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AUTH. NAME AUTHOR AFFILIATION
MCCOLLUM, W.R. Duke Power Co.
RECIP. NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards justification requesting enforcement discretion to avoid unnecessary shutdown of Units 1 & 3. Preliminary proposed TS change marked up page encl.

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Duke Power Company

A Duke Energy Company

Oconee Nuclear Site

P.O. Box 1439

Seneca, SC 29679

W. R. McCollum, Jr.
Vice President

(864) 885-3107 OFFICE

(864) 885-3564 FAX

June 3, 1998

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Notice of Enforcement Discretion (NOED) Request
Steam Generator Tubing Surveillances

Technical Specification 4.17.2 requires that steam generator tubes which exceed the repair limit shall be repaired by sleeving or rerolling, or shall be removed from service. Based on mid-cycle reviews of past steam generator inspection data for Units 1 and 3, Duke Energy Corporation (Duke) has determined that certain repairs were not implemented in accordance with Technical Specification 4.17.2. Attachment 1 contains a justification which requests enforcement discretion to avoid an unnecessary shutdown of Oconee Units 1 and 3.

During the recent Unit 2 refueling outage, operating experience data based on events at Arkansas Nuclear One (ANO) were received by the Duke Steam Generator Engineering staff. This information indicated that previous eddy current indications classified as tube end anomalies (TEA's) had exhibited primary-to-secondary leakage at ANO, thus indicating they were in the pressure boundary. Subsequent evaluation of the ANO data by Duke analysts indicated a potential for indications to extend into the pressure boundary based on current analyst guidelines which were in effect. A review of the eddy current data during the later stages of the Unit 2 outage identified some indications that were reclassified to repairable indications. These tubes were included in the reroll repairs performed during the Unit 2 outage.

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Based on this new information, Duke immediately began to assess the operability implications of this information with respect to Units 1 and 3 on May 6, 1998. The operability evaluation concluded that the steam generator integrity is not adversely impacted by these indications. However, significant analysis efforts were necessary to determine whether all required repairs were made during the past Unit 1 and Unit 3 refueling outages. Duke implemented an aggressive plan to complete this analysis. Based on reasonable doubt from the results of an analysis regarding steam generator tube end anomalies, Oconee determined that a nonconformance with the Technical Specifications existed as of 17:15 hours on June 2, 1998 for Units 1 and 3. Since the condition involves a missed surveillance, a 24 hour grace period is applicable upon discovery of the condition. Following expiration of the 24 hour grace period, Technical Specification 3.0 is required to be entered. Technical Specification 3.0 will require both Units 1 and 3 to be in hot shutdown within 12 hours. Unless enforcement discretion is granted, both units will need to be in hot shutdown by 05:15 hours on June 4, 1998.

Thus, Oconee requests prompt support from the staff to avoid an unnecessary shutdown of Oconee Units 1 and 3. Oconee Unit 2 is not affected since the affected tubes were rerolled or plugged in the most recent refueling outage. Oconee requests enforcement discretion to apply to Units 1 and 3 until a license amendment can be submitted and approved by the staff. Oconee will be working diligently and expeditiously to prepare the license amendment to resolve this issue and will submit the proposed Technical Specifications to the staff on June 4, 1998. Attachment 2 contains the preliminary proposed Technical Specification change marked up page.

NRC Document Control
June 3, 1998
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Please address any questions to J. E. Burchfield, Jr. at
(864-884-3292).

Very Truly Yours,


W. R. McCollum, Jr.
Site Vice President

Attachments (2)

xc: Mr. L. A. Reyes
Regional Administrator, Region II

Mr. M. A. Scott
Senior Resident Inspector

Mr. D. E. LaBarge
ONRR, Project Manager

Attachment 1
Notice of Enforcement Discretion (NOED) Request

Oconee has used Administrative Letter 95-05 to develop this request for enforcement discretion. Relevant information supporting this request for enforcement discretion is provided below.

1. Technical Specification that will be violated:

The Technical Specification that is being violated is Technical Specification 4.17.2. Specification 4.17.2 requires, in part, the following:

"All tubes examined exceeding the repair limit shall be repaired by sleeving or rerolling or removed from service (e.g., plugged, stabilized)."

Specification 4.17.5.f defines repair limit as follows:

"Repair Limit means the imperfection depth beyond which the tube shall be either removed from service by plugging or repaired by sleeving or rerolling because it may become unservicable prior to the next inspection; it is equal to 40% of the nominal tube or sleeve wall thickness."

