

July 14, 1986

Docket No. 50-395

DISTRIBUTION

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Dear Mr. Nauman:

Subject: Environmental Assessment on Steam Generator Tube Plugging Amendment

Re: Virgil C. Summer Nuclear Station, Unit 1

Enclosed is a copy of an "Environmental Assessment and Finding of No Significant Impact" for your information. This assessment relates to your application for amendment dated January 16, 1986, as supplemented May 8, 1986.

This assessment has been forwarded to the Office of the Federal Register for publication.

Sincerely,

*/s/*

Jon B. Hopkins, Project Manager  
PWR Project Directorate #2  
Division of PWR Licensing-A  
Office of Nuclear Reactor Regulation

Enclosure:  
As stated

cc: See next page

*for*  
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Mr. D. A. Nauman  
South Carolina Electric & Gas Company

Virgil C. Summer Nuclear Station

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UNITED STATES NUCLEAR REGULATORY COMMISSIONSOUTH CAROLINA ELECTRIC & GAS COMPANYSOUTH CAROLINA PUBLIC SERVICE AUTHORITYVIRGIL C. SUMMER NUCLEAR STATION, UNIT 1DOCKET NO. 50-395NOTICE OF ENVIRONMENTAL ASSESSMENT AND FINDINGOF NO SIGNIFICANT IMPACT

The United States Nuclear Regulatory Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. NPF-12, issued to South Carolina Electric & Gas Company and South Carolina Public Service Authority (the licensee), for operation of the Virgil C. Summer Nuclear Station, Unit 1, located in Fairfield County, South Carolina.

ENVIRONMENTAL ASSESSMENTIdentification of Proposed Action:

The amendment would revise Technical Specification 3/4.4.5, "Steam Generators" and its bases. The revision would allow steam generator tube imperfections to be addressed by the Westinghouse P-STAR evaluation method as an alternative to the current requirement for tube plugging. Under the P-STAR evaluation method, if tube imperfections located within the tubesheet are below the distance P-STAR (the top 1.25" of the tubesheet), and the tube with imperfections has an intact tube directly above it (one row higher in number, same column), then the tube need not be plugged. The licensee's application for amendment was dated January 16, 1986. Additional information was provided by letter dated May 8, 1986.

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The Need for the Proposed Action:

During the last refueling outage, pure water stress corrosion cracking (PWSCC) was observed in some steam generator tubes and approximately 170 tubes were plugged as a result.

The licensee has pursued an aggressive program to limit the effects of PWSCC. During the last refueling outage, the Westinghouse rotopeening process was applied in the steam generator hot legs. Because of tooling problems, this process was only applied in the central region of the tube sheet. Current plans are to shotpeen the remaining peripheral region during the next refueling outage, if an acceptable process is available. In the interim, it is expected that some cracking may occur in this unpeened region.

The P-STAR criteria is needed to recover some tubes (approximately 97) previously plugged, and to exempt (from plugging or repair) tubes with new indications below the P-STAR depth without any impact on safety. Application of the P-STAR criteria will also ensure that the steam generator plugging margin will be utilized for only those tubes for which tube repair or plugging is the only acceptable alternative. It will allow the inside diameter of the tube to remain unobstructed, permitting the licensee to utilize optimum inspection and repair processes over the entire length of the tube. Finally, this criteria would allow the licensee additional time for careful development of new repair alternatives and the application of the best technology consistent with safety, cost, and limiting radiation exposure to as low as reasonably achievable.

Environmental Impacts of the Proposed Action:

An evaluation was performed to demonstrate tube integrity under the postulated loss of coolant accident condition of secondary to primary differential pressure. Tube collapse strength characteristics indicate that the constraint provided to the tube by the tubesheet gives a significant

margin between tube collapse strength and the limiting secondary to primary differential pressure condition, even in the presence of circumferential or axial indications.

Primary to secondary leakage in a steam generator during normal plant operation is limited by Technical Specifications. This limit, based on plant radiological release considerations is applicable to a leak source within the tubesheet. In evaluating the primary to secondary leakage aspect of the P-STAR criteria, the relationship between the tubesheet region leak rate at postulated feedline break (FLB) accident conditions is assessed relative to that at normal plant operating conditions. The analysis was performed by assuming the existence of a leak path, however, no actual leak path would be expected due to the hardrolling of the tubes into the tubesheet.

