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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

ATTENTION; Mr. Emmett L. Murphy, Materials Engineering Branch
Division of Engineering and Systems Technology

SUBJECT: Steam Generator Tube Support Plate Corrosion

Dear Mr. Murphy:

Enclosed as an attachment to this correspondence is a set of figures which are illustrative of eddy current data corresponding to various stages in the denting corrosion process. The subject attachment is provided in response to your request for information concerning steam generator tube support plate denting and the effect on eddy current signal interpretation.

Evaluations of AVB positions and tube support plate (TSP) elevation tube conditions focus interest on eddy current data corresponding to various stages in the denting corrosion process. Referring to the attachment and beginning with the normal TSP signal, represented in Figure 1, changes resulting from carbon steel corrosion can be detected. For example, Figure 2 shows the signals from a TSP simulation in which a 20 mil deep 1/4" wide 360 degree circumferential groove has been machined in the center; this closely mimics the type of signals which have preceded development of dents in operating plants.

In cases where a TSP intersection has undergone linear carbon steel corrosion, a high density annular accumulation of magnetite (Fe_3O_4) causes an interference or distortion in the signal at the TSP position. This is illustrated in Figure 3, which displays the same simulation from Figure 2 but with the groove now filled with magnetite powder laid in as a wet slurry. These "spike"-like signals represent the Fe_3O_4 influence and provide insight to analysts seeking to characterize a TSP intersection.

When the corrosion proceeds to the point of tube deformation, a diameter change signal is obtained. Even a small local change like 0.001" in the diameter produces a large signal of approximately 20 volts, at normal analysis settings; this results in a horizontally dominant signal which obscures the TSP signal as well as the perturbations produced by carbon steel corrosion and Fe_3O_4. A typical field-generated dent signal is presented as Figure 4.

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This material is for your internal use only and may be used for the purpose for which it is submitted. It should not be otherwise used, disclosed, duplicated, or disseminated, in whole or in part, to any other person or organization outside the Office of Nuclear Reactor Regulation without the express written approval of Westinghouse. Correspondence with respect to the Application for Withholding should reference AW-88-013, and should be addressed to R. A. Wiesemann, Manager of Regulatory and Legislative Affairs, Westinghouse Electric Corporation, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Should additional information be required or should you have any questions or comments on the information provided, please contact Carl W. Hirst (412-374-4311) of my staff.

Very truly yours,

W. J. Johnson, Mgr.
Nuclear Safety Department

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