



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 210 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated July 29, 1999 (2CAN079903), as supplemented by letters dated August 6, 1999 (2CAN089901), October 14, 1999 (2CAN109903), and October 26, 1999 (2CAN109905), Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit No. 2, Technical Specifications (TSs). The requested changes would permit a one-time change to TS 4.4.5.0 which would allow alternate inspection scope and expansion criteria for steam generator tube inspections to be performed during the mid-cycle outage (2P99) scheduled for November 1999. This steam generator tube inspection will address two known degradation mechanisms. Specifically, the inspections proposed for the 2P99 mid-cycle outage would monitor the impact of axial cracking at the eggcrate supports and circumferential cracking at the top-of-the-tubesheet (TTS) region on steam generator tube structural integrity.

The August 6, 1999, October 14, 1999, and October 26, 1999, letters provided clarifying information that did not change the scope of the original application and the initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

Arkansas Nuclear One, Unit No. 2 (ANO-2) is a Combustion Engineering plant with two Model 2815 steam generators with mill annealed Alloy 600 tubing that is explosively expanded along the full depth of the tubesheet. Each steam generator contains 8411 tubes. There are seven full eggcrate-type tube supports, two partial eggcrate tube supports, and two partial drilled hole tube support plates. ANO-2 plans to replace its steam generators during the next refueling outage scheduled for the fall of the year 2000. Thus, the current operating fuel cycle (cycle 14) is the last cycle of operation for these Model 2815 steam generators.

Beginning with a 1992 forced outage and continuing through 1994, circumferential cracking at the TTS has been the limiting form of degradation at ANO-2. In fact, the severity of this form of degradation resulted in mid-cycle outage inspections in 1993 and 1995. TTS circumferential cracking continues to be an active degradation mechanism at ANO-2. However, the application

of more sensitive eddy current probe examination techniques combined with frequent and extensive inspections of the TTS region over the past seven years has improved the licensee's ability to manage this degradation mechanism. The degradation mechanism that now limits the cycle length at ANO-2 is axial cracking at the eggcrate supports. Since a 1996 forced outage, axial cracking at the eggcrate supports has resulted in mid-cycle inspections in 1998 and another planned for this year in November 1999. The steam generator tube inspection scope and inspection expansion criteria planned for the November 1999 2P99 mid-cycle outage are the subject of the proposed TS amendment.

### 3.0 PROPOSED REVISIONS TO THE TECHNICAL SPECIFICATIONS

The licensee has requested a one-time change to the ANO-2 TSs because the 2P99 mid-cycle outage steam generator inspection planned for November 1999 would not be consistent with ANO-2 TSs for the following reasons:

- The current TSs prohibit steam generator tubing inservice inspections at a frequency of less than 12 months. The licensee plans to perform the 2P99 mid-cycle outage inspections approximately 9 months after the previous inspection performed during refueling outage 2R13.
- The current TSs require the first sample of tubes be inspected from the point of entry on the hot leg side completely around the U-bend to the top support of the cold leg. Based on past inspection results, the licensee has determined the specific areas of interest for the 2P99 mid-cycle outage inspections, which include only the straight portion of the tubes in the hot leg and the hot leg TTS region.
- The current TSs require expansions of the steam generator tube inspections based on the results of the previous sample. The licensee requests to specifically limit the expansion criteria for the TTS inspection.

The licensee proposes the following revision to the TSs, which allows for a steam generator tubing inspection at a shorter frequency and using different scope and expansion criteria than currently specified. A note will be added to TS 4.4.5.0 specifying the following:

- The surveillance requirements of Specification 3.4.5 do not apply to the special steam generator tube inspection to be performed during the 2P99 outage scheduled to begin in November 1999,
- The scope and expansion criteria for this inspection are specified in correspondence to the NRC submitted under separate cover,
- The scope and criteria shall be approved by the NRC prior to entering Mode 4, and
- The results of this inspection shall be reviewed by the Plant Safety Committee prior to entering Mode 4 and reported to the NRC within 30 days of entering Mode 4.

## 4.0 EVALUATION

### 4.1 Timing of the Mid-cycle Inspection

The current TSs prohibit steam generator tubing inservice inspections at a frequency of less than 12 months. The licensee plans to perform the 2P99 mid-cycle inspections approximately 9 months after the previous inspection conducted during refueling outage 2R13. The staff finds this acceptable because the shorter run time between inspections will improve the licensee's ability to detect and repair degraded tubes before there is a challenge to tube structural or leakage integrity.

