

October 22, 1990

Docket Nos. 50-348
and 50-364

DISTRIBUTION
See attached sheet

Mr. W. G. Hairston, III
Senior Vice President
Alabama Power Company
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201

Dear Mr. Hairston:

SUBJECT: ISSUANCE OF AMENDMENT NO. 85 TO FACILITY OPERATING LICENSE
NO. NPF-2 AND AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO.
NPF-8 REGARDING STEAM GENERATOR TUBE SLEEVING - JOSEPH M.
FARLEY NUCLEAR PLANT, UNITS 1 AND 2, (TAC NOS. 77487 AND 77488)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 85 to Facility Operating License No. NPF-2 and Amendment No. 78 to Facility Operating License No. NPF-8 for the Joseph M. Farley Nuclear Plant, Units 1 and 2. The amendments consist of changes to the Technical Specifications in response to your submittal dated August 16, 1990.

The amendments change the Technical Specifications to allow steam generator tube sleeving using a laser welding methodology developed by Westinghouse.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's bi-weekly Federal Register notice.

Sincerely,
Original Signed By:

Stephen T. Hoffman, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 85 to NPF-2
2. Amendment No. 78 to NPF-8
3. Safety Evaluation

cc w/enclosures:
See next page

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Mr. W. G. Hairston, III
Alabama Power Company

Joseph M. Farley Nuclear Plant

cc:

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

ALABAMA POWER COMPANY

DOCKET NO. 50-348

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 85
License No. NPF-2

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Alabama Power Company (the licensee), dated August 16, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications, as indicated in the attachment to this license amendment; and paragraph 2.C.(2) of Facility Operating License No. NPF-2 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 85, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

- 3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of receipt of the amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed By:

Elinor G. Adensam, Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 22, 1990

OFC	:LA:PD21:DRPR:PM:PD21:DRPR:	OGC	:D:PD21:DRPR:	:	:
NAME	:KAnderson : SHoffman:	:	: EAdensam	:	:
DATE	:10/4/90 : 10/4/90 :	10/12/90	: 10/22/90 :	:	:

ATTACHMENT TO LICENSE AMENDMENT NO. 85
TO FACILITY OPERATING LICENSE NO. NPF-2
DOCKET NO. 50-348

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages

3/4 4-12
B 3/4 4-3
B 3/4 4-3a

Insert Pages

3/4 4-12
B 3/4 4-3
B 3/4 4-3a

SURVEILLANCE REQUIREMENTS (Continued)
=====4.4.6.4. Acceptance Criteria

a. As used in this Specification:

1. Imperfection means an exception to the dimensions, finish or contour of a tube or sleeve from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal wall thickness, if detectable, may be considered as imperfections.
2. Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube or sleeve.
3. Degraded Tube means a tube, including the sleeve if the tube has been repaired, that contains imperfections greater than or equal to 20% of the nominal wall thickness caused by degradation.
4. % Degradation means the percentage of the tube or sleeve wall thickness affected or removed by degradation.
5. Defect means an imperfection of such severity that it exceeds the plugging or repair limit. A tube or sleeve containing a defect is defective.
6. Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be repaired (i.e., sleeved) or removed from service by plugging and is greater than or equal to 40% of the nominal tube wall thickness. For a tube that has been sleeved with a mechanical joint sleeve, through wall penetration of greater than or equal to 31% of sleeve nominal wall thickness in the sleeve requires the tube to be removed from service by plugging. For a tube that has been sleeved with a welded joint sleeve, through wall penetration greater than or equal to 37% of sleeve nominal wall thickness in the sleeve between the weld joints requires the tube to be removed from service by plugging.
7. Unserviceable describes the condition of a tube or sleeve if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 4.4.6.3.c, above.
8. Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube that has been repaired by sleeving, the tube inspection should include the sleeved portion of the tube.
9. Tube Repair refers to mechanical sleeving, as described by Westinghouse report WCAP-11178 Rev. 1, or laser welded sleeving, as described by Westinghouse report WCAP-12672, which is used to maintain a tube in service or return a tube to service. This includes the removal of plugs that were installed as a corrective or preventive measure.

3/4.4.6 STEAM GENERATORS

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 500 gallons per day per steam generator). Cracks having a primary-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that primary-to-secondary leakage of 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired.

