergy Operations, Inc.  
P.O. Box 1370  
Russellville, AR 72801  
Tel 501-964-8888

Neil S. "Buzz" Carns  
Vice President  
Operations AND

March 30, 1992

2CAN039204

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Mail Station P1-157  
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 2  
Docket No. 50-368  
License No. NFP-6  
Exigent Technical Specification Change Request  
Sleeving Process for Steam Generator Tube Repair

Gentlemen:

Attached for your review and approval is a proposed Technical Specifications (TSs) change revising the Surveillance Requirements for the Arkansas Nuclear One, Unit 2 (ANO-2) steam generator (SG) tubing, TS 4.4.5. This revision would allow the installation of tube sleeves as an alternative to plugging defective tubes. Sleeve installation is proposed to be performed in accordance with Babcock and Wilcox (B&W) Topical Report BAW-2045PA-00 as supplemented by additional information. This B&W topical report has been previously accepted by the NRC staff for referencing in licensing applications in a letter to James H. Taylor of B&W from James E. Richardson dated January 4, 1990.

An evaluation of the applicability of the use of BAW-2045PA-00 for sleeving ANO-2 Combustion Engineering SG tubes has been performed. The results of this evaluation are documented in B&W Report 51-1212539-00, "BWNS Kinetic Sleeve Design-Application to ANO Unit 2", and are provided in Attachment One. This report includes a description of the relevant differences between the B&W Topical Report and installation of sleeves in the ANO-2 SGs. This attachment contains information proprietary to Babcock and Wilcox, therefore an affidavit is provided in Attachment Two. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and specifically addresses the considerations listed in Paragraph (b)(4) of Section 2.790 to the Commission's regulations. Accordingly, it is respectfully requested that Attachment One be withheld from public disclosure in accordance with Title 10 of the Code of Federal Regulations, Section 2.790.

020030

9204030071 920330  
PDR ADOCK 05000368  
PDR

*AROL*  
*11*

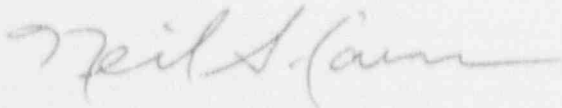
The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the enclosed submittal.

Entergy Operations requests that the proposed change to the TSs be reviewed and approved on an exigent basis in accordance with 10CFR50.91(a)(6) in order to allow sleeving of the defective steam generator tubes identified during the current unanticipated forced outage for ANO-2. The need to utilize a sleeving process to repair ANO-2 SG tubes only became apparent as the result of a recent SG tube leak and subsequent tube inspection.

Steam generator tube repair is currently scheduled to begin on March 31, 1992, with plant heatup anticipated to begin April 21, 1992. Accordingly, Entergy Operations requests your prompt review and approval.

This request has been discussed with the NRR Project Manager for ANO-2 and other members of the NRC Staff. Entergy Operations requests that the effective date for this change be upon NRC issuance of the amendment to allow the tube repair to proceed without delay.

Very truly yours,



NSC/sjf  
Attachments

cc: Mr. Robert Martin  
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. Thomas W. Alexion  
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, Maryland 20852

U. S. NRC  
March 30, 1992  
Page 3

Ms. Sheri Peterson  
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, Maryland 20852

Ms. Greta Dicus, Director  
Division of Radiation Control  
and Emergency Management  
Arkansas Department of Health  
4815 West Markham Street  
Little Rock, AR 72201

STATE OF ARKANSAS        )  
                                  )  
COUNTY OF LOGAN        )        SS

Affidavit

I, N. S. Carns, 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 2CAN0 1204 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.

*N. S. Carns*  
N. S. Carns

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 30th day of March, 1992.