Specifically, on June 2, 1998, at 17:15, it was determined, based on analysis results, that a number of steam generator tubes exceeded the repair limits on Units 1 and 3 and were not removed from service or repaired as required by Specification 4.17.2. The analysis was originated as a result of an investigation into an industry operating experience issue regarding steam generator tube end anomalies (TEAs). The details of this investigation are described in Item #2 below.

2. Circumstances surrounding the situation:

During the recent Unit 2 refueling outage, operating experience data based on events at Arkansas Nuclear One (ANO) were received by the Duke Steam Generator Engineering staff. This information indicated that previous eddy current indications classified as TEA's had exhibited primary-to-secondary leakage at ANO, thus indicating they were in the pressure boundary. Subsequent evaluation of the ANO data by Duke analysts indicated a potential for indications to extend into the pressure boundary based on

analyst guidelines which were in effect at the time of the original analysis. The guidelines were not specific in identifying the landmarks that should be used to determine that indications were outside the pressure boundary. A review of the eddy current data during the later stages of the Unit 2 outage identified some indications that were reclassified from TEA's to repairable indications. These tubes were included in the reroll repairs performed during the Unit 2 outage.

Based on this new information, Duke initiated a Problem Investigation Process (PIP) report on May 6, 1998. Engineering immediately began to assess the operability implications of this information with respect to Units 1 and 3. An evaluation of the results of the previous steam generator inspection results from the refueling outages on Units 1 and 3 indicated a number of tubes with TEA indications that were not repaired during those respective outages. The operability evaluation for Units 1 and 3 conservatively assumed that all the identified TEA's would result in leakage at rates determined by previous measurements on mockups performed by Framatome Technologies. The operability evaluation, completed on May 9, 1998, concluded that the predicted leakage was well below the leakage assumed in design basis steam line break accident analysis.

An action plan was identified to initiate a reanalysis of the Units 1 and 3 data obtained during the previous outages to establish the extent of the TEA indications. The action plan used the operating experience based on the ANO indications and results of steam generator inspections during the recent Unit 2 refueling outage. The following steps were employed to analyze the issue of TEA indications for Units 1 and 3.

- 1) FTI Constructed Mock Up for Eddy Current Evaluation
- 2) Developed Analysis Guidelines
- 3) Selected Analyst
- 4) Trained Analyst
- 5) Conducted Site Specific Testing
- 6) Performed Review of ECT Data for Units 1 and 3
- 7) Resolved any indications as result of review
- 8) Corrected database
- 9) Completed leakage evaluation for any remaining indications

While several activities were performed in parallel, the controlling activity for completing the data review was completion of the mock up. This detailed mockup of the

upper tube sheet and clad was constructed with tubes installed with a geometry identical to the ONS steam generators. Machined defects were included in identified areas. This mockup was used to verify eddy current analyst guidelines were appropriate and comprehensive. The results of this reanalysis indicate that 372 indications out of 2,951 TEA's not previously repaired for Unit 1 and 61 out of 66 TEA's not previously repaired on Unit 3 extended beyond the upper surface of the tube sheet clad. These indications would have met Duke's criteria for repair during the outage by reroll. Ultimately, confirmation of ECT indications in the rolled area that met the repair criteria prompted this NOED request. Based on preliminary results from the review, the Operations Shift Manager was briefed on June 2, 1998, regarding the revised inspection results for Units 1 and 3. The OSM logged the missed surveillance at 1715 hours on June 2, 1998 and Engineering completed its evaluation later that evening.

3. The safety basis for the request, including an evaluation of the safety significance:

This evaluation is for continued operation of Units 1 and 3 absent compliance with Technical Specification 4.17.2 surveillance requirements.

The steam generators are QA condition 1 components. The steam generators serve as part of the RCS pressure boundary and must meet the leakage requirements of the ONS Technical Specifications. The pressure boundary function of the steam generator tubes, particularly the upper tubesheet rolled joints, has been evaluated for continued operation of Units 1 and 3 within their present conditions. A question was raised about the location of indications in tubes classified as tube end anomalies (TEAs). These TEAs are eddy current testing calls for indications at the hot leg tube end, typically between the primary face cladding and the protruding tube end. TEA indications can only be identified when the upper tubesheet roll joints are inspected with a rotating pancake coil (RPC) eddy current probe or a plus-point eddy current probe. To determine if indications may exist in the Unit's 1 and 3 steam generators, a review of the ONS-1 EOC-17 and ONS-3 EOC-16 steam generator eddy current testing inspections was conducted and an operability evaluation was performed. TEA's are characterized as axial eddy current testing indications at the end of the tube outside of the pressure boundary. Some TEA's in the Unit 1 and 3 steam generators may be in the pressure boundary,

which means they must be reclassified as repairable indications. The leak rates from repairable indications are considered in the following analysis.

