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SUBJECT: Provides addl info requested by NRC 950627 ltr re GL 95-03,  
 "Circumferential Cracking of SG Tubes."

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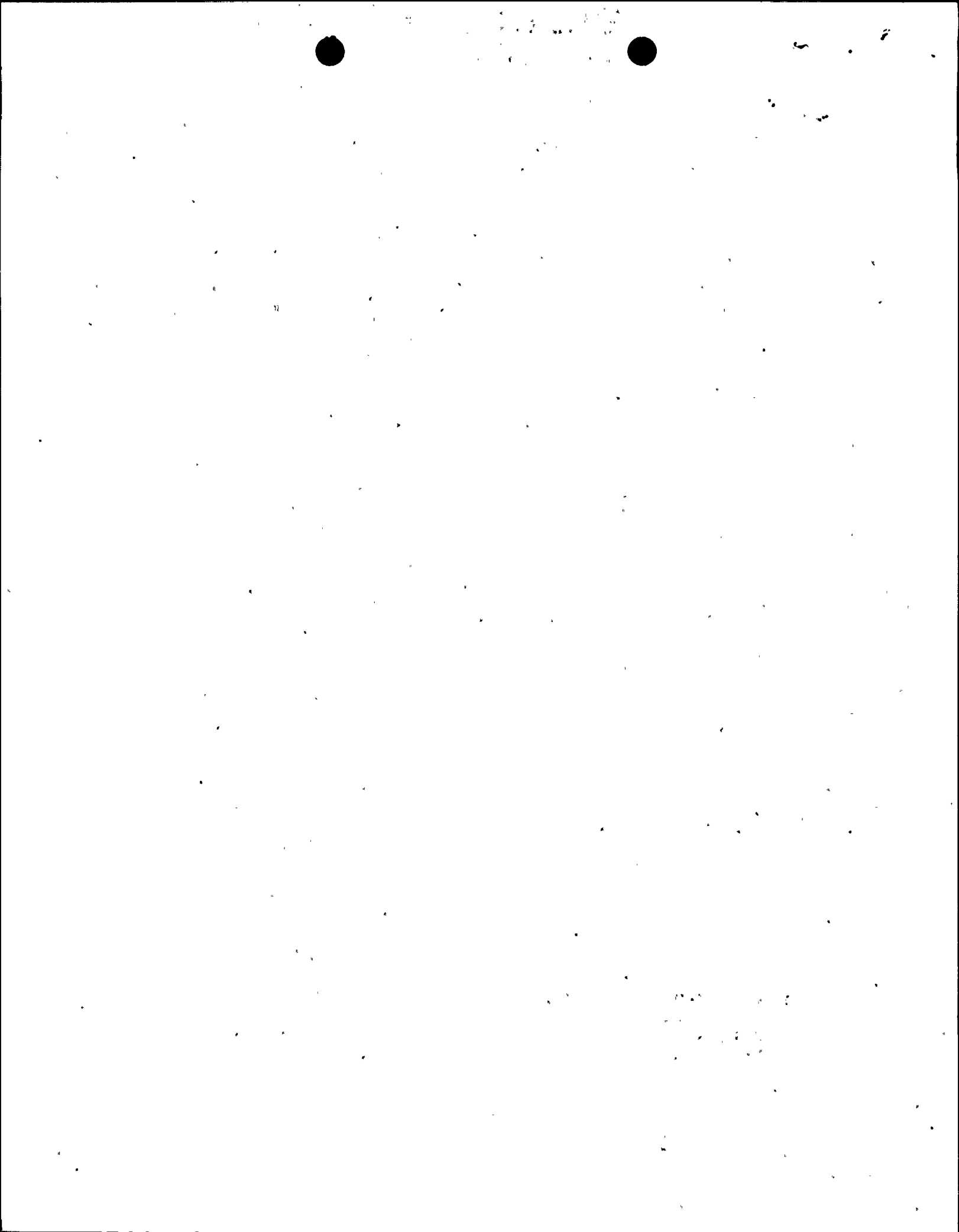
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OCT 11 1995

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United States Nuclear Regulatory Commission  
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SHEARON HARRIS NUCLEAR POWER PLANT  
DOCKET NO. 50-400/LICENSE NO. NPF-63  
GENERIC LETTER 95-03, CIRCUMFERENTIAL CRACKING OF STEAM GENERATOR  
TUBES, REQUEST FOR ADDITIONAL INFORMATION

Gentlemen:

On June 27, 1995, Carolina Power and Light Company (CP&L) provided a response to the U.S. Nuclear Regulatory Commission's (NRC) Generic Letter (GL) 95-03, Circumferential Cracking of Steam Generator Tubes, for the Harris Nuclear Plant (HNP). As a result of the review of the response, the NRC staff identified areas for which additional information or clarification was needed. Two NRC requests for additional information were documented in letters dated September 5, 1995 and September 22, 1995. The enclosure to this letter contains the NRC questions and the CP&L response.

Questions regarding this matter may be referred to Mr. T. D. Walt at (919) 362-2711.

Sincerely,

RWP/rwp

Enclosure

c: Mr. S. D. Ebnetter  
Mr. S. A. Elrod  
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GENERIC LETTER 95-03,  
CIRCUMFERENTIAL CRACKING OF STEAM GENERATOR TUBES,  
ADDITIONAL INFORMATION

NRC Request for Additional Information dated September 5, 1995

NRC Question No. 1: In your response, you indicated that sample expansion will be based on the Electric Power Research Institute PWR Steam Generator Examination Guidelines or the technical specifications, whichever is more conservative. Please clarify the expansion criteria for all locations susceptible to circumferential cracking.

