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 50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287

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 RECIP. NAME RECIPIENT AFFILIATION
 DENTON, H. R. Office of Nuclear Reactor Regulation, Director (post 851125
 STOLZ, J. F. PWR Project Directorate. 6

SUBJECT: Documents addl info discussed during 860807 telcon re
 860116, 0418 & 0627 submittals concerning proposed Tech Spec
 amend to allow use of sleeving method for repair of
 defective steam generator tubes.

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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

September 15, 1986

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. John F. Stolz, Project Director
PWR Project Directorate No. 6

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

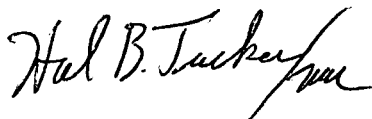
Dear Sir:

By letter dated January 16, 1986, Duke Power Company (Duke) submitted a proposed technical specification amendment for Oconee Nuclear Station to allow the use of sleeving method for repair of the defective steam generator tubes. Supplemental information was provided by letters dated April 18 and June 27, 1986.

The purpose of this letter is to document additional information discussed during a conference call between your staff and Duke on August 7, 1986. The NRC staff indicated the adequacy of the information for completion of their review and approval of the subject amendment request. Attachments 1, 2, 3 and 4 provide Duke's response to the NRC questions discussed during the conference call.

Please note that Duke is planning steam generator tube sleeving during the upcoming Oconee Unit 3 refueling outage in January, 1987. The NRC review and approval of the proposed technical specification amendment is requested by December 31, 1986 to allow sleeving as scheduled for January, 1987.

Very truly yours,



Hal B. Tucker

MAH/06/slb

Attachment

8609250150	860915
PDR	ADOCK 05000269
P	PDR

PA01

Mr. Harold R. Denton, Director
September 15, 1986
Page Two

xc: Dr. J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
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South Carolina Department of Health &
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Columbia, South Carolina 29201

Mrs. Helen Pastis
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. J. C. Bryant
NRC Resident Inspector
Oconee Nuclear Station

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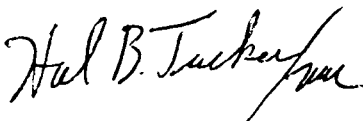
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PA01
11

Mr. Harold R. Denton, Director
September 15, 1986
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NRC Resident Inspector
Oconee Nuclear Station

Attachment 1

Duke Power Company
Oconee Nuclear Station
Documentation of Duke's Response to the
NRC Questions During an August 7, 1986
Conference Call
Steam Generator Tube Sleeving Program

Question 1:

Does the Oconee Design Basis LOCA analysis remain applicable if 5,000 tubes in each OTSG are sleeved?

Response 1:

The influence of the steam generators on LOCA analysis has previously been evaluated for extensive tube plugging which reduced primary flow by 2.5 percent while sleeving 5,000 tubes per OTSG reduces primary flow by less than 1.0 percent. LOCA sensitivity studies have shown that it takes flow reductions on the order of 10 percent to degrade LOCA blowdown performance. Thus it may be concluded that reductions of 1.0 to 2.5 percent have negligible impact.

(a) Large Break LOCA

The large break loss of coolant accident (LOCA) analysis does not rely on steam generator (SG) heat transfer to mitigate the accident. The effect of a slight degradation of SG heat transfer on the licensing basis analysis would be insignificant.

(b) Small Break LOCA

SG heat transfer is important for small break LOCA events with break sizes between 0.005 ft² and 0.01 ft². The potential effect of slightly degraded SG heat transfer due to sleeving is overwhelmed by the conservative emergency feedwater (EFW) flow assumption in the design basis small break LOCA analysis. The analysis assumes that 471 gpm would be available at 1050 psig, while at Oconee there should be at least 1000 gpm available at that pressure. The additional tube wetting and heat transfer due to the additional EFW flow would overwhelm any potential effect from slightly degraded heat transfer. Furthermore, the worst case peak cladding temperature for SBLOCA at Oconee is 1092 F for a 0.07 ft² break, so a large margin exists to the 10 CFR 50 Appendix K acceptance criterion of 2200 F.

Question 2:

Elaborate on the discussion of overheating events in the safety analysis.

Response 2:

There are two types of overheating events, primary system initiated and secondary system initiated. For the primary system initiated events, the safety analysis calculations conservatively assumed no ICS operation to match the steam generator heat removal by increasing feedwater flow. Thus, the assumption was that the initial heat transfer rate was held constant throughout the event. The tube

sleeves do not impact this assumption. For overheating events caused by secondary system changes, such as loss of main feedwater, the dominant factor is the change in nucleate boiling region of the tube bundle. The tube sleeves are located in the upper region of the steam generators where the heat transfer to superheated steam accounts for only a small portion of the total heat transfer. Thus, the tube sleeving does not impact the safety analysis calculations since the effects for the sleeves do not dominate the heat transfer relationship in the steam generator.

Question 3:

Submit additional information regarding examination of the OTSG sleeve with a crosswound eddy current probe.

Response 3:

B&W proprietary report 1157719A-0, "Evaluation of the Crosswound Eddy Current Probe for OTSG Sleeve Examinations", is attached (Attachment 2).

Question 4:

Provide eddy current calibration traces which show the capability to detect actual defects in the OTSG tube with a .410" bobbin coil probe.

Response 4:

For sleeved OTSG tubing, the use of the .410" bobbin coil probe for examining the unsleeved portion of tube has been shown to be acceptable. The .410" bobbin coil is capable of detecting all the flaws in an ASME calibration standard. Attached (Attachment 3) are oscillograms of the worst, intermediate, and best detection capabilities for the 100%, 40%, and 20% through-wall holes. These limits were established by rotating the calibration standard to obtain the minimum to maximum responses of the probe to the flaws. Figures 1 through 3 show the minimum responses that could be obtained by the probe, Figures 4 through 6 represent an average response, and Figures 7 through 9 represent the maximum probe response. The phase angles and amplitudes of these responses are plotted in calibration curves in Figure 10. Once detected, the flaws can be further characterized if required by specialized eddy current techniques, such as inserting a larger coil from the unsleeved end of the tube.