The review of the TEA's for Oconee Units 1 and 3 was completed using clarified analysis guidelines. The results are as follows with all flaws in the clad except where noted:

ONS3 SG "A"

3 TEA's were reported during the EOC-16 RFO
2 are single axially oriented indications (SAI)

ONS3 SG "B"

63 TEA's were reported during the EOC-16 RFO
55 are single axially oriented indications (SAI)
4 are multiple axially oriented indication (MAI),

ONS1 SG "A"

1,020 - TEA's were reported during the EOC 17 RFO
221 are multiple axial indication (MAI)
1 MAI in the carbon steel with four indications
96 are single axial indication (SAI)
1 is a single circumferentially oriented indication (SCI),
1 is mixed mode indications (MMI)
10 stayed as TEA's

ONS1 SG "B"

1,931 -TEA's were reported during the EOC-17 RFO
1,817 remained as TEA's
35 are single axial indications (SAI)
1 SAI is in the carbon steel at the roll transition
3 are single circumferential indications (SCI)
5 are mixed mode indications (MMI)
10 are multiple axial indication (MAI)

Framtome Technologies Incorporated (FTI) has performed testing for Arkansas Nuclear One to measure the leakage from axial EDM notches (0.25 inches x 0.005 inches) in typical rolled joint mockups at 2500 psi at room temperature. The resulting leakage was 0.0066 cubic inches per hour. Tubes were also tested in typical roll mockups with a 360° sever in a ¾ inch deep roll with a resulting leakage of 0.02 inches³/hour at room temperature at 2500 psi. The leakage

from these size notches are conservative due to the width of the notches with respect to cracks.

For this review the indications are conservatively combined for a total leakage value through one steam generator. Current TEA's will not be considered for leakage because they are outside the pressure boundary.

The first consideration is tube burst. The indications are contained within the tubesheet. The tubesheet provides reinforcement to any indication. Therefore, the tubes are not expected to burst under normal and accident conditions. The tube integrity requirements are satisfied.

The second consideration is tube leakage at main steam line break loading conditions. By inspection, Oconee Unit 1 is the most limiting case with respect to leakage due to the number of indications present.

Circumferential Indications

Four circumferential indications were identified in review. These four indications are located interior to the bundle. Therefore, tubesheet hole dilation will not be considered. They have been reported as having circumferential extents of less than 41° and located in the clad of the steam generator. For leakage, they will be considered 360° and the FTI test results will be utilized.

Mixed Mode Indications

There have also been 6 mixed mode indications identified. The data has again been reviewed to determine if they are clear axial or have potential circumferential involvement. For this analysis they will be considered as circumferential indications.

$$(4 \text{ SCI} + 6 \text{ MMI}) \times 0.02 \text{ inches}^3/\text{hour} \times (2575/2500)^2/231 \text{ inches}^3/\text{gallon} / 60 \text{ minutes} / \text{hour} = 0.000015 \text{ gpm}$$

Indications in carbon steel

Two axial indications have been identified in the carbon steel region of the tubesheet. The axial extent of these indications are 0.2 inch and 0.06 inches long. One of these indications is located in the roll transition. From the EPRI PWSCC report the tube is not going to burst due to the reinforcing effect of the tube sheet and is contained within the tubesheet. These indications are not expected to grow to a point of concern with an industry growth rate of 0.03 inches/EFPY. Leakage will be considered for accident conditions for these indications at the rate identified in recent in situ pressure test results for an indication in

the tubesheet. This leaking tube had a leak rate of 0.006 gpm to 0.01 gpm at MSLB temperature and pressures. The axial flow length was 0.33 inches. The leak rate will be assumed to be 0.01 gpm.

2 indications X 0.01 gpm = 0.02 gpm

Multiple Axial Indications

Multiple axial indication are considered by assuming that the number of indications around the circumference is four, which by inspection is conservative.

231 MAI's X 4 indication /tube = 924 axial indications

Single Axial indications

There are 129 indications to be considered.

$(924 + 129) \times 0.0066 \text{ inches}^3/\text{hour} \times (2575/2500)^2 / 231 \text{ inches}^3/\text{gallon} / 60 \text{ minutes} / \text{hour} = 0.00053 \text{ gpm}$

The total leakage for Unit 1 is 0.000015 gpm for circumferential indications + 0.00053 gpm from axial indications + 0.02 gpm from the roll transition flaw = 0.02 gpm

Additional main steam line break leakage from rerolls.