Wastage-type defects are unlikely with proper chemistry treatment of the secondary coolant. However, even if a defect should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or repair will be required for all tubes with imperfections exceeding 40% of the tube nominal wall thickness. If a sleeved tube is found to have through wall penetration of greater than or equal to 31% for the mechanical sleeve and 37% for the laser welded sleeve of sleeve nominal wall thickness in the sleeve, it must be plugged. The 31% and 37% limits are derived from R.G. 1.121 calculations with 20% added for conservatism. The portion of the tube and the sleeve for which indications of wall degradation must be evaluated can be summarized as follows:

a. Mechanical

1. Indications of degradation in the entire length of the sleeve must be evaluated against the sleeve plugging limit.
2. Indication of tube degradation of any type including a complete guillotine break in the tube between the bottom of the upper joint and the top of the lower roll expansion does not require that the tube be removed from service.

BASES

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3. The tube plugging limit continues to apply to the portion of the tube in the entire upper joint region and in the lower roll expansion. As noted above the sleeve plugging limit applies to these areas also.
4. The tube plugging limit continues to apply to that portion of the tube above the top of the upper joint.

b. Laser Welded

1. Indications of degradation in the length of the sleeve between the weld joints must be evaluated against the sleeve plugging limit.
2. Indication of tube degradation of any type including a complete break in the tube between the upper weld joint and the lower weld joint does not require that the tube be removed from service.
3. At the weld joint, degradation must be evaluated in both the sleeve and tube.
4. In a joint with more than one weld, the weld closest to the end of the sleeve represents the joint to be inspected and the limit of the sleeve inspection.
5. The tube plugging limit continues to apply to the portion of the tube above the upper weld joint and below the lower weld joint.

Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect degradation that has penetrated 20% of the original tube wall thickness.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to 10CFR50.73 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.



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

ALABAMA POWER COMPANY

DOCKET NO. 50-364

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 78
License No. NPF-8

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Alabama Power Company (the licensee), dated August 16, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications, as indicated in the attachment to this license amendment; and paragraph 2.C.(2) of Facility Operating License No. NPF-8 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 78, are hereby incorporated in the license. Alabama Power Company shall operate the facility in accordance with the Technical Specifications.

- 3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of receipt of the amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed By:

Elinor G. Adensam, Director
 Project Directorate II-1
 Division of Reactor Projects - I/II
 Office of Nuclear Reactor Regulation

Attachment:
 Changes to the Technical
 Specifications

Date of Issuance: October 22, 1990

OFC	:LA:PD21:DRPR:PM:PD21:DRPR:	OGC	:D:PD21:DRPR:	:	:
NAME	: PAnderson : SHoffman :	SC	: EAdensam :	:	:
DATE	: 10/4/90 : 10/4/90 :	10/12/90	: 10/22/90 :	:	:

ATTACHMENT TO LICENSE AMENDMENT NO. 78

TO FACILITY OPERATING LICENSE NO. NPF-8

DOCKET NO. 50-364

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages

3/4 4-12
B 3/4 4-3
B 3/4 4-3a

Insert Pages

3/4 4-12
B 3/4 4-3
B 3/4 4-3a

SURVEILLANCE REQUIREMENTS (Continued)
=====4.4.6.4. Acceptance Criteria

a. As used in this Specification:

1. Imperfection means an exception to the dimensions, finish or contour of a tube or sleeve from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal wall thickness, if detectable, may be considered as imperfections.
2. Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube or sleeve.
3. Degraded Tube means a tube, including the sleeve if the tube has been repaired, that contains imperfections greater than or equal to 20% of the nominal wall thickness caused by degradation.
4. % Degradation means the percentage of the tube or sleeve wall thickness affected or removed by degradation.
5. Defect means an imperfection of such severity that it exceeds the plugging or repair limit. A tube or sleeve containing a defect is defective.
6. Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be repaired (i.e., sleeved) or removed from service by plugging and is greater than or equal to 40% of the nominal tube wall thickness. This definition does not apply to the area of the tubesheet region below the F* distance in F* tubes. For a tube that has been sleeved with a mechanical joint sleeve, through wall penetration of greater than or equal to 31% of sleeve nominal wall thickness in the sleeve requires the tube to be removed from service by plugging. For a tube that has been sleeved with a welded joint sleeve, through wall penetration greater than or equal to 37% of sleeve nominal wall thickness in the sleeve between the weld joints requires the tube to be removed from service by plugging.
7. Unserviceable describes the condition of a tube or sleeve if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 4.4.6.3.c, above.
8. Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube that has been repaired by sleeving, the tube inspection should include the sleeved portion of the tube.
9. Tube Repair refers to mechanical sleeving, as described by Westinghouse report WCAP-11178 Rev. 1, or laser welded sleeving, as described by Westinghouse report WCAP-12672, which is used to maintain a tube in service or return a tube to service. This includes the removal of plugs that were installed as a corrective or preventive measure.