Question 5:

Provide a copy of Reference 14 listed in BAW-1823P, Rev. 1.

Response 5:

The G. J. Theus report, "Stress Corrosion Cracking Tests of Alloy 600", which was Item 15 in EPRI WS-80-136 workshop proceedings is attached (Attachment 4).

Question 6:

Discuss the use of polythionic acid corrosion testing, and why it was not used in the sleeve qualification.

Response 6:

An accelerated corrosion test of Inconel 600 could be performed in a polythionic acid solution, which is usually prepared by the dissolution of sodium tetrathionate. The material must first be sensitized and then immersed in, for example, a 0.1 molar solution at 40 degrees C for 24 hours. This test is simple and rapid, but it is sensitive to both residual stresses and the material sensitization, so that it is of value primarily as a comparative screening test rather than as a quantitative evaluation.

The caustic corrosion test was selected to evaluate mechanical sleeves because the failure mechanism is the same as in hot AVT water but the time for crack initiation is far quicker. It is considered to be more representative of normal sleeve service than the polythionic acid media.

Question 7:

Address why IGA corrosion tests are not referenced for the application of mechanical sleeving at Oconee.

Response 7:

These tests are not applicable to the Oconee OTSG's because the Oconee OTSG's have not been affected by a general level of IGA.

Attachment 2

Duke Power Company
Oconee Nuclear Station

B&W Proprietary Report 1157719A-0
Evaluation of the Crosswound Eddy Current Probe
For OTSG Sleeve Examination

Babcock & Wilcox

AFFIDAVIT OF JAMES H. TAYLOR

- A. My name is James H. Taylor. I am Manager of Licensing Services in the Nuclear Power Division of Babcock & Wilcox, and as such I am authorized to execute this Affidavit.
- B. I am familiar with the criteria applied by Babcock & Wilcox to determine whether certain information of Babcock & Wilcox is proprietary and I am familiar with the procedures established within Babcock & Wilcox, particularly the Nuclear Power Division, to ensure the proper application of these criteria.
- C. In determining whether a Babcock & Wilcox document is to be classified as proprietary information, an initial determination is made by the Unit Manager, who is responsible for originating the document, as to whether it falls within the criteria set forth in Paragraph D hereof. If the information falls within any one of these criteria, it is classified as proprietary by the originating Unit Manager. This initial determination is reviewed by the cognizant Section Manager. If the document is designated as proprietary, it is reviewed again by Licensing personnel and other management within Nuclear Power Division as designated by the Manager of Licensing Services to assure that the regulatory requirements of 10 CFR Section 2.790 are met.
- D. The following information is provided to demonstrate that the provisions of 10 CFR Section 2.790 of the Commission's regulations have been considered:
- (i) The information has been held in confidence by the Babcock & Wilcox Company. Copies of the document are clearly identified as proprietary. In addition, whenever Babcock & Wilcox transmits the information to a

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AFFIDAVIT OF JAMES H. TAYLOR (Cont'd.)

customer, customer's agent, potential customer or regulatory agency, the transmittal requests the recipient to hold the information as proprietary. Also, in order to strictly limit any potential or actual customer's use of proprietary information, the following provision is included in all proposals submitted by Babcock & Wilcox, and an applicable version of the proprietary provision is included in all of Babcock & Wilcox's contracts:

"Purchaser may retain Company's proposal for use in connection with any contract resulting therefrom, and, for that purpose, make such copies thereof as may be necessary. Any proprietary information concerning Company's or its Supplier's products or manufacturing processes which is so designated by Company or its Suppliers and disclosed to Purchaser incident to the performance of such contract shall remain the property of Company or its Suppliers and is disclosed in confidence, and Purchaser shall not publish or otherwise disclose it to others without the written approval of Company, and no rights, implied or otherwise, are granted to produce or have produced any products or to practice or cause to be practiced any manufacturing processes covered thereby.

Notwithstanding the above, Purchaser may provide the NRC or any other regulatory agency with any such proprietary information as the NRC or such other agency may require; provided, however, that Purchaser shall first give Company written notice of such proposed disclosure and Company shall have the right to amend such proprietary information so as to make it non-

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AFFIDAVIT OF JAMES H. TAYLOR (Cont'd.)

proprietary. In the event that Company cannot amend such proprietary information, Purchaser shall, prior to disclosing such information, use its best efforts to obtain a commitment from NRC or such other agency to have such information withheld from public inspection.

Company shall be given the right to participate in pursuit of such confidential treatment."

(ii) The following criteria are customarily applied by Babcock & Wilcox in a rational decision process to determine whether the information should be classified as proprietary. Information may be classified as proprietary if one or more of the following criteria are met:

- a. Information reveals cost or price information, commercial strategies, production capabilities, or budget levels of Babcock & Wilcox, its customers or suppliers.
- b. The information reveals data or material concerning Babcock & Wilcox research or development plans or programs of present or potential competitive advantage to Babcock & Wilcox.
- c. The use of the information by a competitor would decrease his expenditures, in time or resources, in designing, producing or marketing a similar product.
- d. The information consists of test data or other similar data concerning a process, method or

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AFFIDAVIT OF JAMES H. TAYLOR (Cont'd.)

component, the application of which results in a competitive advantage to Babcock & Wilcox.

- e. The information reveals special aspects of a process, method, component or the like, the exclusive use of which results in a competitive advantage to Babcock & Wilcox.
- f. The information contains ideas for which patent protection may be sought.

The document(s) listed on Exhibit "A", which is attached hereto and made a part hereof, has been evaluated in accordance with normal Babcock & Wilcox procedures with respect to classification and has been found to contain information which falls within one or more of the criteria enumerated above. Exhibit "B", which is attached hereto and made a part hereof, specifically identifies the criteria applicable to the document(s) listed in Exhibit "A".

