

Summary of Telecon: C. Eicheldinger to V. Stello, Jr.

Date: May 10, 1976

We have been discussing with you our program for tube denting investigations and the status of these efforts to date. You are currently reviewing the report on tube denting that we transmitted to you in December, 1975. You will recall that one of our actions in this program was to remove a section of the tube support plate and associated tubes from an operating steam generator in which denting has been observed. Last week we were able to remove a section from a steam generator at the Turkey Point Unit 4 plant of FP&L. The section was sent to the Westinghouse R&D Laboratory for evaluation and we are beginning to receive the first preliminary results.

In addition, a similar section of support plate is being removed from VEPCO's Surry Unit 2. The removal operation is still underway. In the process, visual observations of the uppermost tube support plate have been made and reported to us.

As a result of the Turkey Point and Surry observations, we have identified the presence of some cracking of the tube support plates. Several observations of cracking of the ligament between a tube hole and an interstitial flow hole were made from both plants. Also at Surry, radial growth of the tube support plate has resulted in closing the original 3/8" gap between the edge of the plate and the wrapper. The wrapper is a cylindrical member which encloses the tube bundle and forms the inner boundary of the downcomer flow region.

The configuration of the tube support plate/tube bundle and the corrosion mechanism leading to denting result in the development of compression forces on the tubes and the plate itself. These forces tend to lock the tubes and plate firmly together even in the presence of ligament cracking. These compressive forces were observed during tube pulling and support plate segment removal

operations when very large forces were required to remove the specimens. The presence of these radial compressive forces preserves the geometry of the plate even if cracked.

Our initial assessment of the condition of these steam generators has not identified an adverse impact on public health and safety. Nevertheless, we have undertaken a series of actions to ensure complete understanding of the conditions which have been observed and also the consequences of postulated extrapolation of these conditions. Actions currently underway include:

- a) Completion of the support plate segment removal operation at Surry.
- b) Additional visual observations at both Surry 2 and possibly Turkey Point 4.
- c) Complete evaluation of the specimens removed from the steam generators and identification of the mechanisms involved.
- d) A finite element stress analysis of the tube support plate, including the presence of cracks, to assess stress levels and structural integrity.
- e) Analysis of a postulated steam break accident in combination with the potential of loose metal segments in the generator. Possible adverse effects on tube integrity will be assessed. In addition to analytical treatment, an experimental investigation is also planned.
- f) Post-LOCA and post-steam break tube integrity under blowdown loads will be reassessed with an assumed degraded condition of the tube support plates.
- g) Possible abrasion effects of local support plate fractures on tube integrity will be investigated for steam break blowdown. Experimental verification is planned.

Our evaluation indicates that only the Surry and Turkey Point Plants have experienced significant tube support plate cracking and associated tube denting. No denting has been observed on plants which have always operated on AVT chemistry or which operated for a very short time on phosphate chemistry and then switched

to AVT. A number of other plants operated for a more extended period of time on phosphate before the switch to AVT. However, with the exception of Surry and Turkey Point, only minor indications of tube diameter reduction and no indications of leakage due to denting have been observed. Consequently, we conclude that our investigation of tube support plate cracking should be focused on the Surry and Turkey Point plants.

We intend to remain in close communication with you during the course of our investigation and to keep you fully advised of all relevant information. We do not anticipate the need for any further actions at this time.