BASES
=====3/4.4.6 STEAM GENERATORS

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 500 gallons per day per steam generator). Cracks having a primary-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that primary-to-secondary leakage of 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired.

Wastage-type defects are unlikely with proper chemistry treatment of the secondary coolant. However, even if a defect should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or repair will be required for all tubes with imperfections exceeding 40% of the tube nominal wall thickness. If a sleeved tube is found to have through wall penetration of greater than or equal to 31% for the mechanical sleeve and 37% for the laser welded sleeve of sleeve nominal wall thickness in the sleeve, it must be plugged. The 31% and 37% limits are derived from R.G. 1.121 calculations with 20% added for conservatism. The portion of the tube and the sleeve for which indications of wall degradation must be evaluated can be summarized as follows:

a. Mechanical

1. Indications of degradation in the entire length of the sleeve must be evaluated against the sleeve plugging limit.
2. Indication of tube degradation of any type including a complete guillotine break in the tube between the bottom of the upper joint and the top of the lower roll expansion does not require that the tube be removed from service.

BASES

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3. The tube plugging limit continues to apply to the portion of the tube in the entire upper joint region and in the lower roll expansion. As noted above the sleeve plugging limit applies to these areas also.
4. The tube plugging limit continues to apply to that portion of the tube above the top of the upper joint.

b. Laser Welded

1. Indications of degradation in the length of the sleeve between the weld joints must be evaluated against the sleeve plugging limit.
2. Indication of tube degradation of any type including a complete break in the tube between the upper weld joint and the lower weld joint does not require that the tube be removed from service.
3. At the weld joint, degradation must be evaluated in both the sleeve and tube.
4. In a joint with more than one weld, the weld closest to the end of the sleeve represents the joint to be inspected and the limit of the sleeve inspection.
5. The tube plugging limit continues to apply to the portion of the tube above the upper weld joint and below the lower weld joint.

F* tubes do not have to be plugged or repaired provided the remainder of the tube within the tubesheet that is above the F* distance is not degraded. The F* distance is equal to 1.79 inches and is measured down from the top of the tubesheet or the bottom of the roll transition, whichever is lower in elevation. Included in this distance is an allowance of 0.25 inch for eddy current elevation measurement uncertainty.

Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect wastage type degradation that has penetrated 20% of the original tube wall thickness.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to 10CFR50.73 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 85 TO FACILITY OPERATING LICENSE NO. NPF-2
AND AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO. NPF-8

ALABAMA POWER COMPANY

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

By letter dated August 16, 1990, the Alabama Power Company submitted a request for changes to the Joseph M. Farley Plant (Farley), Units 1 and 2, Technical Specifications to allow steam generator tube sleeving using a laser welding methodology developed by Westinghouse. The amendment requests are applicable to both Units 1 and 2. The technical justification supporting the proposed changes was provided as WCAP-12672, "Steam Generator Sleeving Report, Laser Welded Sleeves, J. M. Farley Units 1 and 2," (Proprietary), and WCAP-12673, "Steam Generator Sleeving Report, Laser Welded Sleeves, J. M. Farley Units 1 and 2," (Non-proprietary).

2.0 BACKGROUND

The proposed amendments would modify a portion of the Technical Specifications to specify the requirements for the repair of steam generator tubes by installation of sleeves with laser welded joints. Currently, the Farley, Units 1 and 2, Technical Specifications include requirements for repair using sleeves with mechanical joints for those steam generator tubes with eddy current indications showing greater than 40% through wall degradation. The proposed Technical Specification changes would specify the requirements for repairing degraded or defective tubes utilizing sleeves with laser welded joints. The proposed amendments also include criteria for allowable wall degradation in the sleeve and in the tube in the region of the sleeve to tube joint.

3.0 DISCUSSION

The supporting technical and safety evaluations for the subject amendments (WCAP-12672), show that the repair of degraded tubes using sleeves will result in tube bundle integrity consistent with the original design basis.