- (iii) The document(s) listed in Exhibit "A", which has been made available to the United States Nuclear Regulatory Commission was made available in confidence with a request that the document(s) and the information contained therein be withheld from public disclosure.
- (iv) The information is not available in the open literature and to the best of our knowledge is not known by Combustion Engineering, EXXON, General Electric, Westinghouse or other current or potential domestic or foreign competitors of Babcock & Wilcox.

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AFFIDAVIT OF JAMES H. TAYLOR (Cont'd.)

(v) Specific information with regard to whether public disclosure of the information is likely to cause harm to the competitive position of Babcock & Wilcox, taking into account the value of the information to Babcock & Wilcox; the amount of effort or money expended by Babcock & Wilcox developing the information; and the ease or difficulty with which the information could be properly duplicated by others is given in Exhibit "B".

E. I have personally reviewed the document(s) listed on Exhibit "A" and have found that it is considered proprietary by Babcock & Wilcox because it contains information which falls within one or more of the criteria enumerated in Paragraph D, and it is information which is customarily held in confidence and protected as proprietary information by Babcock & Wilcox. This report comprises information utilized by Babcock & Wilcox in its business which afford Babcock & Wilcox an opportunity to obtain a competitive advantage over those who may wish to know or use the information contained in the document(s).

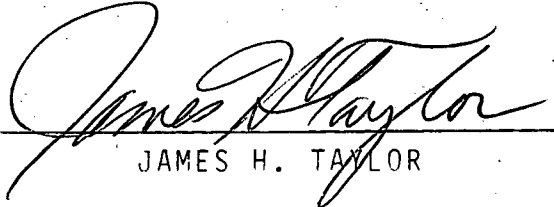

JAMES H. TAYLOR

Exhibit A

"Evaluation of The Cross Wound Eddy Current Probe for OTSG Sleeve Examinations," B&W Document 1157719A-0, Babcock & Wilcox, Lynchburg, Virginia, August, 1985.

Exhibit B

Public disclosure of the Report "Evaluation of The Cross Wound Eddy Current Probe for OTSG Sleeve Examinations," B&W Document 1157719A-0, is likely to cause harm to the competitive position of Babcock & Wilcox due to the amount of effort and money expended by Babcock & Wilcox in developing the information and the use or difficulty with which the information could be duplicated by others. The information considered proprietary to Babcock & Wilcox relates to the following aspects of this report:

1. Sleeve dimensions and materials.
2. Details of examination methods for the sleeved tube.

The proprietary criteria which apply to this information are b, c, d, e, and f.

PROPRIETARY INFORMATION

NOTICE

THE ATTACHED DOCUMENT MAY CONTAIN "PROPRIETARY INFORMATION" AND SHOULD BE HANDLED AS NRC "OFFICIAL USE ONLY" INFORMATION. IT SHOULD NOT BE DISCUSSED OR MADE AVAILABLE TO ANY PERSON NOT REQUIRING SUCH INFORMATION IN THE CONDUCT OF OFFICIAL BUSINESS AND SHOULD BE STORED, TRANSFERRED, AND DISPOSED OF BY EACH RECIPIENT IN A MANNER WHICH WILL ASSURE THAT ITS CONTENTS ARE NOT MADE AVAILABLE TO UNAUTHORIZED PERSONS.

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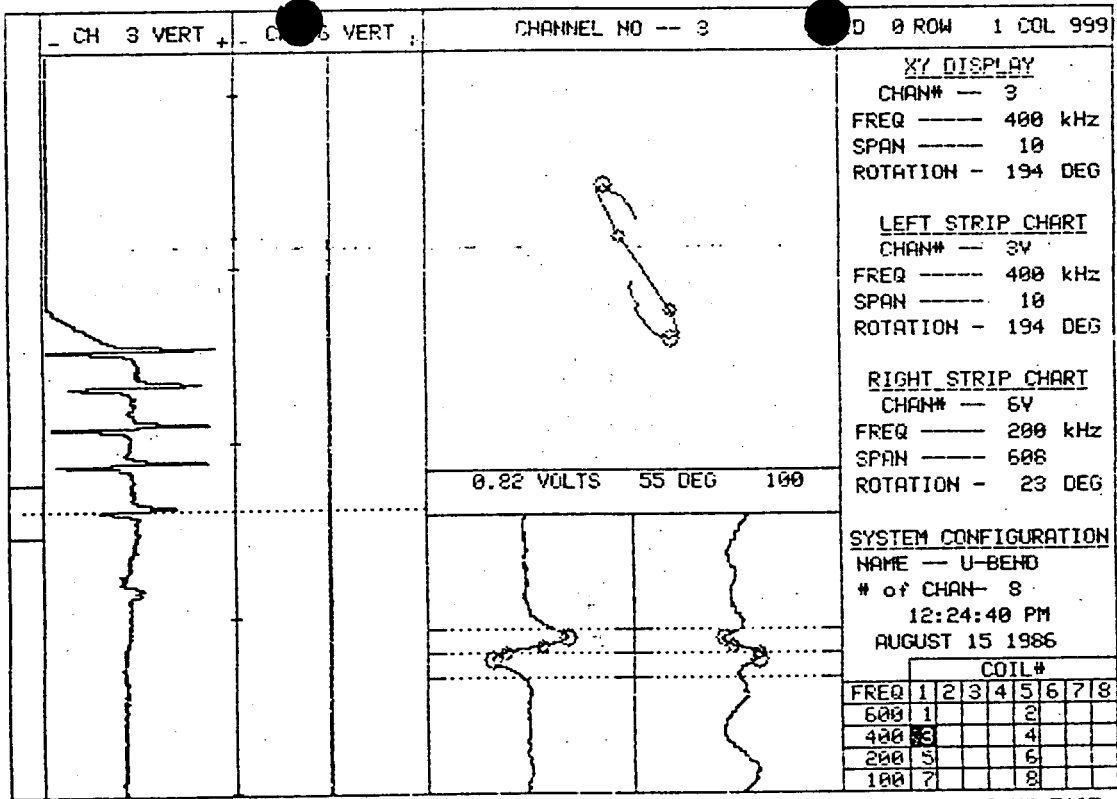
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PROPRIETARY INFORMATION

