

April 18, 1989

Mr. Emmett L. Murphy
Office of Reactor Regulation
Materials Engineering Branch
U.S. Nuclear Regulatory Commission
MS WFN-9H15
Washington, DC 20555

Dear Mr. Murphy,

On April 13, I met with representatives of the NRC, Consumers Power Co. (the utility company that operates Palisades) and one of the utilities consultants. An attendance list is attached. The meeting took place at the company headquarters in Jackson, Michigan. The utility wanted a review of their eddy-current qualification program at this time to see if they were going in the right direction. The discussions centered on the use of the Zetec MIZ-18 with the "New Mix" that Zetec is using and the fabrication of the IGA standards. Palisades has had a rash of tube leaks lately, and a number of unscheduled outages. They have been operating between 60 and 80% of full power the past several weeks to keep their leak rate from growing.

The "New Mix" or "Turbo-Mix" was introduced by Zetec in 1988 and I reviewed it at the Steam Generator Workshop last June. I found out from Lloyd Lamb of Zetec that they had applied some least squares techniques to reduce the noise on the signal, and produce better Lissajous figures. These techniques are similar to the ones that we use to compute the defect size directly. They generate the Lissajous figure, measure its phase angle and calculate the defect depth from the phase. The reduction in noise was dramatic in the cases that Lloyd demonstrated at the workshop and in the cases that Blaine Curtis showed in Jackson. Lloyd said that now they were having a hard time convincing people that their results are real, the same way that he wasn't convinced of our results when he first saw them. The suppression of dents up to 15 mils radial was quite good, with dent signals that were of the order of 200 V being reduced to a residual of 1 V or less. The ASME standard defects showed up fairly well, except that the dent suppression calculations interfered with deeper defects. This is to be expected since the deeper defects produce magnitudes and phases close to the signal that is being suppressed. A set of higher operating frequencies would probably give better results, but then the smaller defects would be diminished. The present mix uses four frequencies ranging from 10 to 600 kHz. The smaller ASME standard defects were clearly visible and their depth measurable.

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Blaine was experimenting with the weighting of the different parts of the different readings to determine the combination that gave the best suppression of the dent with the least distortion of the ASME standard defects. The ones he was currently using weighted the 100% defect and the 20% defect (the end points of the defect curve) heavier than the intermediate points. He would also include the readings for the tube support and the different size dents, up to the maximum value. In general, he would weight the maximum dent value greater than the lesser dent readings. He would then do the least squares fit and determine the coefficients for that maximum dent range. In reading an unknown dent, he would first determine the dent size and then go to the corresponding set of coefficients to size any defects that may be present. This technique does not use a complete matrix of the defect, dent and tube support values that may be present. As we have seen in earlier tests while it is desirable to have the complete matrix of property combinations present, it is not essential, or in many cases, possible.

A separate calibration curve was needed with the "New Mix", and this calibration curve had to be established for each probe. The variability between probes may be due to the frequency response of the probe, the coil outer diameters, of the way the wire "lays" in each of the differential coils. It would be desirable if some type of QA could eliminate the need to calibrate each coil separately, since this requires a higher level of skill than is needed for the present data evaluation. However, this could be automated with the right computer programs and set of standards. This technique, if carefully applied, should increase the sensitivity of all inspections that have large dents or other parameters that must be suppressed. It can be applied to the rotating pancake and the 8X1 probes as well as the bobbin probes.

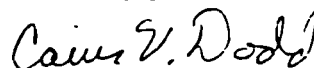
The utility is manufacturing a large number of standards that include wastage, circumferential cracks, and IGA. They have done a rather extensive program to qualify their IGA standard set. They used sulfuric acid on sensitized inconel tubes to create circumferential bands of IGA, about 0.200 in. long. This type of IGA, which has been prevalent at Palisades, has a conductivity ratio of about 10 to 1. The type of IGA produced at Ginna and Point Beach has a conductivity ratio of about 1.5 to 1, and is much harder to detect. The utility has done a good job of producing these standards and verifying their identity throughout the metallography. The IGA is created at five different locations along the tube and then eddy current tests are performed at each location. Metallography is then performed at each of the end locations, with the IGA being sectioned every 0.050 in. Some of the defects had stringers and fingers of IGA that have been observed at a number of plants. These fingers tend to have an axial length comparable that of the band of IGA. The utility has invited me to bring my equipment to their NDE lab in Jackson to measure the conductivity of their IGA and to map some of their defects. This could be quite beneficial to our research programs and should be pursued.

One important part of the upgrade of their capabilities is the use of the 8X1 pancake coil array probe. They are still planing to include this in their MIZ-18 inspection, but they had nothing to report on the qualification of this probe now.

The original plans were for this new inspection program to be ready at the next outage. However, it is still undetermined as to when this will occur. The current plans are to shut down May 13 to plug their leakers, and their new qualification program will not be completed until July 31. They have now decided to replace their generators as soon as they can, and may operate at a reduced power level in order to stretch their refueling outage until September 1990. They will then replace the generators at this major outage.

Another concern is the Westinghouse plug failure that occurred at North Anna. Since they have a large number of similar plugs in their generators, they would like to have some fix available for their plugs at their next outage. Therefore, they may try to postpone their May 13 outage until September 1989, after the peak summer load. This is a long time to operate a leaky generator. If there is a postponement of their outage past July 31, then the new MIZ-18 inspection will be used rather than the older MIZ-12 technology.

Sincerely yours,



Caius V. Dodd

Nondestructive Testing Group
Metals and Ceramics Division

Attachment

cc/att: A. M. Gill, NRC-NRR
D. J. McGuire
J. G. Pruett
G. M. Slaughter
C. V. Dodd/file

ATTENDANCE LIST FOR MEETING ON 4/13/89

NAME	AFFILIATION
Bob VanWagner	Consumers Power Co, Palisades
Jack M. Decker	Consumers Power Co, NDT Lab, Jackson
Lori Leitch	Consumers Power Co, Metallurgy
Bill Pavlichko	Consumers Power Co, Metallurgy
Ralph R. Frisch	Consumers Power Co, NDT Lab, Jackson
Kelly V. Cedarquist	Consumers Power Co, ISI, Palisades
Steve Webb	Consumers Power Co, NDT Services
Blaine L. Curtis	ANA - Consultant
Al DeAgazio	USNRC
Emmett Murphy	USNRC
Caius Dodd	ORNL