The sleeving report addresses three distinct types of sleeves - a full length tubesheet sleeve, an elevated tubesheet sleeve, and a support

plate sleeve. The full length tubesheet sleeve is used for degradation at the top of the tubesheet, since the lower joint is formed at the bottom of the tubesheet. The elevated tubesheet sleeve is used at Farley, Unit 2, because Farley, Unit 2, has full depth rolled tubes and an alternate plugging criterion (F*) previously accepted by the NRC. The alternate plugging criterion allows tube degradation below a predetermined distance from the tubesheet secondary face to remain in service due to the support the tubesheet provides in the area of the defect. For the elevated tubesheet sleeves, the sleeve's lower joint is formed at an elevation above the primary face of the tubesheet, which means the tube is the pressure boundary for some portion within the tubesheet. The support plate sleeve may be installed to bridge degradation located at tube support plate locations or in the free tube span.

Laser welding sleeving technology has been previously applied at Doel 3 in Belgium in July 1988. Fifty-five sleeves were installed and inspected in a demonstration program. Two tubes with laser welded sleeves were removed after one year of operation and metallographically examined. The results of this inspection verified that both process parameters and inprocess inspection were accurate barometers of the as produced laser weld.

The Farley laser weld system produces a weld equivalent to the system applied at Doel 3. The major differences are that the previous system used a gaseous CO₂ laser while the current system uses a solid state Nd:YAG laser and the CO₂ system was mounted to the steam generator manway and directed by mirrors while the Nd:YAG system is delivered from outside the containment building by fiberoptic cable.

3.0 EVALUATION

The staff evaluation of the amendments proposed by Alabama Power Company and the WCAP-12672 report prepared by Westinghouse is based upon the following considerations. Steam generator tube sleeving is a repair technique that is an alternative to removing defective or degrading tubes from service by plugging. Sleeves are designed to span a defective or degraded region of a steam generator tube and to maintain the steam generator tubing primary-to-secondary pressure boundary under normal and accident conditions. A successful sleeving system must provide a corrosion resistant sleeve material with structural integrity and leak tightness of the sleeved tube. The sleeving process must not have a detrimental effect on the serviceability of the existing tube.

The sleeve configuration has been designed and analyzed in accordance with the rules of the ASME Boiler and Pressure Vessel Code. Fatigue and stress analyses of the sleeved tube assemblies produced acceptable

results. Mechanical testing has shown that the structural strength of the sleeves under normal, faulted and upset conditions is within acceptable limits. Leak rate testing has demonstrated that the leak rates of the joints between the sleeve and the existing tube under normal, faulted and upset conditions are below acceptable rates. The existing Technical Specification's leakage rate requirements and accident analysis assumptions remain unchanged in the event leakage from the sleeve would occur. Any leakage through the sleeved region of the tube due to localized tube degradation is bounded by the existing steam generator tube rupture analysis. The proposed Technical Specification changes to support the installation of laser welded joint sleeves does not adversely impact any other previously evaluated design basis accident or the results of LOCA and non-LOCA accident analyses. The results of the qualification testing, analyses, and plant operating experience demonstrate that the sleeve assembly is an acceptable means of maintaining tubes in service. Furthermore, in accordance with Regulatory Guide 1.83 recommendations, the sleeved tube can be monitored through periodic inspections with present eddy current techniques. Plugging limit criteria are established in the technical specifications for the tube in the region of the sleeve.

The sleeve repair of degraded steam generator tubes, as identified in the sleeving report, has been demonstrated to restore the integrity of the tube bundle under normal and postulated accident conditions. The safety factors used in the design of sleeves for the repair of degraded tubes are the safety factors given in the ASME Boiler and Pressure Vessel Code used in steam generator design. The plugging limit criteria for the sleeve has been established using the methodology contained in Regulatory Guide 1.121, and includes an additional margin (20%) as required by the staff. The design of the sleeve joints has been verified by testing to preclude significant leakage during normal and postulated accident conditions. Use of the ASME Code and Regulatory Guide 1.121 criteria and methods assures that the margin to safety with respect to structural integrity is the same for the sleeves as for the original steam generator tubes.