Attachment 3

Duke Power Company
Oconee Nuclear Station

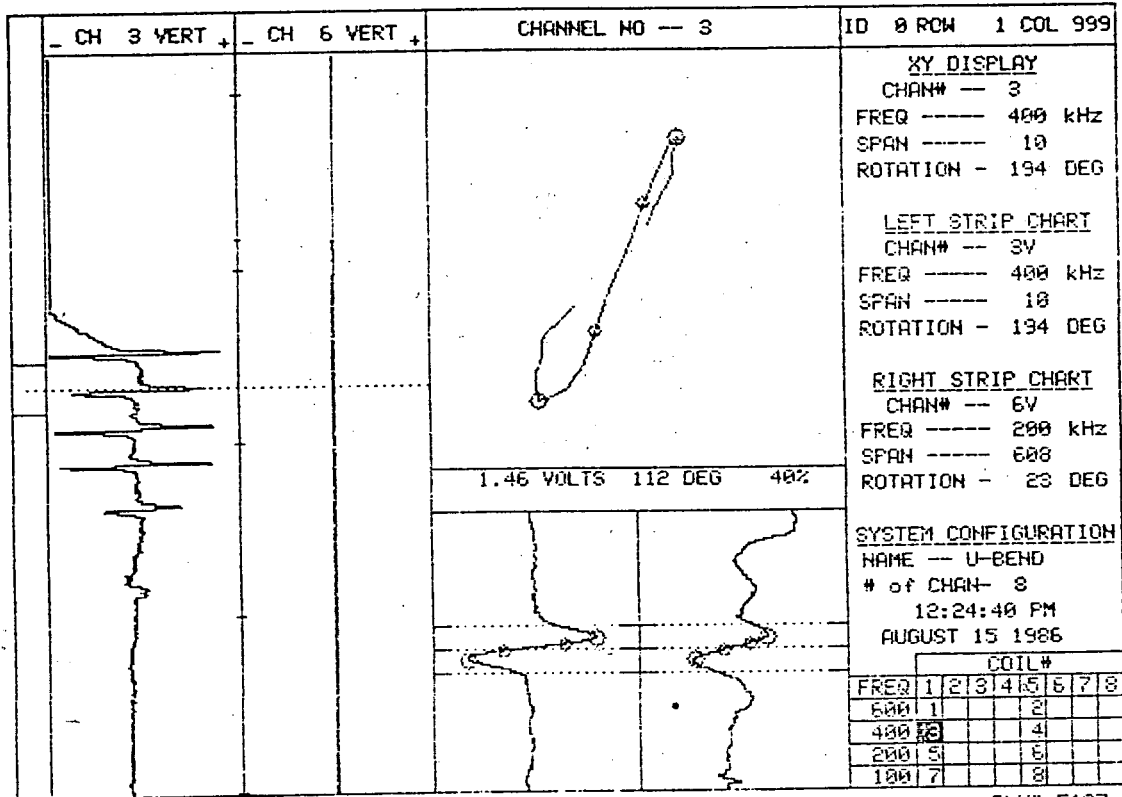
Oscilligrams Limits of the Worst, Intermediate, and
Best Detection Capabilities for the
100%, 40%, and 20% Through-Wall Holes for
0.410" Bobbin Coil Probe



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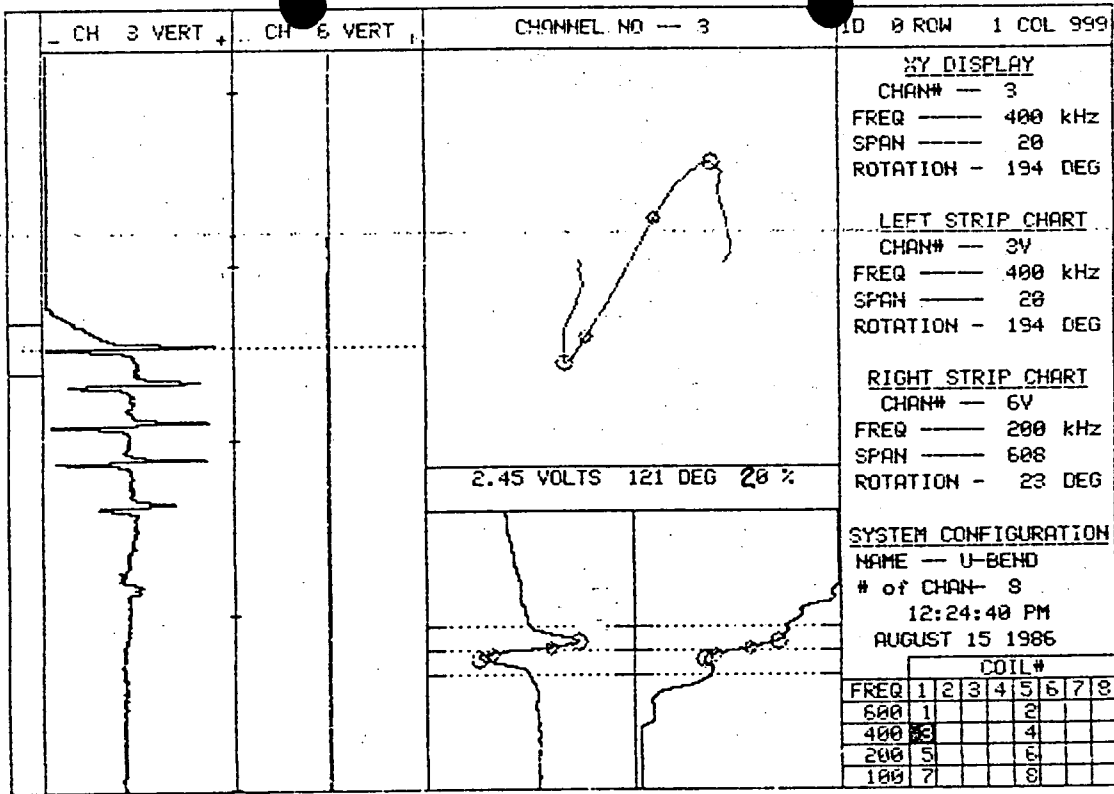
Figure : 1



