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AUTH. NAME AUTHOR AFFILIATION
FITZPATRICK, E. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
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SUBJECT: Submits results of eddy current steam generator tube insp &
subsequent steam generator tube repairs performed on steam
generators during 1995 Unit 1 refueling outage.

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October 13, 1995

AEP:NRG:1166Y

Docket Nos.: 50-315

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Gentlemen:

Donald C. Cook Nuclear Plant Unit 1
U-1 Steam Generator 15 Day Inspection Repair Report and
Category C-3 Report

Pursuant to the requirements of the Donald C. Cook Nuclear Plant Technical Specification 4.4.5.5a, this letter is to inform you of the results of our eddy current steam generator tube inspection and subsequent steam generator tube repairs performed on the steam generators during the 1995 Unit 1 Refueling Outage.

Eddy current tube inspection of the Unit 1 steam generators began on August 26, 1995. All tube inspections, repairs, and vendor reports were completed this outage on September 19, 1995. Inspections included 100 percent of all previously nonplugged tubes, and a number of previously plugged tubes that were restored to service by use of the 2 volt interim plugging criteria (IPC) and F* criteria and tube end re-roll. Attachment 1 describes the examination and repairs. Attachment 2 discusses the investigation of the defects found and the actions taken as a result of those investigations in accordance with the follow-up requirements of the Technical Specification 4.4.5.5c for inspections which fall into Category C-3.

Sincerely,

for W. E. Fitzpatrick
E. E. Fitzpatrick
Vice President

plt

Attachments
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ATTACHMENT 1 TO AEP:NRC:1166Y

UNIT 1 STEAM GENERATOR TUBE INSPECTION REPORT
INSPECTION RESULTS (C-3) AND TUBE REPAIRS

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INSPECTION RESULTS (C-3) AND TUBE REPAIRS

Table 1 provides a summary of inspection results for each steam generator by degradation location, based on technical specification plugging criteria. The results of the inspection places the steam generators in the C-3 category, primarily due to the number of roll transition defects at the hot leg tubesheet tube hard roll transitions (HLRT). It should be noted, however, that the vast majority of these tubes were returned to service by application of the F* criteria and re-rolling. When considering only newly identified defects removed from service by plugging, the inspection would be classified as C-2.

A total of 105 tubes were plugged among the four steam generators. This total includes 20 tubes plugged from prior refueling outages that were scheduled for recovery but determined not to be recoverable and again plugged. Therefore, the actual number of new tubes plugged for this outage is 85. The breakdown per steam generator for the 85 tubes is as follows: SG11 - 20 tubes, SG12 - 18 tubes, SG13 - 25 tubes and SG14 - 22 tubes.

A total of 934 tubes were restored to service by application of F* criteria and tube end re-roll at the HLRT. This total includes recovery of 107 tubes which were plugged in prior outages due to defects located in the HLRT. The breakdown per steam generator for the 934 tubes is as follows: SG11 - 231 tubes, SG12 - 117 tubes, SG13 - 477 tubes and SG14 - 109 tubes.

Technical Specification 4.4.5.5d for implementation of the IPC to tube support plate intersections requires notification of the NRC prior to returning the steam generators to service should any of the conditions noted in 4.4.5.5d 1-4 arise. None of these conditions arose. In summary: 1) actual end-of-cycle voltage distribution did not result in exceeding the leak limit during the previous cycle, 2) no crack-like circumferential indications were detected at the support plate intersections, 3) no indication extended beyond the confines of the tube support plate, and 4) conditional burst probability does not exceed 1×10^{-2} as calculated per WCAP-14277.

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cc: A. A. Blind
G. Charnoff
H. J. Miller
NFEM Section Chief
NRC Resident Inspector - Bridgman
J. R. Padgett

TABLE I

Steam Generator Tube Inspection Results

Area	SG 11				SG 12				SG 13				SG 14			
	Indi-cations	Defects	Recover List	Plug List	Indi-cations	Defects	Recover List	Plug List	Indi-cations	Defects	Recover List	Plug List	Indi-cations	Defects	Recover List	Plug List
CLTSP	80	11		11	74	12		12	64	18		18	75	16		16
AVB	9	0		0	21	0		0	75	2		2	20	0		0
U-Bend	0	0		0	0	0		0	0	0		0	0	0		0
HLTS	13	13	0	13	13	13	0	13	5	5	0	5	9	9	0	9
HLTSP	211	0	0	0	138	1	0	1	93	1	0	1	194	0	0	0
HLRT	244	231	231	0	132	117	117	0	505	479	477	2	111	109	109	0
HLSLV	0	0		0	0	0		0	0	0		0	0	0		0
Misc	7	1		1	8	0		0	3	1		1	1	0		0
Total	564	256	231	25	386	143	117	26	745	506	477	29	410	134	109	25

AVB = anti-vibration bar intersection
 CLTSP = cold leg tube support plate intersection
 HLRT = hot leg tubesheet roll transition
 HLSLV = hot leg hybrid expansion joint sleeve
 HLTS = hot leg tubesheet region
 HLTSP = hot leg tube support plate intersection
 RPC = three-coil rotating pancake coil probe
 U-bend = tight radius (rows 1 and 2) u-bends

ATTACHMENT 2 TO AEP:NRG:1166Y

UNIT-1 STEAM GENERATOR TUBE INSPECTION REPORT
INVESTIGATION OF THE HOT LEG TUBESHEET TUBE HARD ROLL
TRANSITION REGION AND CATEGORY C-3 CORRECTIVE ACTIONS

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INVESTIGATION OF THE HOT LEG TUBESHEET TUBE HARD ROLL

TRANSITION REGION AND C-3 CORRECTIVE ACTIONS

The Cook Nuclear Plant Unit 1 refueling outage eddy current inspections for the Cecco 5 sample program resulted in a Category C-3 classification, per Technical specification 4.4.5.5. The principle reason for the C-3 classification was due to the defects identified at HLRT.

This was a first application of the Cecco 5 coil probe in this region of each steam generator. This enhanced inspection technique has a better capability to detect PWSCC indications in this tube region geometry than that of bobbin coil probes. Therefore, it is believed that the enhanced inspection technique is responsible for the high number of tube defects identified this refueling outage rather than occurrence of rapidly propagating corrosion. This conclusion is further supported by the lack of PWSCC at other susceptible tube locations. The results of 1995 motorized rotating pancake coil probe inspection, done at tube locations susceptible to PWSCC such as the low row U-bends or at tube dent locations at support plate, showed no signs of PWSCC.

HLRT primary water stress corrosion cracking (PWSCC) has historically been an area of concern for the Cook Nuclear Plant Unit 1 steam generators. However, it has not been a rapidly propagating phenomenon and is being held in check to a manageable degree, especially when considering the unit has operated since 1975. This has been accomplished due to: a) unit operation at reduced temperature and pressure, which reduces the corrosion rate and tube stress, b) application of industry recommended chemistry guidelines, and c) available tube repair by either F* and tube end re-roll or tube plugging. These remedial activities have helped maintain tube structural integrity and an operating history of no significant PWSCC-caused primary to secondary tube leakage.

The 1995 eddy current inspection results will be reviewed in further detail in the following months, along with other available industry experience. This will be done to develop an overall assessment of steam generator tube integrity and to assess the need for any changes to measures now in place, as well as to aid in planning future tube inspections.