March 22, 1990

Docket No. 50-395

DISTRIBUTION

See attached sheet

Mr. O. S. Bradham
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
P. O. Box 88
Jenkinsville, South Carolina 29065

Dear Mr. Bradham:

SUBJECT: ISSUANCE OF AMENDMENT NO. 91 TO FACILITY OPERATING LICENSE NO. NPF-12 - VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1, REGARDING B&W KINETIC SLEEVING PROCESS FOR STEAM GENERATOR TUBE REPAIR (TAC NO. 74839)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 91 to Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station, Unit No. 1. The amendment consists of changes to the Technical Specifications in response to your application dated September 19, 1989, as supplemented in letters dated December 11, 1989 and January 16, 1990.

Your September 19, 1989 submittal requested a revision to Technical Specification (TS) 3/4.4.5, Steam Generators. This revision would allow the option of using the Babcock & Wilcox (B&W) kinetic sleeving process for steam generator tube repair.

This Amendment approves this TS change. A copy of the related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's Bi-weekly Federal Register notice.

Sincerely,

Original Signed By:

John J. Hayes, Jr., Project Manager
Project Directorate II-1
Division of Reactor Projects I/II

Enclosures:
1. Amendment No. 91 to NPF-12
2. Safety Evaluation

cc w/enclosures
See next page

OFC	:LA:PDII-1	:PM:PDII-1	:D:PDII-1	:	:	:	:
NAME	:PAnderson	:JHayes:sw	:EAdensam	:	:	:	:
DATE	: 2/22/90	: 2/22/90	: 2/23/90	:	:	:	:

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Document Name: SUMMER AMEND

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cc:

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Executive Vice President
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AMENDMENT NO. 91 TO FACILITY OPERATING LICENSE NO. NPF-12 - SUMMER, UNIT 1

Docket File
NRC PDR
Local PDR
PDII-1 Reading
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E. Adensam
P. Anderson
J. Hayes
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D. Hagan (MNBB 3302)
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W. Jones (P-130A)
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H. Conrad
ACRS (10)
GPA/PA
ARM/LFMB

cc: Licensee/Applicant Service List

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

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

DOCKET NO. 50-395

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 91
License No. NPF-12

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by South Carolina Electric & Gas Company (the licensee), dated September 19, 1989, as supplemented December 11, 1989, and January 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 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-12 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 91 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. South Carolina Electric & Gas Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective as of its date of issuance, and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed By:

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 22, 1990

OFC	:LA:PD21:DRPR	:PM:PD21:DRPR	:OGC	:D:PD21:DRPR	:	:	:
NAME	:PAnderson:	:JHayes:sw	:MYoung	:EAdensam	:	:	:
DATE	:3/12/90	:3/22/90	:3/12/90	:3/22/90	:	:	:

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ATTACHMENT TO LICENSE AMENDMENT NO. 91

TO FACILITY OPERATING LICENSE NO. NPF-12

DOCKET NO. 50-395

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Remove Pages	Insert Pages
3/4 4-14	3/4 4-14
3/4 4-14a	3/4/ 4-14a
3/4 4-15	3/4 4-15

4.4.5.4 Acceptance Criteria

a. As used in this Specification:

1. Imperfection means an exception to the dimensions, finish or contour of a tube from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube 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.

3. Degraded Tube means a tube containing imperfections greater than or equal to 20% of the nominal wall thickness caused by degradation.

4. % Degradation means the percentage of the tube 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 containing a defect is defective.

6. Tube Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be repaired (i.e. sleeving) or removed from service by plugging and is 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 provided the tube is not degraded (i.e., no indications of cracking) within the F* distance.

7. Sleeve Plugging or Repair Limit

a. For the area in the upper weld joint, any degradation shall be plugged unless it can be clearly demonstrated by a qualified NDE technique that the degradation is less than 40% of the nominal wall thickness of the sleeve for ID imperfections or less than 40% nominal wall thickness of the tube for O.D. imperfections.

b. For the area of the tube behind the sleeve and above the upper weld joint, tubes with any degradation shall be plugged unless it can be clearly demonstrated by a qualified NDE technique, that the degradation is less than 40% of the nominal wall thickness.

c. For the area below the upper weld joint, any defect greater than 40% of the nominal sleeve wall thickness shall be plugged.

SURVEILLANCE REQUIREMENTS (Continued)

8. Unserviceable describes the condition of a tube 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 4.4.5.3.c, above.