The staff concurs that the use of Inconel 690 TT sleeves is an improvement over the Inconel 600 material used in the original steam generator tubing. Corrosion tests conducted under the Electric Power Research Institute (EPRI) sponsorship confirm WCAP-12672 test results regarding the improved corrosion resistance of Inconel 690 TT over that of Inconel 600. Accelerated stress corrosion tests in caustic and chloride aqueous solutions have also indicated that Inconel 690 TT resists general corrosion in aggressive environments. Isothermal tests in high purity water have shown that, at normal stress levels, Inconel 690 TT has high resistance to intergranular stress corrosion cracking under extended high temperature exposure. EPRI concluded as a result of these laboratory corrosion tests that Inconel 690 TT material could be used for PWR steam generator tubing with all volatile treatment of secondary water systems.

Inconel 690 is a Code approved material (ASME SB-163), covered by ASME Code Case N-20, and is acceptable to the NRC under Regulatory Guide 1.85 (Rev. 24, July 1986). The NRC staff has approved Westinghouse's use of Inconel 690 TT tubing in replacement steam generators.

In addition to the Doel 3 demonstration program experience, extensive testing of laser welded joints shows that the laser welds meet dimensional and general weld quality requirements. Weld process qualifications verify that the process is capable of reproducing sound welds. Laser welded joints, not within the tube sheet, will be given a post-weld heat treatment (PWHT) that relieves the residual stresses in the tube. Residual stresses in areas adjacent to welds develop due to weld metal shrinkage upon solidification of the weld metal. In mill annealed Alloy 600 tubing that is susceptible to primary water stress corrosion cracking (PWSCC), the post-weld residual stresses could contribute to the induction of PWSCC. Tests of as-welded joints in susceptible mill annealed Alloy 600 tubes indicate that the residual stresses adjacent to the laser weld do not lead to the degree of PWSCC as that experienced by roll transitions. Nevertheless, the process includes a PWHT that provides further enhancement in PWSCC resistance of the tubing.

The non-destructive examination (NDE) of the laser welded sleeves utilizes two techniques. First, a method to confirm that the laser welds meet critical process dimensions and acceptable weld quality. Secondly, tests have shown that the sleeve/tube assembly is capable of being evaluated through subsequent routine in-service inspection. Ultrasonic inspection techniques are used during sleeve installation to confirm weld acceptance and eddy current inspection technology is used to establish baseline inspection and perform subsequent in-service inspections.

Conventional eddy current techniques have been modified to incorporate the most recent technology in the inspection of the sleeve/tube assembly. Inspection of the sleeve/tube assembly involves the use of a cross-wound coil for the straight regions of the sleeve/tube assembly and for the transition regions.

The inspection of sleeves will necessitate the use of an eddy current probe than can pass through the sleeve's internal diameter. For the tube span between sleeves, this will result in a smaller fill factor than is optimum. The possibility for tube degradation in free span lengths is less, as plant data have shown that this area is less susceptible than other locations. In the event that an indication is detected, the licensee has made the commitment that any tube indication in this region that has not been previously identified on the prior sleeved tube baseline inspection, will require further inspection by alternate techniques prior to acceptance of that indication.

4.0 SUMMARY

Based on the preceding analysis, it is concluded that operation of Farley, Units 1 and 2, in accordance with the proposed amendment is acceptable.

The staff further finds that the use of the eddy current equipment and techniques as described in WCAP-12672 or their equivalent to be currently acceptable. However, the licensee has committed to utilize advanced state-of-the-art techniques as they are developed and verified after a 10 CFR 50.59 review.

5.0 ENVIRONMENTAL CONSIDERATION

These amendments change a requirement with respect to installation or use of a facility component located within the restricted areas as defined in 10 CFR Part 20 and change the surveillance requirements.

The staff has determined that these amendments involve no significant increase in the amounts, and no significant change in the types of any effluents that may be released off site, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration, and there has been no public comment on such finding. Accordingly, these amendments meet 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 these amendments.

6.0 CONCLUSION

The Commission made a proposed determination that this amendment involves no significant hazards consideration which was published in the Federal Register (55 FR 38598) on September 19, 1990, and consulted with the State of Alabama. No public comments or requests for hearing were received, and the State of Alabama did not have any comments.

The staff 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 these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: October 22, 1990

Principal Contributor: H. Conrad

AMENDMENT NO. 85 TO FACILITY OPERATING LICENSE NO. NPR-2 - FARLEY, UNIT 1
AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO. NPF-8 - FARLEY, UNIT 2

~~Docket File~~

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