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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit - 1
Docket No. 50-313
License No. DPR-51
Licensee Event Report 50-313/1999-005-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is the subject report concerning Once Through Steam Generator Tube Surveillance Testing.

Very truly yours,

Jimmy D. Vandergrift
Director, Nuclear Safety

JDV/rhs

enclosure

IE22

cc: Mr. Ellis W. Merschoff
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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95
LICENSEE EVENT REPORT (LER)	ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4) Once Through Steam Generator Tube Left In Service With A Flaw Exceeding The Technical Specifications Limit As A Result Of A Process Deficiency

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	15	1999	1999	005	00	01	13	2000	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
POWER LEVEL (10)	100		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
			20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		Specify in
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		Abstract Below
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		and in Text

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Richard H. Scheide, Nuclear Safety and Licensing Specialist	501-858-4618

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On December 15, 1999, during a review of eddy current test data from the previous refueling outage (1R15), it was discovered that an indication in the upper roll transition area of tube 110/60 in the "A" Once Through Steam Generator (OTSG) had been inadvertently reclassified from repairable to non-repairable by an independent oversight review analyst. This error resulted in leaving in service a tube with a flaw exceeding the Technical Specification (TS) limit. Since the defective tube in the "A" OTSG was not repaired as required, the "A" OTSG was declared inoperable and TS 3.0.3 was entered at 1446 CST on December 15, 1999. Enforcement discretion was requested from the NRC to allow sufficient time for submittal and NRC review and approval of an exigent TS change request. The enforcement discretion request was verbally approved by the NRC at 1836 CST on December 15. The root cause of this event was a process deficiency. The process will be revised to ensure that both the technical and administrative facets of resolving an issue are independently reviewed. Because extensive measures were already in place to enhance the operators' ability to detect and respond to OTSG tube leakage, no specific immediate corrective actions were taken regarding this event. The defective tube will be repaired during the next refueling outage.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Arkansas Nuclear One - Unit 1	05000313	1999	005	00	2 OF 5

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

A. Plant Status

At the time this condition was identified, Arkansas Nuclear One Unit 1 (ANO-1) was operating at approximately 100 percent power.

B. Event Description

On December 15, 1999, it was identified that a Once Through Steam Generator (OTSG) tube had been left in service following the previous refueling outage (1R15) with a flaw exceeding the Technical Specifications limit.

The inservice inspection of the ANO-1 OTSGs is conducted in accordance with ANO-1 Technical Specification 4.18. Specification 4.18.2 states, "Inservice inspection of steam generator tubing shall include non-destructive examination by eddy-current testing or other equivalent techniques." Specification 4.18.5.b notes, "The steam generator shall be determined operable after completing the corresponding actions (plug, reroll, or sleeve all tubes exceeding the plugging limit and all tubes containing non-TEC through-wall cracks) required by Table 4.18-2." Table 4.18-2 specifies the expansion criteria for sampling of the steam generator tubes and requires defective tubes to be plugged, rerolled, or sleeved. Specification 4.18.5.a.6 defines a defect as, "an imperfection of such severity that it exceeds the plugging limit except where the imperfection has been spanned by the installation of a sleeve." Plugging Limit is defined in Specification 4.18.5.a.7 as, "the imperfection depth at or beyond 40% of the nominal tube wall thickness for which the tube shall be sleeved, rerolled, or removed from service because it may become unserviceable prior to the next inspection."

During 1R15, an Alternate Repair Criteria was implemented for indications located at the tube ends of the OTSGs. Part of the requirements for determining the postulated accident induced leakage at the end of the cycle is a determination of the number of flaws at the tube ends. During the outage, as part of condition monitoring, a conservative assumption with respect to the number of axial tube end cracks was made for tubes containing multiple indications until detailed analysis could be performed following the outage. In December 1999, during the performance of the analysis for the operational assessment, a review of the resolution analysis compare sheet for tube 110/60 verified that calls were made at two locations on the tube: one at the tube end which was appropriately classified as non-repairable, and one at the Upper Roll Transition (URT). The URT indication was correctly classified as repairable by both the primary and secondary production analysts, but its location was incorrectly logged. The primary and secondary resolution analysts concurred with the repairable code but did not change the incorrect location. During the independent oversight process, the reviewing analyst corrected the location of the URT indication, but also inadvertently changed its classification from repairable to non-repairable. A reevaluation of tube 110/60 data confirmed the original classification of repairable. As a result of this error, tube 110/60 was left in service following 1R15 with a flaw that exceeded the Technical Specifications plugging limit.

Failure to repair a OTSG tube with a flaw that potentially exceeds the Technical Specifications plugging limit constitutes a failure to comply with the surveillance requirements of Technical Specification 4.18.5.b. There is no specific action statement associated with the failure to comply with the surveillance requirements; however, the specification implies that operability of the OTSGs cannot be demonstrated without repairing all tubes that contain flaws exceeding the plugging limit.

Technical Specification 3.1.1.2 requires that two OTSGs be operable whenever reactor coolant average temperature is above 280° F. Since the defective tube in the "A" OTSG was not repaired as required by Specification 4.18.5.b, the affected OTSG was declared inoperable. Because there is no specific action statement associated with Specification 3.1.1.2, Technical Specification 3.0.3 was determined to be applicable. Technical Specification 3.0.3 was entered at approximately 1446 CST on December 15, 1999.