9. 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.

10. Sleeve Inspection means an inspection fo the sleeved portion of the tube. This inspection will include 3 inches of the parent tube directly above the upper weld, the upper weld which forms the new pressure boundary, and the sleeve material below the upper weld.

11. Repaired tube means a tube that has undergone a process that re-establishes its serviceability. One or more of the following will be used when sleeving a steam generator tube:

    The Combustion Engineering Inc. weld sleeve process will be used per report CEN-337-P.

    The Babcock & Wilcox Kinetic sleeve process will be used per report BAW-2045 P.

SURVEILLANCE REQUIREMENTS (Continued)

12. Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed after the field hydrostatic test and prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections.

13. F* Distance is the distance into the tubesheet from the face of the tubesheet or the top of the last hardroll, whichever is lower (further into the tubesheet) that has been conservatively chosen to be 1.6 inches.

14. F* TUBE is the tube with degradation, below the F* distance, equal to or greater than 40%, and not degraded (i.e., no indications of cracking) within the F* distance.

b. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair all tubes exceeding the plugging limit) required by Table 4.4-2.

4.4.5.5 Reports

a. Within 15 days following the completion of each inservice inspection of steam generator tubes, the number of tubes plugged or repaired in each steam generator shall be reported to the Commission in a Special Report pursuant to Specification 6.9.2.

b. The complete results of the steam generator tube inservice inspection shall be submitted to the Commission in a Special Report pursuant to Specification 6.9.2 within 12 months following the completion of the inspection. This Special Report shall include:

1. Number and extent of tubes inspected.

2. Location and percent of wall-thickness penetration for each indication of an imperfection.

3. Identification of tubes plugged or repaired.

c. Results of steam generator tube inspections which fall into Category C-3 and require prompt notification of the Commission shall be reported pursuant to 10 CFR 50.72(b)2(i) prior to resumption of plant operation. A report pursuant to 10 CFR 50.73(a)2(ii) shall be submitted to provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

d. The results of inspections of F* tubes shall be reported to the Commission in a report to the Director, ONRR, prior to the restart of the unit following the inspection. This report shall include:

1. Identification of F* tubes, and
2. Location and size of the degradation

NRC approval of this report is not required prior to restart.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGUALTION

SUPPORTING AMENDMENT NO. 91 TO FACILITY OPERATING LICENSE NO. NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-395

1.0 INTRODUCTION

By letter dated September 19, 1989, South Carolina Electric & Gas Company (SCE&G) requested a revision to the Technical Specifications for the Virgil C. Summer Nuclear Station (VCSNS). The proposed change would revise the surveillance requirements of Technical Specification (TS) 3/4.4.5, Steam Generators, to permit the option of using the Babcock & Wilcox (B&W) kinetic sleeving process for steam generator tube repair. This change will provide SCE&G with an alternative to plugging degraded tubes and will provide them with an additional sleeving source. Clarifying information in support of the amendment request was submitted on December 11, 1989 and on January 16, 1990. The January 16, 1990 submittal did not alter the proposed action or affect the initial determination noticed in the Federal Register on January 10, 1990.

2.0 EVALUATION

Technical Specification 4.4.5.4.a.10, Acceptance Criteria-Repaired Tube, presently allows steam generator tube repair using the Combustion Engineering sleeve process. The requested TS change would: (1) retitle item a.6 under TS 4.4.5.4 to "Tube Plugging or Repair Limit"; (2) would take items a-c presently under a.6 and place them under a new item a.7 entitled, "Sleeve Plugging or Repair Limit"; (3) renumber existing items a.7 through a.11 of TS 4.4.5.4.a as a result of the addition of the new a.7; and (4) modify the existing item a.10 to allow the use of B&W sleeves for steam generator tube repair. The currently permitted Combustion Engineering sleeve process is retained in the TS 4.4.5.4.a.10 as an option.

The change to existing TS 4.4.5.4.a.10 to allow the use of the B&W sleeve references B&W topical report BAW-2045P, "Recirculating Steam Generator Kinetic Sleeve Qualification for 3/4 Inch O.D. Tubes." The topical report was submitted to the NRC by a letter dated June 9, 1988, and a supplement to the original submittal was made on December 12, 1988, which contained answers to the NRC request for additional information. The staff approved the topical report as being suitable for referencing in a letter to James H. Taylor of B&W from James E. Richardson, dated January 4, 1990.