### 4.2 Inspection Scope and Expansion Criteria

The current TSs require the first sample of tubes be inspected from the point of entry on the hot leg side completely around the U-bend to the top support of the cold leg. Based on past inspection results, the licensee determined the specific areas of interest for the 2P99 mid-cycle outage inspection. These areas differ from the TSs requirements, and thus the licensee requests staff approval of its inspection scope. Also, the current TSs require expansions of the steam generator tube inspections based on the results of the previous sample. The licensee plans to specifically limit the expansion criteria for the TTS inspection. This would differ from the TSs requirements, and thus the licensee requests staff approval of its expansion criteria. The staff's evaluation of the inspection scope and expansion criteria is discussed in detail below for each relevant degradation mechanism.

#### 4.2.1 Mid-cycle Inspection for Axial Cracking at the Eggcrate Supports

Recent inspection results indicate that axial cracking at the hot leg eggcrate supports is the limiting degradation mode for ANO-2. Thus, the licensee plans to perform a 100% inspection of tubes in both the "A" and "B" steam generators using a bobbin coil probe from the hot leg tube end to one inch above the seventh tube support plate on the hot leg side. For tubes that have been previously sleeved, the bobbin coil probe inspection will be from the cold leg side and will cover the expanse from one inch above the seventh support plate on the hot leg side down to the top of the sleeve. The licensee will inspect all bobbin indications using a rotating pancake coil (RPC) and will repair all confirmed indications. The licensee supplied information that demonstrated its inspection scope is biased to the most susceptible location in the steam generators, in terms of both size and number of axial indications. This is consistent with staff experience that degradation is most significant on the hot leg side of the steam generator in the lower support plates due to the higher temperatures. The staff finds the inspection scope acceptable because it is suitably biased to inspect the most susceptible locations of the steam generator tubing for axial cracking at the eggcrate supports.

The initial inspection scope is comprehensive in that the licensee plans to inspect nearly the entire hotleg length of 100% of the tubes in both steam generators. The one area the licensee does not plan to inspect initially is the hot leg tubesheet portion of sleeved steam generator tubes. However, the licensee will expand its inspection scope to include this area if one confirmed indication is found within the tubesheet of a nonsleeved tube. If that occurs, the inspection will be expanded to include the length of tube below the installed sleeves in the affected steam

generator. Given the comprehensive initial inspection scope and sensitive expansion criteria, the staff finds the expansion criteria for axial cracking to be acceptable.

The licensee committed to testing axial indications that meet the in situ pressure test criteria described in Electric Power Research Institute's (EPRI's), "In situ Pressure Test Guideline," Revision 1, Technical Report No. TR-107620-R1, April 1999, that are not bounded by previous testing. The licensee will also perform condition monitoring and an operational assessment per the Nuclear Energy Institute's (NEI's) 97-06, "Steam Generator Program Guidelines." The condition monitoring results will be provided in the 30 day report to the NRC staff, and the operational assessment will be provided to the staff within 90 days of entering Mode 4. The licensee's plans for in situ pressure testing, condition monitoring and operational assessment are consistent with industry guidelines and staff expectations. Such actions serve to ensure that adequate inspections have been performed such that degraded tubes are identified and removed from service or otherwise repaired before there is a challenge to tube structural and/or leakage integrity.

#### 4.2.2 Mid-cycle Inspection for Circumferential Cracking at the TTS

On June 2, 1999, the licensee submitted the operational assessment for cycle 14 at ANO-2. The licensee also discussed the operational assessment with the staff in a meeting held June 28, 1999. The operational assessment concluded that a full cycle between inspections for TTS circumferential cracking was acceptable. Although its operational assessment supports a full cycle of operation for the TTS circumferential indications, the licensee plans to inspect a very limited region of the TTS in one steam generator during the upcoming mid-cycle inspection to minimize the potential for primary-to-secondary leakage. The staff's review of the inspection scope and expansion criteria for this special inspection follows. Our review of the operational assessment submitted on June 2, 1999 is focused on the most limiting mode of degradation, which is axial cracking at the eggcrate supports. The staff has no plans at this time to review in detail the operational assessment relative to TTS circumferential cracking.