At approximately 1730 CST on December 15, 1999, ANO verbally requested enforcement discretion from the shutdown requirements of Technical Specification 3.0.3 to allow sufficient time for submittal and NRC review and approval of an exigent Technical Specification change request for a one time exemption to the requirements of Technical Specification 4.18.5.b. The exemption will allow one tube with axial indications at the URT with a potential through-wall depth of greater than the plugging limit to remain in service for the remainder of the current fuel cycle.

Verbal approval of the requested enforcement discretion was granted at approximately 1836 CST on December 15, 1999. A formal written request for enforcement discretion was submitted on December 16 and written approval was granted by the NRC on December 17, 1999. The exigent Technical Specification change request was submitted on December 16, 1999.

C. Root Causes

The data analysis process associated with the inservice inspection program for the OTSGs involves several levels of review. The initial review of raw data is accomplished by two production analysis teams (Primary and Secondary). These analysts are trained to conservatively flag any indications that meet the analysis guidelines reporting requirements. The next step involves review of the indications flagged by the production analysts and assigning the appropriate codes (i.e., repairable/non-repairable). This step in the process requires that two resolution analysts concur on the disposition of each indication. After concurrence, the information is entered into a database. An independent review is then performed to identify any apparent errors and to check any indications dispositioned as non-repairable. The independent review analyst has the ability to change information in the database; however, there is no independent verification of database changes made at this point in the process. It was at the independent review point in the process where the error was made that resulted in leaving a flawed tube in service.

The root cause of this event was determined to be a process deficiency that allowed database information to be changed without being independently reviewed.

A contributing factor to this condition was human error in that the independent reviewing analyst did not practice self-checking when modifying database information.

D. Corrective Actions

Extensive measures have been previously taken at ANO to enhance the operators' ability to detect and respond to OTSG tube leakage. These measures included the installation of high sensitivity N-16 monitors capable of detecting small changes in primary-to-secondary leakage and installing computer software with enhanced trending capabilities. Additionally, the procedurally required shutdown limits regarding primary-to-secondary leakage were made more restrictive than those required by the Technical Specifications. Since these measures were in place prior to this event, there are no additional immediate corrective actions deemed necessary.

The OTSG Examination Guidelines will be revised by December 1, 2000, to ensure that both the technical and administrative facets of resolving an indication are independently reviewed.

Tube 110/60 in the "A" OTSG will be repaired during the next ANO-1 refueling outage.

E. Safety Significance

The OTSG upper roll areas have been inspected three times (1R13, 1R14, and 1R15) with indications being detected in the roll transition each time. There have been several OTSG tubes pulled that confirmed that the degradation mechanism is Primary Water Stress Corrosion Cracking (PWSCC) with an axial orientation as a result of the residual stress fields. Examination of a tube pulled during 1R13 that exhibited a roll transition indication confirmed the existence of this degradation mechanism at ANO.

The approach used for evaluating the leakage integrity of the URT flaws is to conservatively estimate the number of flaws which may leak at accident conditions at the end of cycle. A depth distribution and flaw profile is used to determine which flaws could leak and to characterize the potential leakage through those flaws. From this the total potential leakage at accident conditions is calculated for this mechanism. The number and size distribution of upper roll transition flaws is expected to be the same at the end of cycle 16 as the previous cycle. Thus, the potential accident induced primary-to-secondary leakage will remain below 1 gpm.

There has been no evidence of leakage through a URT flaw in the operating history of ANO-1. A "bubble" test was performed at the end of cycle 14 with no leakage being identified from this degradation mechanism. This test consisted of pressurizing the secondary side of the OTSG with a gas and monitoring the primary side for leakage. The current operating leakage is approximately minimum detectable.

The repairable call in tube 110/60 consisted of two separate URT axial flaws. They were both sized at a maximum depth of 97% through wall (TW) with lengths of 0.05 inch and 0.04 inch. The average depth of these flaws were 74% and 59% respectively. The potential accident induced leakage resulting from two axial flaws of this length, assuming 100% TW for their entire length, is negligible. Therefore, the postulated accident induced leak rate contribution at the end-of-cycle 16 from URT PWSCC is negligibly affected. This estimate is determined to be conservative based on the indications being located in the tubesheet.

Conditional core damage probability is the increase in core damage frequency due to a given condition other than that assumed for the base Probabilistic Risk Assessment (PRA). The PRA assumed that the tube integrity is such that no OTSG tube rupture would be induced due to transient conditions. The limiting licensing basis transient that could most adversely affect the tubes by creating a high differential pressure across the tubes is a Main Steam Line Break (MSLB) accident. This accident could produce a tube differential pressure of up to 2500 psid. However, since the flaws in tube 110/60 are located within the tubesheet, the likelihood of tube rupture is not increased as a result of leaving the tube in service. This situation has been qualitatively assessed and the conditional core damage probability for this condition is estimated to be inconsequential.

The subject flaws do not represent a structural or leakage concern. Therefore, continued operation with axial flaws in tubing contained within the tubesheet does not pose a concern relative to the health and safety of the public.

F. Basis for Reportability

Technical Specification 3.0.3 establishes requirements for actions when a Limiting Condition for Operation (LCO) is not met and no action statement is provided. Entry into Technical Specification 3.0.3 for any reason is reportable pursuant to 10CFR50.73(a)(2)(i)(B).

G. Additional Information

LER 50-313/98-001-00 reported a OTSG tube left in service with a flaw exceeding the Technical Specifications limit. However, the root cause of that event involved the misinterpretation of eddy current data whereas the condition reported in this LER was the result of a process deficiency that allowed data entry without independent review. Therefore, the corrective actions implemented as a result of the previous event would not be expected to prevent this event.