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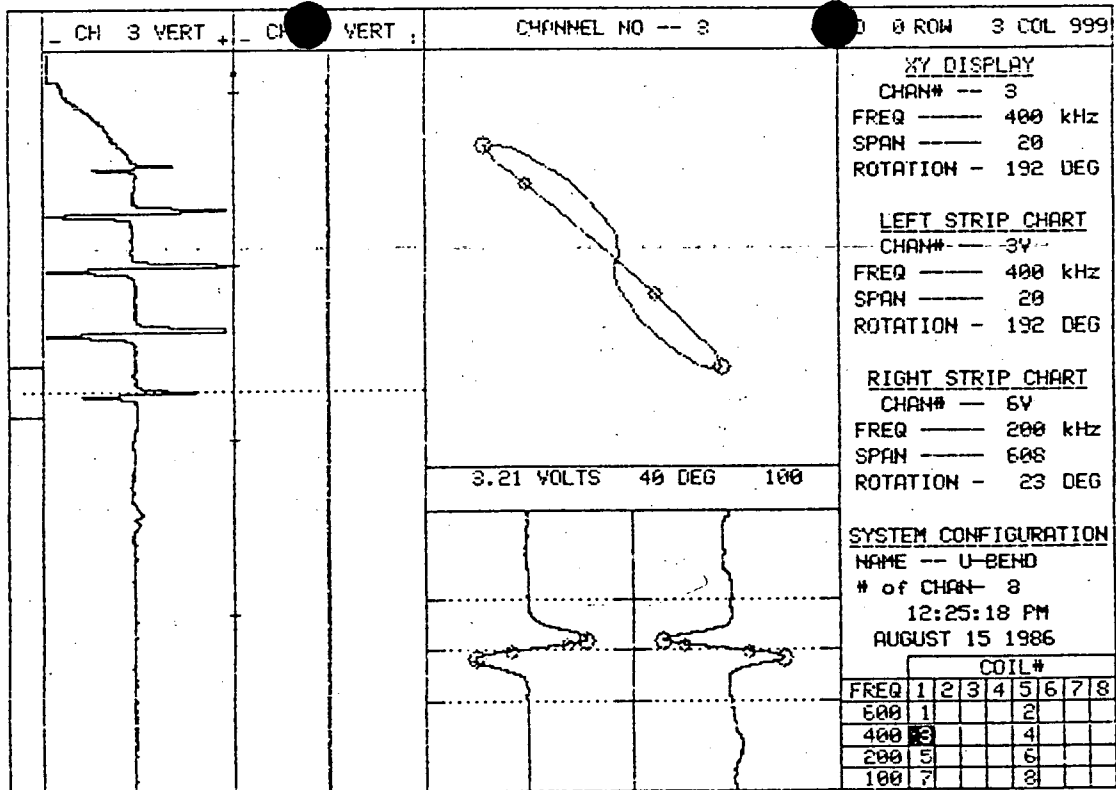
Figure : 2



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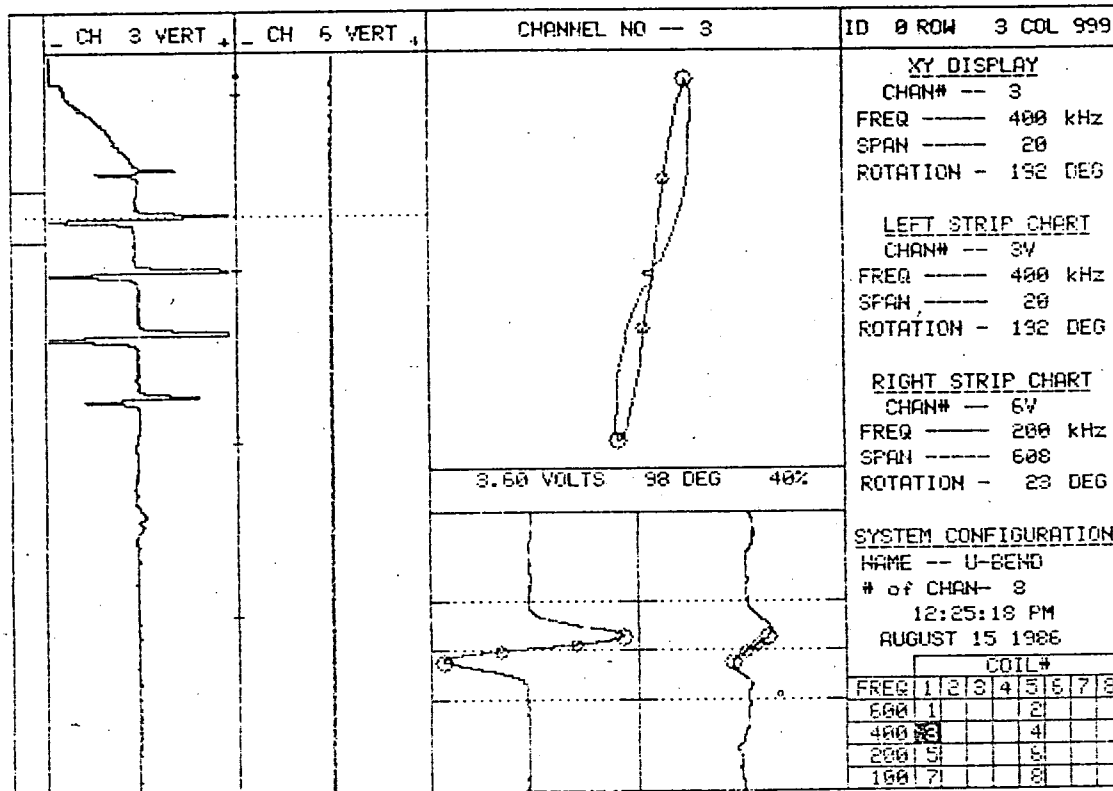
Figure : 3