CP&L Response:

CP&L's June 27, 1995 response to the Generic Letter stated that the inspection scope for Refueling Outage No. 6 (RFO 6) would include three inspections programs for locations susceptible to circumferential cracking. They were:

- 20% hot leg TTS inspection in each steam generator, and
- 20% row 1 and 2 U-Bend inspection in each steam generator, and
- 20% dented tube support plate (>5 volt) inspection in each steam generator.

The expansion criteria for these inspection programs for RFO 6 are described below. Note that the planned inspections, as discussed in the June 27, 1995 response to the Generic Letter, were for RFO 6, which commenced September 2, 1995. The subject steam generator tube inspections have already been completed; therefore the actual results are reported below as well.

**Hot Leg Top-of-Tubesheet RPC Program**

If circumferential cracking had been detected in the 20% base RPC inspection scope, then 100% of the non-plugged tubes would have been inspected in the three steam generators.

The actual planned inspection program included 100% of the non-plugged hot leg tubes in the top-of-tubesheet region of the three steam generators. Two circumferential cracks were detected: one in steam generator "A" and one in steam generator "C". Because the initial inspection scope already covered 100% of the non-plugged hot leg tubes in the top-of-tubesheet region, the expansion criteria became not applicable.

**Low Row U-bend Inspection Program**

If circumferential cracking had been detected in one or more of each steam generator's 20% base RPC inspection scope of the low row U-bend tubes, then 100% of the non-plugged row 1 and 2 U-bends would have been inspected in the three steam generators. No circumferential cracking was detected in the base 20% inspection scope.

## Dented Tube Inspection Program

Tubes selected for the 20% dented tubes at tube support plate examination focused primarily on the hot leg dents. If circumferential cracking had been detected, then for the affected steam generator, 100% of the remaining hot leg dents (in non-plugged tubes) and 20% of the cold leg dents (in non-plugged tubes) would have been inspected. No circumferential cracking was detected in the base inspection scope.

NRC Question No.2: It was indicated that dents greater than 5.0 volts will be inspected with a probe qualified for circumferential crack detection. Please provide the procedures used for sizing the dents. If a dent voltage threshold is used (e.g., 5.0 volts) for determining the size of the dents, provide the calibration procedure used. If the procedure is identical to the procedure for the voltage-based repair criteria, a detailed description is not necessary.

### CP&L Response:

In accordance with the CP&L Shearon Harris Analyst Guidelines, dent indications are recorded when they exceed 5.0 volts. They are recorded with the primary differential frequency (550 KHz) if in mid-span, and with the primary differential mix channel (550/100 KHz) if located at a structure. The calibration procedure for establishing the voltage reference is to set the 550 KHz differential channel to 4.00 volts utilizing the ASME 20% flat bottom holes in the calibration standard. This setting is saved and stored to the other channels.

NRC Question No.3: Several plants with preheater model steam generators expanded tubes into the tube support plate in the preheater region to minimize the potential for vibration-induced wear. Since these expansions contain similarities to other expanded regions which have experienced circumferential cracking, please discuss whether or not this area is susceptible to circumferential cracking. If this area is susceptible to circumferential cracking, please submit the information requested in Generic Letter (GL) 95-03 per the guidance contained in the GL.

### CP&L Response:

The subject tubes are in the cold leg side of the steam generators and as such do not have the thermal conditions that are normally associated with susceptibility to circumferential cracking. Although CP&L believes that this area has minimal susceptibility, an inspection was performed of 20% of the tubes which have been expanded into the preheater (at both expansion zones) in one steam generator. No circumferential cracks were detected. If a circumferential crack had been detected during this inspection, then the inspection scope would have been increased to 100% of the non-plugged expanded preheater tubes in the three steam generators.



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NRC Request for Additional Information dated September 22, 1995NRC Question:

During the Maine Yankee outage in July/August 1994, several weaknesses were identified in their eddy current program as detailed in NRC Information Notice 94-88, "Inservice Inspection Deficiencies Result in Severely Degraded Steam Generator Tubes". In Information Notice 94-88, the staff observed that several circumferential indications could be traced back to earlier inspections when the data was reanalyzed using terrain plots. These terrain plots had not been generated as part of the original field analysis for these tubes. For the rotating pancake coil (RPC) examinations performed at your plant at locations susceptible to circumferential cracking during the previous inspection (i.e., previous inspection per your Generic Letter 95-03 response), discuss the extent to which terrain plots were used to analyze the eddy current data. If terrain plots were not routinely used at locations susceptible to circumferential cracking, discuss whether or not the RPC eddy current data has been reanalyzed using terrain mapping of the data. If terrain plots were not routinely used during the outage and your data has not been reanalyzed with terrain mapping of the data, discuss your basis for not reanalyzing your previous RPC data in light of the findings at Maine Yankee. Discuss whether terrain plots will be used to analyze the RPC eddy current data at locations susceptible to circumferential cracking during your next steam generator tube inspection (i.e., the next inspection per your Generic Letter 95-03 response).

CP&L Response:

Terrain plots were used extensively to review Motorized Rotating Pancake Coil (MRPC) data during primary, secondary, and resolution analysis functions of the RFO 6 inspection. In addition, MRPC was used as necessary to disposition indications in the 20% full length bobbin coil testing in each steam generator. As previously discussed, the RFO 6 inspection detected one top-of-tubesheet circumferential crack in steam generator "A" and one in "C". Both affected tubes were plugged and stabilized.

During RFO 5 MRPC testing was performed at top-of-tubesheet intersections and at other locations to address suspect indications. C-Scan plots (terrain plots) were used to assist in evaluating potential degradation.

Given the broad scope of the RFO 6 inspection, HNP has essentially re-baselined those areas within the steam generators susceptible to circumferential cracking. Therefore, CP&L believes it is unnecessary to reexamine additional RFOs eddy current program test results.