*Sandy Sichenmeyer*  
Notary Public

My Commission Expires:

11/11/2000

ENCLOSURE

PROPOSED TECHNICAL SPECIFICATION

AND

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. NFP-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT TWO

DOCKET NO. 50-368

## PROPOSED CHANGE

The proposed Technical Specifications (TSs) change revises the Surveillance Requirements for the Arkansas Nuclear One, Unit 2 (ANO-2) steam generator (SG) tubing, TS 4.4.5. This revision would allow the installation of mechanical tube sleeves in the ANO-2 SGs, using a Babcock and Wilcox (B&W) methodology as an alternative to plugging defective steam generator tubes. The acceptance criteria for SG inservice inspections has been revised to allow sleeving as an acceptable means of repairing a defective tube. Reporting requirements have been added for those tubes spanned by a sleeve. Additionally, the Basis for TS 4.4.5 has been revised to: (1) reflect that defective SG tubes can be repaired by sleeving; (2) reference the applicable documents for SG tube sleeving; and (3) add a discussion related to inservice inspection of sleeved tubes.

## BACKGROUND

On March 9, 1992, ANO-2 control room operators noted an increase in condenser offgas radioactivity indication. Following evaluations of the indication and SG sampling and analysis, it was determined that there was a tube leak in the "A" SG and the unit was shutdown and placed in cold shutdown. The circumstances of this event were discussed with the NRC Staff in a telephone conversation on March 16, 1992, and will be documented in a Licensee Event Report to be issued in April, 1992.

The leaking tube was located in the "A" SG hotleg side just above the tube sheet. The leak was confirmed with eddy current testing of the affected tube. Based on evaluations of the condition, Entergy Operations decided it was prudent to perform additional eddy current testing of the hotleg tubes in both SGs. As a result of this testing, additional indications of tube degradation at the tube sheet have been identified that are greater than 40% through wall.

The current TSs require a tube that exhibits a through-wall defect of 40% or greater to be isolated from service by means of a tube plug. The tube plug isolates flow through the tube, thereby removing the tube from service. As several tubes are plugged, the effective heat transfer area of the steam generators is reduced and the differential pressure across the SG is increased. This results in reduced coolant flow rate available for core cooling.

The purpose of a sleeve is to repair a defective SG tube in order to maintain the function and integrity of the tube. The mechanical sleeving methodology consists of inserting a sleeve inside the defective original tube, bridging the defect and forming a new pressure boundary. The sleeve functions in essentially the same manner as the original tube. The installation of the sleeves does not significantly affect the heat transfer removal capability of the tube being sleeved and a large number of sleeves can be installed without significantly affecting primary coolant flow rate.

## BASIS FOR EXIGENT REQUEST

Pursuant to 10CFR50.91(a)(6), Entergy Operations hereby requests NRC approval of this proposed TS change on an exigent basis. Exigent authorization is requested in order to minimize delays in the repairs of identified degraded SG tubes and restart of the unit from the current outage. Currently, the ANO-2 TSs require that tubes having indications whose depths are 40% or greater through wall be removed from service by plugging. Based on the results of the current tube inspections, it is anticipated that ANO-2 may exceed the currently analyzed number of tubes that can be plugged. Additionally, as indicated above, sleeving is a preferential method of repairing defective SG tubes. The need to utilize a sleeving process to repair ANO-2 SG tubes only became apparent as a result of a recent unanticipated SG tube leak and subsequent tube inspections.

## DISCUSSION

B&W Topical Report, BAW-2045PA-00, "Recirculating Steam Generator Kinetic Sleeve Qualification for 3/4 Inch OD Tubes", contains information to support the sleeving of Westinghouse Model D SGs having 3/4 inch OD tubing. Data is provided in the report concerning the design of the sleeve, the qualification program, installation methods, and nondestructive examinations.

BAW-2045PA-00 was submitted to the NRC by B&W Nuclear Technologies in letters dated June 9 and December 12, 1988. The Staff found the topical to be acceptable in their safety evaluation that was transmitted to B&W in letter dated January 4, 1990. The Staff stated the topical was acceptable for referencing in license applications to the extent specified and under the limitations delineated in the report and the associated NRC safety evaluation.

