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Dan A. Nauman
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May 8, 1986

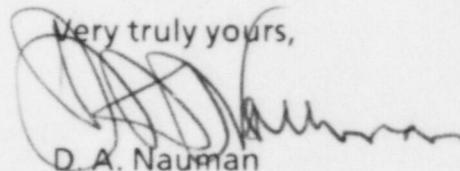
Mr. Jon B. Hopkins
Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Operating License NPF-12
Additional Information Required
for the Environmental Evaluation

Dear Mr. Hopkins:

The attached enclosure is provided in response to the questions generated by your letter to Mr. D.A. Nauman of April 16, 1986. These questions were submitted with regard to performing an environmental evaluation of the steam generator tube repair and tube plugging requests.

Should you have any further questions, please call at your convenience.

Very truly yours,

D. A. Nauman

DBM:DAN:jez

c: V. C. Summer	C. L. Ligon (NSRC)
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1. What is the number of tubes currently plugged that could have their plug removed and tube repair performed?

Based upon the most recent Eddy Current test data, it is estimated that 71 tubes can have their plugs removed, and be returned to service by performing a tube sheet area repair. This consists of 18 tubes in Steam Generator A, 26 tubes in Steam Generator B, and 27 tubes in Steam Generator C. Refer to Table 1 for further detail.

2. What is the number of tubes currently plugged that could have their plugs removed and P-STAR criteria successfully applied?

Of the 276 tubes currently plugged and eligible for repair, 97 tubes can have their plugs removed and P-STAR applied as the only required action to return them to service. This consists of 17 tubes in Steam Generator A, 56 tubes in Steam Generator B, and 24 tubes in Steam Generator C.

In addition, approximately 108 tubes in Steam Generator B were plugged as a precautionary measure. It is anticipated that these tubes will be recovered after the application of a tube repair process (U-Bend heat treatment or alternative). Refer to Table 1 for further detail.

3. What is the estimated radiation exposure per tube associated with:

- a. Tube Plug Removal

In discussion with tube sleeving vendors, and in conjunction with V. C. Summer time motion studies and survey information, if the same decon was achieved it was learned that radiation exposure for steam generator tube plug removal would be about 75 mr/plug.

- b. Tube Repair

From vendors, it was learned that robotic tube repair methods will result in individual exposures of about 175 mr/sleeve prior to the deconning of steam generator bowls. History at Indian Point 3 has indicated that a manual steam generator tube sleeve operation would result in approximately 750 mr/sleeve. Indian Point 3 did a decon of the Steam Generator bowls, and dose rates decreased by a factor of 8. In evaluating Indian Point time motion studies and V. C. Summer survey information, if the same decon results were achieved, it is estimated that dose rates could be reduced to approximately 100 mi/sleeve for manual tube sleeving operations.

- c. Tube Plugging

Actual history indicates that individual exposure due to manual tube plugging will be around 250 mr/plug. In discussion with the tube plugging vendors, it is estimated that robotic tube plugging would result in exposures of approximately 100 mr/plug, depending of the size of the program.

4. What is the estimated amount and content of solid waste that could be created, if all repair eligible tubes currently plugged, have their plugs removed and are repaired?

Actual history indicates that the repair of all eligible tubes would create approximately 300 cubic feet of solid waste consisting of plugs, decon supplies, Herculite, plastic protective clothing, and HEPA filters. This quantity of waste is representative of entering the steam generator solely for the purpose of tube repair. It is anticipated that South Carolina Electric & Gas (SCE&G) will be performing tube repair in conjunction with other planned Steam Generator related activities (i.e., eddy current testing and nozzle dam installation). Therefore, the actual waste generated solely for tube repair will be a portion of the total waste generated.

5. What is the need for tube repair capability and P-STAR criteria compared to the alternative of tube plugging?

In general, the plugging of Steam Generator tubes is undesirable because it reduces RCS flow, increases moisture carry-over in the steam lines, shortens component life, and increases radiation exposure to plant personnel. The application of P-STAR and tube repair processes allows the tubes to remain in service, reducing, if not, negating, the above mentioned effects. In addition, tube repair capability and the application of P-STAR criteria would allow the plant to maintain margin with respect to the limits assumed in the safety analysis.

6. What is the need for P-STAR criteria compared to the alternative of tube repair?

SCE&G has pursued an aggressive program to limit the affects of Pure Water Stress Corrosion Cracking. 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.

SCE&G will apply the P-STAR criteria to recover some tubes previously plugged and, to exempt (from 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 SCE&G to utilize optimum repair processes over the entire length of the tube. Finally, this criteria would allow SCE&G additional time for careful development of new repair alternatives and the application of the best technology consistent with safety, cost and ALARA.

TABLE 1

STEAM GENERATOR TUBE STATUS

Steam Generator	⁽¹⁾ Recoverable Tubes			# of Tubes Not Recoverable by P* or Tube Sheet Area Repair	Total # of Tubes Plugged
	By P* Only	By Tube Sheet Area Repair ⁽²⁾ Only	Tube Recoverable by U-Bend Tube Repair		
A	17	18	0	5	40
B	56	26	108	7	197
C	24	27	0	3	54
TOTAL	97	71	108	15	291

- NOTES:
1. Tubes capable of being returned to service
 2. Anticipated tube repair method is sleeving