For the postulated leak source within the tubesheet, increasing the tube differential pressure increases the driving head for the leak. It also decreases the length of the leak path annulus, due to the pullout of a postulated separated tube end, and increases the tube to tubesheet loading. Of these effects, only the last two are significant to a leakage source within the tubesheet. For an initial location of a leak source below the top of the tubesheet equal to P-STAR, the FLB pullout effect results in approximately a 10 percent increase in the leak rate relative to that which could be associated with normal plant operation. This small effect is reduced by the increased tube-to-tubesheet loading associated with the increased differential pressure. Thus, for a circumferential indication within the tubesheet region which is left in service in accordance with the P-STAR criteria, the existing Technical Specification primary to secondary leakage criterion is sufficient to maintain conditions consistent with accident analysis assumptions.

For axial indications in the tubesheet region, the tube end remains structurally intact, minimizing any amount of pullout due to the previously identified mechanisms. For this case, the leak rate due to FLB differential pressure would be bounded by the leak rate for a free span leak source with the same crack length, which is the basis for the accident analysis assumptions.

In actuality, the hardrolled joint is expected to be leaktight, i.e., the plant would not be expected to experience leak sources emanating below P-STAR. Since the presence of the tubesheet tube indications is not expected to increase the likelihood that the plant would experience a significant number of leaks, it is expected that if a primary to secondary leak is detected in a steam generator, it would not be in the tube region below P-STAR. Thus, no significant radiation exposure for personnel looking for tubesheet tube leaks is anticipated.

There are currently 97 plugged tubes that could be unplugged and have P-STAR criteria applied. The estimated occupational radiation exposure to unplug the tubes is 7.27 REM, which is less than 1% of the estimated annual occupational radiation exposure contained in the Final Environmental Statement, dated May 1981.

It is estimated that approximately 100 ft<sup>3</sup> of solid radioactive waste would be created from unplugging these 97 tubes, if that was the only steam generator activity being performed. This is less than 2% of the estimated solid radioactive waste shipped annually contained in the Final Environmental Statement. However, it is expected that the licensee would perform tube unplugging in conjunction with other steam generator activities. Therefore, the waste generated solely from this activity would be a portion of the total waste generated and could be less than 100 ft<sup>3</sup> since some of the preparatory actions associated with unplugging, which would generate waste, may be a part of other steam generator activities.

From the above evaluation of accidents, leakage, occupational radiation exposure, and radiological effluents, the Commission concludes that there are no significant radiological environmental impacts associated with granting of the proposed amendment.

With regard to potential non-radiological impacts, the proposed amendment involves systems located entirely within the restricted area as defined in 10 CFR Part 20. It does not affect non-radiological plant effluents and has no other environmental impact. Therefore, the Commission concludes that there are no significant non-radiological environmental impacts associated with the proposed amendment.

Alternatives to the Proposed Action:

Since the Commission has concluded that the environmental effects of the proposed action are not significant, any alternatives with equal or greater environmental impacts need not be evaluated.

The principal alternative would be to deny the requested amendment. This would not reduce the environmental impacts associated with correction of steam generator tube imperfections and would result in reduced reactor coolant system flow, potentially leading to derating of the plant.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the "Final Environmental Statement Related to the Operation of Virgil C. Summer Nuclear Station, Unit 1" (NUREG-0719), dated May 1981.

Agencies and Persons Consulted: The NRC staff reviewed the licensee's request and did not consult other agencies or persons.

FINDING OF NO SIGNIFICANT IMPACT

The Commission has determined not to prepare an environmental impact statement for the proposed amendment. Based upon the foregoing environmental assessment, the NRC staff concludes that the proposed action will not have a significant effect on the quality of the human environment.

For further details with respect to this action, see the request for amendment dated January 16, 1986, as supplemented May 8, 1986, which is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and at the Fairfield County Library, Garden and Washington Streets, Winnsboro, South Carolina 29810.

Dated at Bethesda, Maryland this 14th day of July, 1986.

FOR THE NUCLEAR REGULATORY COMMISSION



Lester S. Rubenstein, Director  
PWR Project Directorate #2  
Division of PWR Licensing-A  
Office of Nuclear Reactor Regulation