Based on past inspection results, the licensee has found that the "A" steam generator is the limiting steam generator for TTS circumferential cracking with respect to both the severity of the degradation (e.g., percent degraded area or PDA) as well as the number of affected tubes. Thus, the licensee plans to limit its inspection of the TTS region to the "A" steam generator. The licensee has also documented that the cracking is associated with a kidney-shaped sludge pile. Within the sludge pile region, the licensee identified two areas in the "A" steam generator that have produced the largest (in terms of PDA) circumferential cracks. The licensee developed an inspection plan that includes and bounds these areas. Specifically, the licensee took the largest cracks (structural challenges and those that leaked at main steam line break (MSLB) conditions) from the 1992 and 1994 inspections and bound them by 4 tubes. This inspection area also contains all tubes with flaws that were larger than 50% PDA found since the 1992 inspection. The licensee then increased the inspection scope slightly to provide a buffer zone of at least two tubes around the largest flaws. This results in an inspection scope of approximately 500 inservice tubes or about 6% of the total tube population. The axial extent of the inspection scope will be limited to +/- 2 inches of the TTS using an RPC probe. All confirmed indications will be repaired. The staff finds the licensee's initial inspection scope to be adequate because the inspection area is biased to those tubes most likely to have significant degradation. The staff considers the number of tubes to be inspected quite small when

compared to the number of tubes which are at risk for circumferential cracking. However, the licensee has concluded, based on its most recent operational assessment, that a mid-cycle inspection of the TTS region is not needed at all. The licensee wants to inspect its most vulnerable area to limit any potential primary-to-secondary leakage during the upcoming cycle. Although we have not reviewed the operational assessment in detail for TTS circumferential indications, the information the staff has at this time supports the licensee's assertion that a mid-cycle inspection is not needed for this area of the steam generator. Thus, the limited inspection scope at the TTS is justified.

With respect to expansion criteria, the licensee will size all circumferential indications and evaluate the indications for in situ pressure testing in accordance with EPRI guidelines. The licensee will test circumferential indications that meet the in situ pressure testing selection criteria that are not bounded by previous testing. The licensee will expand its TTS inspection if circumferential indications in the "A" steam generator fail to pass in situ testing requirements of less than 0.04 gpm total leakage at MSLB pressure or burst of any single flaw at less than 3 times normal operating differential pressure ( $3\Delta P$ ). The expansion will be to inspect the TTS region of all inservice non-sleeved tubes in the "A" steam generator and a random 20% inspection of the TTS region of inservice non-sleeved tubes in the "B" steam generator. The licensee will apply similar expansion criteria to inspection results from the "B" steam generator. The staff finds the expansion criteria acceptable because the criteria are appropriately sensitive to leakage, which is of primary concern with circumferential indications, and also because the criteria are consistent with the licensee's June 2, 1999, operational assessment. The staff finds the inspection expansion plan to be acceptable because it requires a comprehensive inspection of the TTS region in both steam generators. The licensee also committed to expanding the inspection scope to ensure all tubes that meet in situ screening criteria are bounded by two tubes.

As discussed above for axial cracking, the licensee will perform condition monitoring and an operational assessment per NEI's 97-06, "Steam Generator Program Guidelines." The condition monitoring results will be provided in the 30 day report to the NRC staff, and the operational assessment will be provided to the staff within 90 days of entering Mode 4. The licensee's plans for in situ pressure testing, condition monitoring and operational assessment are consistent with industry guidelines and staff expectations. Such actions also serve to ensure that adequate inspections have been performed such that degraded tubes are identified and removed from service or otherwise repaired before there is a challenge to tube structural and/or leakage integrity.

## 5.0 SUMMARY

Based on the evaluation provided above, the staff finds the proposed changes to the technical specifications to be acceptable. Furthermore, the staff finds the proposed inspection scope and expansion criteria for the 2P99 mid-cycle inspection to be acceptable.

## 6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

## 7.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 54375, October 6, 1999). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 8.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S. Coffin

Date: November 5, 1999

Docket  
file



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

November 15, 1999

Mr. Randall K. Edington  
Vice President - Operations  
Entergy Operations, Inc.  
River Bend Station  
P. O. Box 220  
St. Francisville, LA 70775

**SUBJECT: RIVER BEND STATION, UNIT 1 - COMPLETION OF LICENSING ACTION FOR  
GENERIC LETTER 98-01 AND SUPPLEMENT 1, "YEAR 2000 READINESS OF  
COMPUTER SYSTEMS AT NUCLEAR POWER PLANTS" (TAC NO. MA1881)**

Dear Mr. Edington:

On May 11, 1998, the U.S. Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 98-01, "Year 2000 Readiness of Computer Systems at Nuclear Power Plants," to all holders of operating licenses for nuclear power plants, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel. The NRC issued GL 98-01 to ensure that licensees were adequately addressing potential date-related errors with computer systems, embedded software devices, and software applications sufficiently in advance of the Year 2000 (Y2K) rollover date to ensure that nuclear power plants will be in a stable, safe condition during the Y2K transition.