An evaluation of the applicability of the use of BAW-2045PA-00 for sleeving tubes in the ANO-2 SGs, manufactured by Combustion Engineering, has been performed. The results of this evaluation are documented in B&W Report 51-1212539-00, "BWNS Kinetic Sleeve Design-Application to ANO Unit 2", and are provided in Attachment One. This report includes a description and qualitative evaluation of the relevant differences between the Topical Report and installation of sleeves in the ANO-2 SGs. As discussed in the report, a "comparative analysis" is being performed to analytically verify the acceptability of installing sleeves in the ANO-2 SGs. The results of this analysis, currently expected to be completed by April 3, 1992, will be submitted to the NRC.

The B&W sleeving methodology consists of a kinetic welding process to join the upper free-span joint of the sleeve to the tube wall and the lower tubesheet joint of the sleeve to the tube wall.

Eddy current techniques were developed to inspect the installed sleeve and tube. A bobbin coil probe is used to inspect the tube outside the sleeved area to the sensitivities required by the ASME Code. In the sleeve, a rotating probe technique supplements the bobbin coil analysis to attain the required detection sensitivity of through wall defects in all areas of the sleeve. Eddy current is also used to verify sleeve position and expansions.

These examinations are performed after the sleeves have been installed and serve as a baseline to determine if there is sleeve degradation in later operating years.

For sleeved tubes, the adequacy of the system that is used for periodic inservice inspections will be validated. Additionally, Entergy Operations commits to evaluate and appropriately implement upgraded testing methods as better methods are developed and validated for commercial use.

#### PROPOSED TECHNICAL SPECIFICATION CHANGES

A definition for "tube and tubing" is added to TS 4.4.5.4.a which includes the use of a sleeve to form the pressure boundary in the area of a tube spanned by a sleeve. The other definitions of TS 4.4.5.4.a were renumbered appropriately. This new definition is intended to clarify that SG tubing surveillance applies to that portion of the tube or sleeve which forms the pressure boundary. The intent of this change is to clarify that a tube must contain a defect in its pressure boundary to be defective. A defect in the region of the tube which is spanned by a sleeve is not a defect in the tube's pressure boundary, and should not be defined as such.

Defects which have been spanned by a sleeve need not be considered for determination of inspection result category. For the case in which detectable degradation of tube has been spanned by a sleeve, further tube wall penetrations in the parent tube are considered inconsequential since that portion of the tube no longer constitutes the primary-to-secondary system pressure boundary. Therefore the tube does not require the same degree of scrutiny as a wall penetration  $\geq 20\%$  in a portion of the tube that does constitute the pressure boundary.

The mandatory inspection requirement still applies to a sleeved tube which has been subjected to a random full length examination and has been found to have a wall penetration  $\geq 20\%$  in either the portion of the tube which is not spanned by the sleeve or in the sleeve itself.

The term "Plugging Limit" in TS 4.4.5.4.a.6 was changed to "Plugging or Repair Limit" and the definition changed for consistency with the new definition for tube or tubing.

In accordance with the past Staff position that the "Surveillance Requirements" section of TSS must include a statement that defective tubes may be repaired in accordance with a specific topical report sleeving procedure referenced by number, B&W Topical Report BAW-2045PA-00 as supplemented by the information provided in B&W Report 51-1212539-00, "B&WNS Kinetic Sleeve Design-Application to ANO-2", has been added to TS 4.4.5.4.b.

The addition of reporting requirements for sleeved tubes to TS 4.4.5.5 ensures tubes which have exceeded the plugging or repair limit are promptly reported to the NRC. This philosophy is consistent with current reporting requirements for plugged tubes.

TS Table 4.4-2 has been revised to permit sleeving as well as plugging repairs.

Additionally, the misspelling of the word "minimum" in the column entitled Sample Size of Table 4.4-2 was corrected.



The Bases for TS 4.4.5 has been revised to reflect that degraded SG tubes can be repaired by sleeving in accordance with the applicable reports. Additionally, the commitments to validate the adequacy of the system used for periodic inservice inspection of sleeved tubes and to evaluate and appropriately implement upgraded testing methods as better methods are developed for commercial use are added to the Bases section.