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Figure : 4

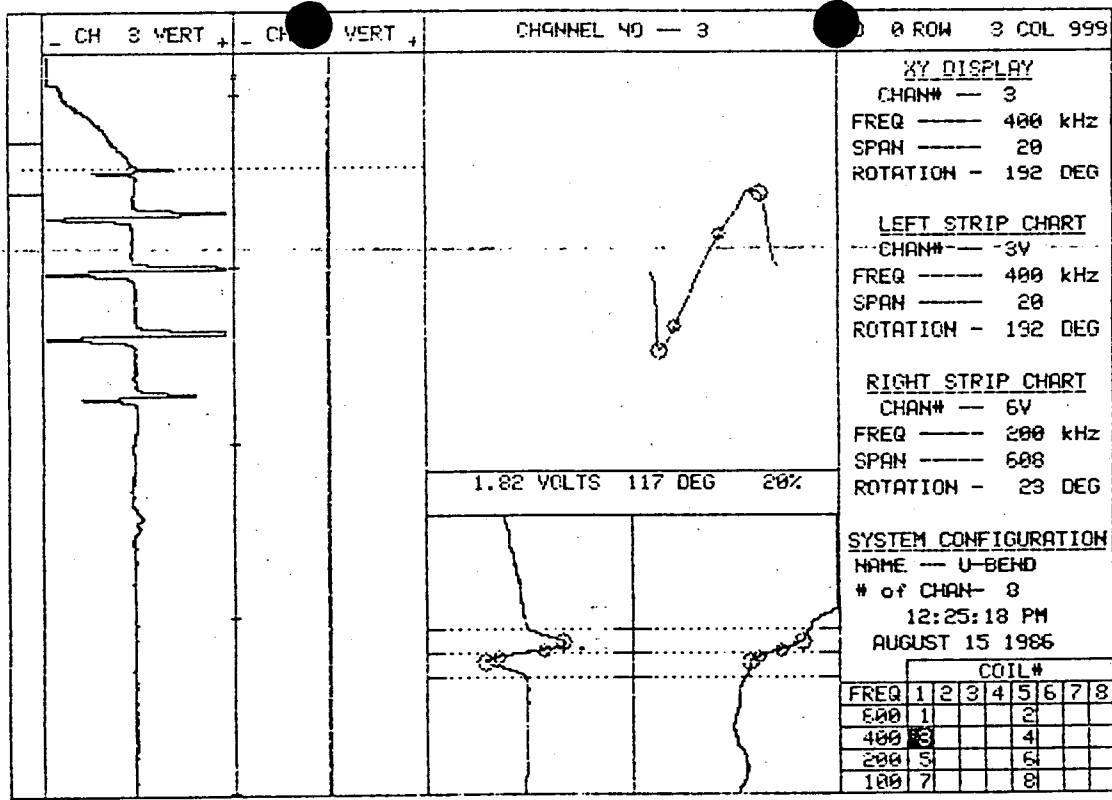
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Figure : 5

