

SUMMARY OF INFORMATION AND CONCLUSIONS  
W/NRC MEETING - MAY 12, 1976

The meeting began with brief introductions by Mr. D. G. Eisenhut of the NRC and Mr. C. Eicheldinger of Westinghouse. This was followed by a description of the agenda for the meeting by Mr. T. M. Anderson of Westinghouse. Mr. Anderson then went on to state the purpose of the meeting and to summarize background information on the subject of steam generator tube denting which was provided to the NRC Staff in November and December, 1975. (See Westinghouse letter NS-CE-871 dated December 18, 1975).

Mr. W. D. Fletcher of Westinghouse then proceeded to provide an update on the progress of Westinghouse diagnostic programs related to the steam generator tube denting phenomenon. This presentation included a summary of eddy current and visual inspection results obtained prior to and since December 1975, an assessment of the progression of the denting phenomenon at affected operating plants, characterization of tube leakage occurrences related to the phenomenon, and an assessment of tubing integrity in the affected units. The information presented by Mr. Fletcher demonstrated that:

1. The denting phenomenon has been detected only in steam generators which have operated for a significant period of time on phosphate chemistry;
2. Reported "hourglassing" of tube support plates and tube leakage associated with denting has occurred only at Turkey Point and Surry plants;
3. Associated tube leakage can be characterized as low level, detectable, and increasing only slowly allowing adequate time for planned shutdown and maintenance;
4. No denting, "hourglassing" of tube support plates, or tube leakage has occurred in steam generators which have operated only on AVT chemistry or which utilized phosphate control for a limited time period;
5. The conclusions presented in November/December 1975 and summarized at the beginning of the meeting by Mr. T. M. Anderson were still valid.

Following Mr. Fletcher's presentation, Mr. A. A. Massaro of Westinghouse outlined the procedure utilized at Turkey Point Unit No. 4 and Surry Unit No. 2 to remove a sample of the top tube support plate with dented tube samples intact. Mr. Massaro then described the visual observations of tube support plate cracks at Surry Unit No. 2 and showed photographs taken on May 9, 1976 in a Surry steam generator. These photographs showed the "wedge" area and "patch plate" area of the top tube support plate.

Mr. R. T. Begley of Westinghouse R&D Laboratories then discussed preliminary findings related to the initial evaluations of the support plate segment which was removed from Turkey Point Unit No. 4 including results of mechanical property tests on the support plate material and deposit characterization.

Following Mr. Begley's remarks, Dr. L. Conway of Westinghouse presented an assessment of the present condition of the Turkey Point Unit No. 4 and Surry Unit No. 2 steam generator tube support plates and a brief description of the postulated mechanism causing the denting phenomenon and support plate abnormalities. Dr. Conway then proceeded to discuss the safety assessment for normal operating and accident conditions. This assessment can be summarized as follows:

1. The configuration of the tube support plate/tube bundle and the corrosion mechanism leading to denting result in the development of compressive forces on the tubes and the plate itself. These forces tend to lock the tubes and plate firmly together even in the presence of tube support plate ligament cracking. These compressive forces and corrosion products 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.
2. The tube support plates are present primarily for purposes of fabrication and to prevent flow induced vibration of tubes in critical locations during normal operation. Preliminary evaluation of the present condition of the support plates at Turkey Point Unit No. 4 and Surry Unit No. 2 indicates continued ability to carry out these functions.

3. Although not expected to occur, loose pieces of support plate material should not cause catastrophic tube failure even under worst case accident conditions. Results of recent tests in which segments of support plate material were impacted on unpressurized tube samples at conservatively high velocities up to 100 ft/sec were presented as evidence.
4. Although further investigations are continuing, the present assessment is that continued operation of affected steam generators has no adverse impact on public health and safety.

Following a discussion period, NRC Staff members held a caucus and returned with the following conclusions presented by Mr. D. G. Eisenhut:

1. The NRC was in essential agreement with the postulated mechanism presented by Westinghouse based on the data available.
2. The NRC, based upon the information presented, did not consider this to be a safety hazard affecting the public health and safety and therefore that operation of affected plants could continue and startup of Turkey Point Unit No. 4 and Surry Unit No. 2 should not be delayed.
3. Westinghouse was requested to submit copies of transparencies used during the meeting as soon as possible along with a schedule of planned future actions.

ATTACHMENT NO. 3

NS-CE-1081

AGENDA

W/NRC MEETING - 5/12/76

- I. Introduction
  - A. Summary
  - B. Update Progress of Diagnostic Programs
- II. Tube/TSP Sample Removal
  - A. Removal Procedure
  - B. FLA/VIR Visual Findings
  - C. FLA/VIR Lab Exams
- III. Assessment of Present Conditions of S.G. at VIR & FLA
  - A. Tubing
  - B. Support Plates
- IV. Safety Assessment
  - A. Normal Operation
  - B. Accident Conditions
- V. Summary
  - A. Action Plan/Schedule