The purpose of a sleeve is to repair a degraded steam generator tube in order to maintain the function and integrity of the tube. The sleeve functions in essentially the same manner as the original tube. B&W topical report BAW-2045P describes, in detail, the analytical methods used for design and qualification of the B&W sleeve. The topical report lists the specifications, mainly ASME Boiler and Pressure Vessel Code requirements, used in design, procurement and qualification of the sleeve. It also summarizes the transients used to establish sleeve loading.

BAW-2045P contains the results of the sleeve design verification which included analysis and confirmatory testing to demonstrate the acceptability of the steam generator sleeving technique for defective tubes. The design and operating conditions specified for the sleeve bound the VCSNS steam generator design conditions. According to the SCE&G, the generic topical report (BAW-2045P) was written utilizing VCSNS specific design data.

The sleeve design described in BAW-2045P is qualified for two lengths, eleven inches and seventeen and one half inches. The lower end of each sleeve is located approximately 16 inches from the primary face of the tubesheet. The shorter sleeve may be utilized in all the steam generator tubes, including the peripheral tubes which typically do not permit the introduction of sleeves due to the close proximity of the bowl in that area. The longer sleeve extends further into the tube past the flow distribution baffle.

The sleeve material is thermally treated Alloy 690 Inconel with a specified minimum wall thickness of 0.039 inches. The required minimum thickness is 0.027 inches based on primary side design pressure. This material has been demonstrated to be much more resistant to corrosion phenomenon as detailed in BAW-2045P. The design and operating conditions of BAW-2045P bound those for VCSNS. The upper sleeve/tube joint is produced by a kinetic weld/expansion which is subsequently stress relieved. The joint is qualified as both a strength and seal weld. The lower joint may consist of either a kinetic weld in the tubesheet or a mechanically sealed joint produced by rolling the sleeve in the tubesheet. The lower joint is qualified for applicable loads without taking credit for the original strength of the tube rolled into the tubesheet. Therefore, the structural integrity of the tube is maintained by the sleeving process.

The adequacy of the sleeve to withstand cyclic loadings was demonstrated using fatigue testing. Fatigue testing consisted of cyclic vibration, pressure, thermal, and axial loading. These tests were performed to demonstrate the structural adequacy of the installed sleeve. In all cases, the results of the tests indicated that the sleeve conformed to the design requirements of the steam generators.

Based on Regulatory Guide 1.121 guidelines for tube degradation limits, a plugging limit of 40% of the original sleeve wall has been established. Eddy current techniques are available to perform necessary sleeve/tube inspections for defect detection and to verify proper installation of the sleeve. SCE&G has stated that available techniques are capable of providing 20% defect sensitivity in the required areas of the tube/sleeve pressure boundary.

A proprietary method is described in the topical report, with supporting validation data, that demonstrates the inspectability of the sleeve and underlying tube. SCE&G has provided a commitment to validate the adequacy of any system that is used for periodic inservice inspections as well as a commitment to upgrade testing methods as better methods are developed and validated for commercial use.

Based on the staff's previous review and approval of BAW-2045(P), as revised to include the changes described in the letter dated December 12, 1988, from J. H. Taylor, B&W, to L. C. Shao, NRC, the staff has concluded that the use of B&W sleeves is acceptable. Accordingly, the change to TS 4.4.5.4.a.10 to allow use of B&W sleeves for repair is acceptable.

The retitling of item a.6 under TS 4.4.5.4, the placement of items a-c, presently under a.6, under a new item a.7 and the renumbering of existing items a.7 through a.11 of TS 4.4.5.4.a as a result of the addition of the new a.7 are editorial in nature. The staff approves these changes also.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The 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 this amendment involves no significant hazards consideration, and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 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 this amendment.

4.0 CONCLUSION

The Commission has issued a "Notice of Consideration of Issuance of Amendment to Facility Operating License and Propose No Significant Hazards Consideration Determination and Opportunity for Hearing" which was published in the FEDERAL REGISTER on January 10, 1990 (55 FR 948) and consulted with the State of South Carolina. No public comments or request for hearing were received, and the State of South Carolina did not have comments.

The staff has concluded, based upon 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 , and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

The additional information provided by the licensee on January 16, 1990 clarified certain matters in response to a question raised by the staff. The correspondence did not change the substance of the amendement request.

Principal Contributors: H. Conrad
J. Hayes

Dated: March 22, 1990