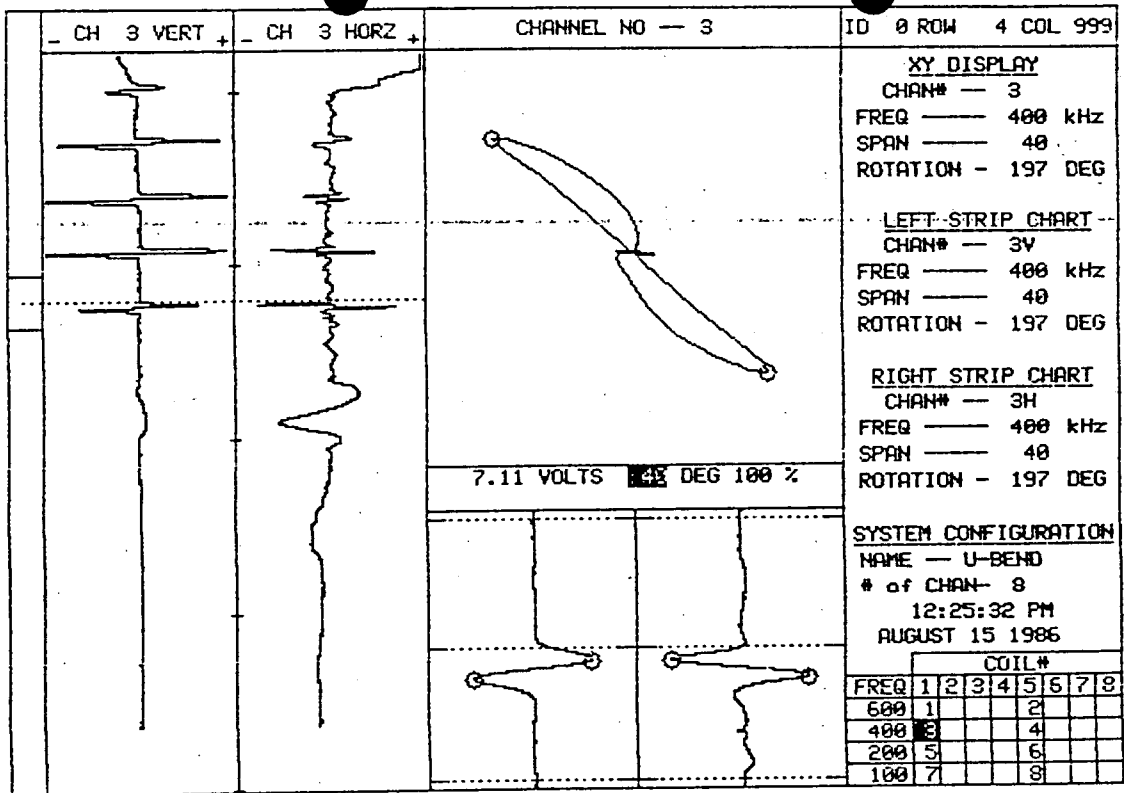
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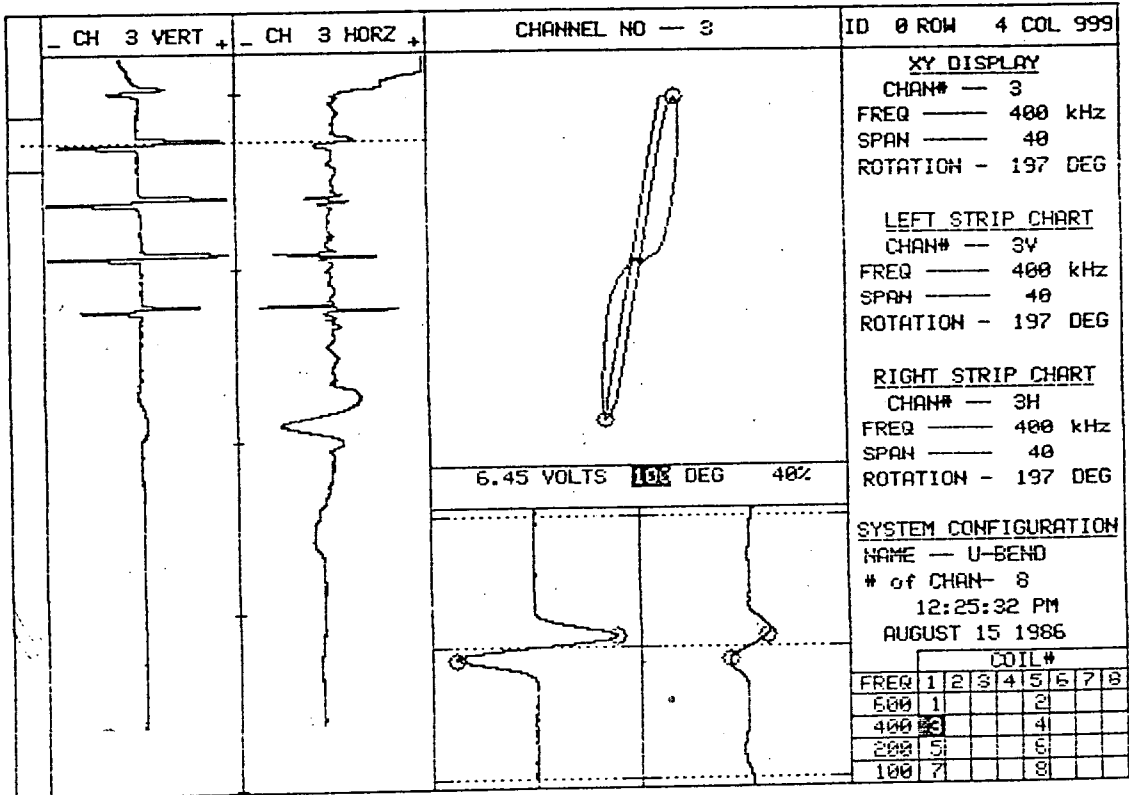
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Figure: 6



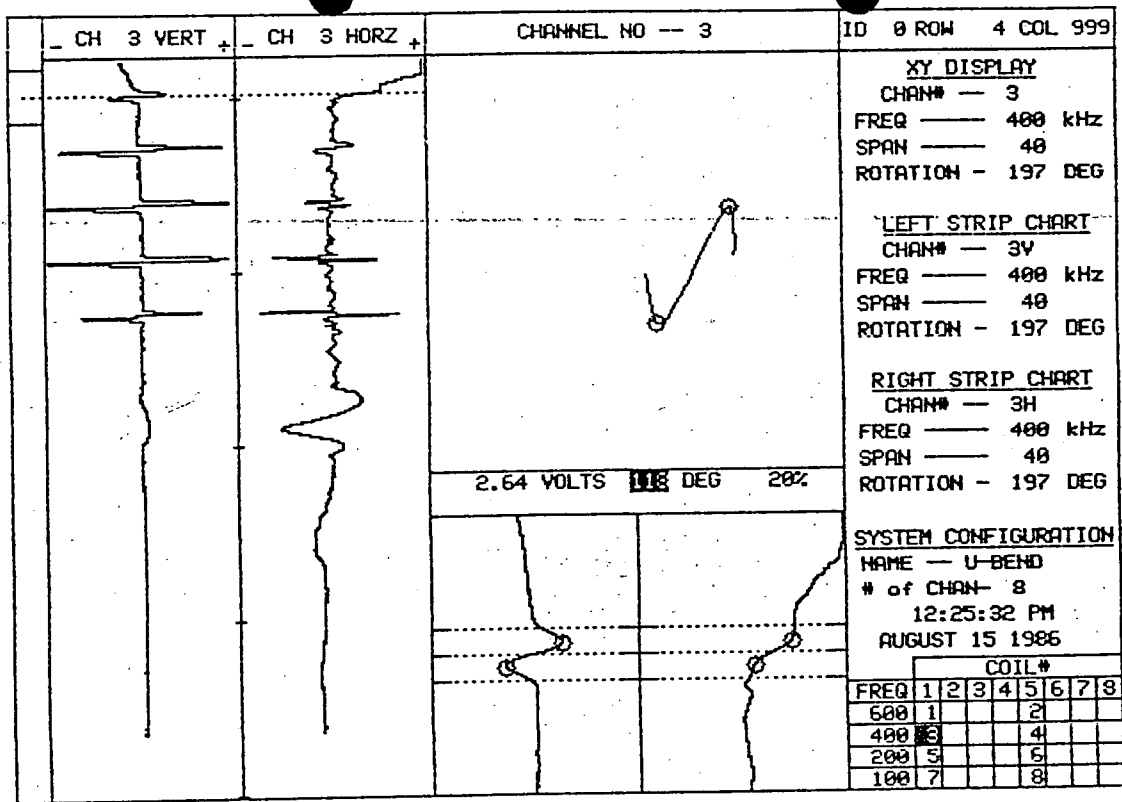
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Figure: 7