Subsequent to the issuance of GL 98-01, increased public awareness and government attention to the Y2K issue resulted in concern over not only public health and safety of nuclear power plants, but also concern over the ability of nuclear power plants to continue to provide power to the national electric power grid. Therefore, on January 14, 1999, the staff issued Supplement 1 to GL 98-01 to provide addressees with a voluntary, alternative response to that required in item (2) of GL 98-01. In responding to Supplement 1, addressees were asked to confirm Y2K readiness of the facility with regard to those systems within the scope of the license and NRC regulations, as well as those systems required for continued operation of the facility after January 1, 2000. Addressees were permitted to voluntarily respond to Supplement 1 to GL 98-01 on or before July 1, 1999, in lieu of item (2) of GL 98-01.

In response to GL 98-01, you provided letters dated July 30, 1998, and June 30, 1999, concerning Y2K readiness at River Bend Station. These submittals provided the information solicited by GL 98-01. The staff has reviewed your response and has concluded that all requested information has been provided. Therefore, we consider GL 98-01 to be closed for your facility.

NUREG-1706, "Year 2000 Readiness in U.S. Nuclear Power Plants," provides a status of nuclear power plant Y2K readiness as of September 1, 1999, and a description of NRC actions to determine Y2K readiness in operating U.S. reactors. The staff assessment of Y2K readiness consisted of independently evaluating nuclear power plant licensee Y2K readiness program processes, reviewing licensee responses to NRC requests for reporting Y2K readiness (i.e., GL 98-01 and Supplement 1), and combining the results on these assessments to achieve

PDR ADOCK

DF01

Randall K. Edington

-2-

November 15, 1999

a high level of assurance that each facility will operate safely during the transition from 1999 to 2000 and on other Y2K sensitive dates. NUREG-1706 is linked to the NRC home page (<http://www.nrc.gov/NRC/NEWS/year2000.html>).

We would like to acknowledge the efforts you have completed to date in preparing your plant for the Y2K transition and appreciate your continued cooperation on this important issue.

If you have any questions regarding this matter, please contact Robert Fretz at (301) 415-1324.

Sincerely,

ORIGINAL SIGNED BY

Robert J. Fretz, Project Manager, Section 1  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-458

cc: See next page

**DISTRIBUTION:**

File Center	PD IV-1Reading	J. Calvo
PUBLIC	L. Berry	
ACRS	A. Hansen, Lead PM	
OGC	K. Brockman, RIV	

Document Name: G:\PDIV-1\RiverBend\MA1881ltr.wpd

To receive copy of document indicate - E = copy w/encl C = copy w/o encl N = no copy

OFFICE	PM/PDIV-1	E	LA/PDIV-1	E		SC/PDIV-1	E
NAME	RFretz <i>RFretz</i>		DJohnson <i>dj</i>			RGramm <i>RG</i>	
DATE	11 / 8 /99		11 / 08 /99		/ /99	11 / 8 /99	

OFFICIAL RECORD COPY

River Bend Station

cc:

Winston & Strawn  
1400 L Street, N.W.  
Washington, DC 20005-3502

Manager - Licensing  
Entergy Operations, Inc.  
River Bend Station  
P. O. Box 220  
St. Francisville, LA 70775

Senior Resident Inspector  
P. O. Box 1050  
St. Francisville, LA 70775

President of West Feliciana  
Police Jury  
P. O. Box 1921  
St. Francisville, LA 70775

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, TX 76011

Ms. H. Anne Plettinger  
3456 Villa Rose Drive  
Baton Rouge, LA 70806

Administrator  
Louisiana Radiation Protection Division  
P. O. Box 82135  
Baton Rouge, LA 70884-2135

Wise, Carter, Child & Caraway  
P. O. Box 651  
Jackson, MS 39205

Executive Vice President and  
Chief Operating Officer  
Entergy Operations, Inc.  
P. O. Box 31995  
Jackson, MS 39286

General Manager - Plant Operations  
Entergy Operations, Inc.  
River Bend Station  
P. O. Box 220  
St. Francisville, LA 70775

Director - Nuclear Safety  
Entergy Operations, Inc.  
River Bend Station  
P. O. Box 220  
St. Francisville, LA 70775

Vice President - Operations Support  
Entergy Operations, Inc.  
P. O. Box 31995  
Jackson, MS 39286-1995

Attorney General  
State of Louisiana  
P. O. Box 94095  
Baton Rouge, LA 70804-9095

May 1999