Unit 1:

$4166 \text{ rerolls} \times 0.0055 \text{ inches}^3/\text{hour} \text{ at room temperature at } 2330 \text{ psi} \times (2575/2320)^2 / 231 \text{ inches}^3/\text{gallon} / 60 \text{ minutes} / \text{hour} = 0.002 \text{ gpm}$

Unit 3:

0 rerolls = 0 gpm

The total predicted main steam line break tube leakage is 0.023 gpm for Unit 1. The resulting leakage is less than that assumed in the off site dose analysis of 0.7 gpm at room temperature for each unit. Since Unit 1 is bounding, both units meet the MSLB leakage requirements for steam generator integrity. Therefore, the analysis concludes that the steam generators are capable of performing their intended safety function during normal operation and postulated accident conditions.

4. The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety and that neither an unreviewed safety question nor a significant hazard consideration is involved.

Unreviewed Safety Question and No Significant Hazards Review:

1) Increase the probability of an accident evaluated in the SAR?

No. This evaluation addresses the potential effects of a missed surveillance and repair opportunity for steam generator tubes. As described in the safety evaluation, operating with some steam generator tubes with TEAs and repairable indications in Units 1 and 3 does not increase the probability of an accident evaluated in the SAR because this condition is not an accident initiator. There is no physical change to the plant SSCs or operating procedures. Neither electrical power systems, nor important to safety mechanical SSCs will be adversely affected. The steam generators have been evaluated as operable for normal and accident conditions. There are no shutdown margin, reactivity management, or fuel integrity concerns. There is no increase in accident initiation likelihood, therefore analyzed accident scenarios are not impacted.

2) Increase the probability of a malfunction of equipment important to safety evaluated in the SAR?

No. As described in the safety evaluation, operating with some steam generator tubes with TEAs and repairable indications in Units 1 and 3 does not increase the probability of a malfunction of equipment important to safety. This activity is not a test procedure and does not physically change out or modify any plant system, structures, or components. The steam generators are QA condition 1 components that serve as part of the RCS pressure boundary and must meet the leakage requirements of the ONS Technical Specifications. Nothing is being done to inhibit their integrity or function. No valve manipulations, electrical alignments, or system configurations are required. No new hazardous materials or potential missiles are installed.

3) Increase the consequences of an accident evaluated in the SAR?

No. This activity will not adversely affect the ability to mitigate any SAR described accidents. The total evaluated main steam line break leakage from the areas evaluated is 0.023 gpm for Unit 1 which is the limiting unit. The resulting leakage was considerably less than that assumed in

the off site dose analysis of 0.7 gpm for each unit. Therefore both Units 1 and 3 met the MSLB leakage requirements for steam generator integrity with no compensatory actions required. There is no adverse impact on containment integrity, radiological release pathways, fuel design, filtration systems, main steam relief valve setpoints, or radwaste systems.

4) Increase the consequences of a malfunction of equipment important to safety evaluated in the SAR?

No. No safety related or important to safety equipment necessary to place or maintain the plant in safe shutdown condition will be impacted by continued operation, absent the surveillance. As described in the safety evaluation, operating with some steam generator tubes with TEAs and repairable indications in Units 1 and 3 does not increase the consequences of a malfunction of equipment important to safety. The total evaluated main steam line break leakage from the areas evaluated is 0.023 gpm for Unit 1 which is the limiting unit. The resulting leakage was considerably less than that assumed in the off site dose analysis of 0.7 gpm for each unit. Therefore both Units 1 and 3 met the MSLB leakage requirements for steam generator integrity with no compensatory actions required. There is no adverse impact on containment integrity, radiological release pathways, fuel design, filtration systems, main steam relief valve setpoints, or radwaste systems.

5) Create the possibility for an accident of a different type than any evaluated in the SAR?

No. There is no increased risk of unit trip, or challenge to the RPS or other safety systems. There is no physical effect on the plant, ie none on RCS temperature, boron concentration, control rod manipulations, core configuration changes, and no impact on nuclear instrumentation. There is no increased risk of a reactivity excursion. No new failure modes or credible accident scenarios are postulated from this activity. The MSLB scenario has been thoroughly evaluated and the potential for damage to the steam generator tubes is not increased.

6) Create the possibility for a malfunction of a different type than any evaluated in the SAR?

No. There is no physical change to the plant SSCs or operating procedures. This change does not involve any plant changes, electrical lineups, or valve manipulations. No QA conditions or code requirements are degraded. No new equipment or components were installed. No credible new failures are postulated.

7) Reduce the margin of safety as defined in the bases to any Technical Specification?

No. No function of any important to safety SSC will be adversely affected or degraded as a result of continued operation. No safety parameters, setpoints, or design limits are changed. There is no adverse impact to the nuclear fuel, cladding, RCS, or required containment systems. Therefore, the margins of safety as defined in the bases to any Technical Specifications are not reduced as a result of this change.