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Figure: 8



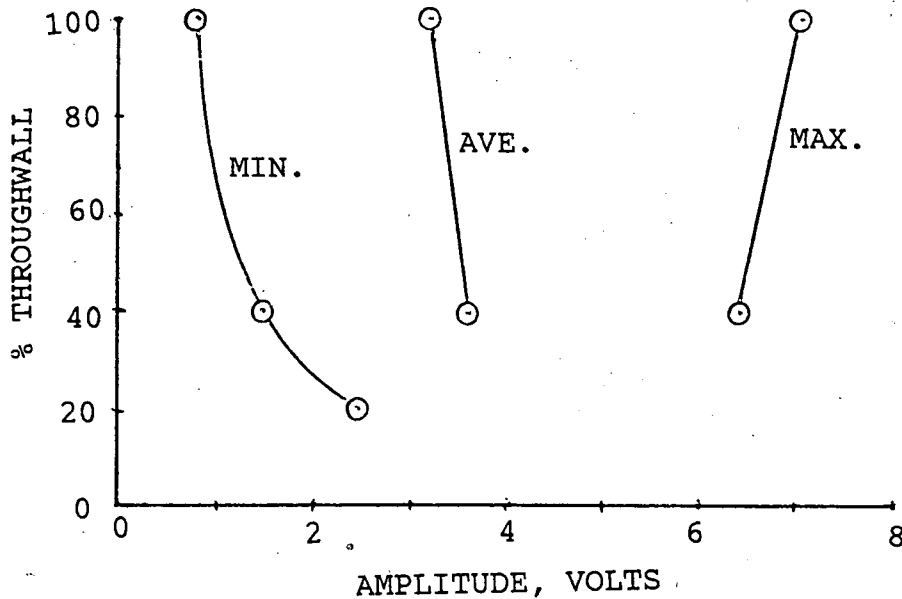
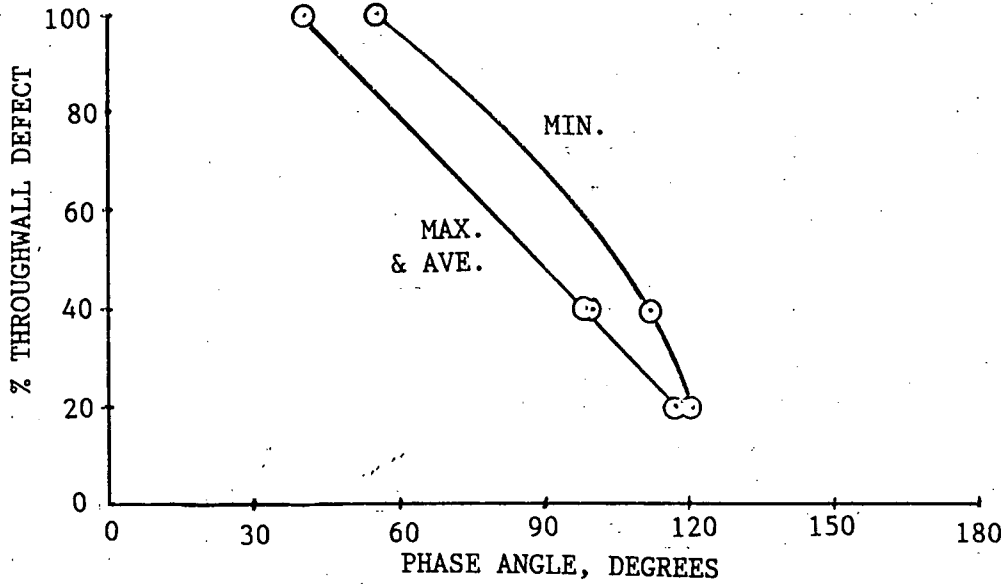
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Figure: 9

FIGURE 10

CALIBRATION CURVE

ASME Calibration Standard
 .410 Dia. Bobbin Coil in a
 .625 OD x .034 Wall Inconel 600 Tube



% THRUWALL	PHASE ANGLE, DEG			AMPLITUDE, VOLTS		
	MIN	AVE	MAX	MIN	AVE	MAX
100	55	40	40	0.82	3.21	7.11
40	112	98	100	1.46	3.60	6.45
20	121*	117*	118*	2.45*	1.82*	2.64*

* Specimen had four 20% TW holes at the same axial location. Thus there is no significant difference in the response to the 20% TW hole.

Attachment 4

Duke Power Company
Oconee Nuclear Station

The G. J. Theus Report,
"Stress Corrosion Cracking Tests of Alloy 600",
Which Was Item 15 in EPRI WS-80-136 Workshop Proceedings

**Workshop Proceedings: U-Bend Tube Cracking
in Steam Generators**

WS-80-136

Proceedings, June 1981

**Denver, Colorado
August 20-21, 1980**

Edited by

**C. E. Shoemaker
Steam Generator Project Office**

Prepared for

Steam Generator Owners Group

and

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