Requests for changes to TSs to allow the installation of sleeves in SGs at other nuclear facilities (i.e., ANO-1, TMI-1, Ginna, D.C. Cook, Trojan, Crystal River) have been previously submitted to NRC and approved. These requests have shown that there is no significant increase in the probability or consequences of an accident previously evaluated or create the possibility of a new or different kind of accident from an accident previously evaluated.

#### 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 consideration using the standards in 10CFR50.92(c). A discussion of those 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 proposed change to permit the use of SG tubing sleeves as an alternative to tube plugging is a safe and effective repair procedure that does not require removing a tube from service. Mechanical strength, corrosion resistance, installatic method, and inservice inspection techniques of sleeves have been shown to meet NRC acceptance criteria.

Analytical verification will be performed using design and operating transient parameters selected to envelop loads imposed during normal operating, upset and accident conditions. Fatigue and stress analysis of sleeved tube assemblies will be completed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III. The results of the qualification testing, analyses and plant operating experience will demonstrate that the sleeving process is an acceptable means of maintaining SG tube integrity. Furthermore, the sleeve assemblies can be monitored through periodic inspections with eddy current test techniques.

The TSs continue to require isolation of a tube or sleeve containing a detected 40% reduction in the primary to secondary system pressure boundary.

The consequences of accidents previously analyzed are not increased as a result of sleeving activities. In the case of a tube rupture, the sleeve may actually result in a slightly reduced leak/flow rate through the broken tube due to the smaller effective flow area. The minor reduction in flow area associated with a tube sleeve has no significant effect on SG performance with respect to heat transfer or system flow resistance and pressure drop. In any case, all analytical impacts are clearly bounded by

evaluations which demonstrate the acceptability of tube plugging which totally removes the tube from service. Therefore, in comparison to plugging, tube sleeving is considered a significant improvement with respect to steam generator performance. The cumulative impact of multiple sleeved tubes is evaluated to ensure the effects remain within the analytical design bases (both normal and accident).

Therefore, based on the above, this change does not significantly increase the probability or consequences of an accident previously evaluated.

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

A sleeved tube performs the same function, in the same passive manner, as an unsleeved tube. Tube sleeves are designed, qualified, and maintained under the stress and pressure limits of ASME Section III and Regulatory Guide 1.121. Eddy current testing is performed following installation of each sleeve. This is done to verify proper installation of the sleeve and to obtain a baseline eddy current reading for each sleeve in order to monitor for subsequent degradation of the primary to secondary pressure boundary.

Therefore, the possibility of a new or different kind of accident from any previously evaluated is not created.

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

SG tube integrity is maintained under the same limits for sleeved tubes as for unsleeved tubes; i.e. ASME Section III and Regulatory Guide 1.121. The degradation limit at which a tube is considered inoperable remains unchanged and is detectable for sleeves as well as tubes. The TSS continue to require monitoring and restriction of primary to secondary system leakage through the SGs, such that there remains reasonable assurance that a significant increase in leakage, due to failure of a sleeved (or unsleeved) tube, will be detected. The slight reduction in RCS flow, due to sleeving, is considered to have an insignificant impact on SG operation during normal operation and accident conditions and is clearly bounded by tube plugging evaluations. The TSS will continue to contain reporting requirements for tubes which have had their degradation spanned (regardless whether the tube is plugged or sleeved).

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

The NRC has provided guidance, in 51 FR 7750 - 3/6/86, concerning the application of these 10CFR50.92 standards by providing examples of amendments which are likely to involve no significant hazards considerations. The proposed amendment modifying TS 4.4.5 most closely matches example B.(ix) from this guidance: "A repair or replacement of a major component or system important to safety, if the following conditions are met: (1) The repair or replacement process involves practices which have been successfully implemented at least once on similar components or systems elsewhere in the nuclear industry or in other industries, and does not involve a significant increase in the probability or consequences of an accident previously evaluated or create the possibility of a new or different kind of accident from any accident previously evaluated; and (2) The repair or replacement component or system does not result in a significant change in its safety function or a significant reduction in any safety limit (or limiting condition of operation) associated with the component or system."

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