CONCLUSION

Based on the preceding evaluation, the noncompliance will not be of potential detriment to the public health and safety and neither an unreviewed safety question nor a significant hazard consideration is involved.

5. The basis for the licensee's conclusion that the compliance will not involve adverse consequences to the environment.

No environmental impact analysis is necessary since this request does not involve a significant hazards consideration, a significant change in the types/amounts of effluents that may be released offsite, or a significant increase in the individual/cumulative occupational radiation exposure.

6. Any proposed compensatory measure(s).

The safety analyses have demonstrated that the expected leakage from these indications would be very low. Compensatory measures related to this issue include:

- The Operations Shift Manager was briefed on this issue and it is being carried as a "plant concern" on the operations turnover sheets. A training package will be provided to heighten the sensitivity of the operators regarding the indications on Units 1 and 3 and the need to monitor primary-to-secondary leakage.
- An administrative limit on primary-to-secondary leakage of 100 gpd is being implemented, which is more conservative than the Technical Specification limit of 150 gpd.

7. The justification for the duration of the noncompliance.

Duke requests that enforcement discretion be granted for Oconee Units 1 and 3 until the license amendment is issued to the Technical Specifications. This license amendment will permit operation with unrepaired/unplugged steam generator tubes with tube end anomalies which potentially meet the defect criterion as defined in Specification 4.17.5.e. Attachment 2 contains the proposed preliminary Technical Specification revised page. This revised page is in draft form and is subject to some minor revision. It is Duke's intent to submit this license amendment on June 4, 1998.

8. A statement that the request has been approved by the Plant Operations Review Committee.

On June 3, 1998, the Plant Operations Review Committee reviewed and approved this request for enforcement discretion.

9. The request must specifically address how one of the NOED criteria for appropriate plant conditions is satisfied.

Duke believes that this request satisfies the NOED criteria (Criterion B1) in that this request for enforcement discretion is necessary to avoid an undesirable plant evolution as a result of complying with the license condition and minimize the potential safety consequences and operational risks. Compliance with Technical Specification 4.17.2 will require Oconee Units 1 and 3 to shut down and enter a steam generator outage to satisfy the surveillance requirements. As previously described, there is no safety significance associated with this compliance issue and requiring a shutdown of two units does not minimize potential safety consequences or operational risk.

On June 2, 1998, at 17:15, Duke arrived at a reasonable doubt, based on detailed analysis results of the steam generator tube end anomaly (TEA) issue, that a number of steam generator tubes in Units 1 and 3 potentially exceeded the repair limits specified in Specification 4.17.5.f. Unit 2 was unaffected. Immediately upon reaching this conclusion, it was determined that Oconee Units 1 and 3 did not meet Specification 4.17.2, in that these steam generator tubes had not been repaired or removed from service as

required. The TEA issue was recognized during the most recent Unit 2 refueling outage, and action was taken to conservatively repair or remove from service the affected Unit 2 steam generator tubes. However, to assess whether tubes in Units 1 and 3 exceeded the repair limit criterion, a review of previous inspection results and a detailed analysis was necessary. Duke believes that initiation of the analysis, and actions taken in regard to the analysis results, were timely and appropriate. Therefore, no previous opportunity to identify the Technical Specification nonconformance existed. Thus, it is Duke's position that this issue fully conforms to the NOED criteria that have been issued by the staff.

10. If a follow-up license amendment is required, the NOED request must include marked-up Technical Specification pages showing the proposed Technical Specification changes. The actual license amendment request must follow within 48 hours.

A follow-up license amendment will be required to permit operation with unrepaired/unplugged steam generator tubes with tube end anomalies which potentially meet the defect criterion as defined in Specification 4.17.5.e. Attachment 2 contains the proposed preliminary Technical Specification revised page. This revised page is in draft form and is subject to some minor revision. It is Duke's intent to submit this license amendment on June 4, 1998.

11. A statement that prior adoption of approved line-item improvements to the TS or the ITS would not have obviated the need for the NOED request.

Oconee has custom Technical Specifications and is in the process of converting to Improved Technical Specifications (ITS). The ITS submittal was made on October 28, 1997, satisfying a commitment from Duke to make the submittal by October 31, 1997. Thus, Oconee has taken the initiative to improve its specifications and take advantage of the industry operating experience associated with ITS. Line-item improvements in Technical Specifications would not have avoided this specific case since it involves a mid-cycle reanalysis of steam generator inspection data based on operating experience.

Attachment 2

Preliminary Proposed Technical Specification Change
Marked-Up Pages