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DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards facility steam generator operating history. Encl updates info provided by 800403 ltr.

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373-4083

September 23, 1981

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

Re: Oconee Unit 3
Docket No. 50-287

Dear Sir:

Please find attached the Steam Generator Operating History for Oconee Unit 3, updating the information provided by my letter of April 3, 1980, through the 1981 refueling outage inservice inspection. The updated histories for Units 1 and 2 were transmitted by my letter of May 8, 1981.

Very truly yours,

William O. Parker, Jr.

JLJ/php
Attachment

A001
S1/1

OCONEE NUCLEAR STATION

UNIT 3

STEAM GENERATOR OPERATING HISTORY

OCONEE NUCLEAR STATION

UNIT 3

I. BASIC PLANT INFORMATION

Startup Date: December 10, 1974

Utility: Duke Power Company

Location: Seneca, South Carolina

Thermal Power: 2568 MWt

NSSS Supplier: Babcock & Wilcox (B & W)

Number of Loops: 2

Steam Generator Supplier, Model No. Type: B & W, 177 FA, Once Through Steam Generator

Number of tubes per Generator: 15,530

Tube Size, Material: Alloy 600; 0.625" OD; 0.557" ID

II. STEAM GENERATOR OPERATING CONDITIONS

Normal Operation

Inlet Temperature: 604°F

Primary Flow Rate: 65.66×10^6 lb/hr

Primary Pressure: 2200 psi

Secondary Pressure: 925 psi

Allowed Leak Rate: 1 gpm

Accidents

Design Basis LOCA; Maximum Delta-P: 925 psi

Main Steam Line Break; Maximum Delta-P: 2200 psi

III. STEAM GENERATOR SUPPORT PLATE INFORMATION

Material: SA 212 B Carbon Steel

Design Type: Broached

Design Code: ASME III (thru 1967)

Dimensions: 58.7"R, thickness 1.5"

Steam Flow Rate: 5.6×10^6 lb/hr

Tube Hole Dimensions: 5/8" D (nominal) x 0.034" wall

IV. STEAM GENERATOR BLOWDOWN INFORMATION

Oconee Nuclear Station's Once Through Steam Generators (OTSG) are not designed to perform normal blowdowns. There is no operational requirement to perform normal blowdowns. The steam generator sample line, however, can provide a limited blowdown capability of 1 GPM during power operation.

V. WATER CHEMISTRY SPECIFICATIONS

Water chemistry specifications for Unit 3 are the same as Unit 1 and are contained in Attachment 1, Section V.

VI. TURBINE STOP VALVE TESTING PROCEDURES

Turbine Stop Valve Testing Procedures for Unit 3 are the same as those for Unit 1 and are contained in Attachment 1, Section VI.

VII. STEAM GENERATOR DEGRADATION HISTORY

A. November 1976 - Initial Refueling Inspection

Steam Generator 3A

Number of tubes inspected: 586 (3.77%)

Number of tubes plugged prior to this ISI: 0

Number of tubes plugged this ISI: 0

Metalurgical Exam Results: No evidence of degradation in excess of 20%.

Steam Generator 3B

Number of tubes inspected: 489 (3.15%)

Number of tubes plugged prior to this ISI: 3 (0.02%)

Number of tubes plugged this ISI: 0

Metalurgical Exam Results: 4 tubes had degradation between 20-30%. No other tubes showed evidence of degradation in excess of 20%

B. October 1977 - 289 EFPD since last refueling inspection

Steam Generator 3A

Number of tubes inspected: 1090 (7.00%)

Number of tubes plugged prior to this ISI: 0

Number of tubes plugges this ISI: 0

Metalurgical Exam Results: No evidence of degradation in excess of 20%

Steam Generator 3B

Number of tubes inspected: 1090 (7.00%)

Number of tubes plugged prior to this ISI: 20 (0.13%)

Number of tubes plugged this ISI: 0

Metalurgical Exam Results: 6 lane tubes had evidence of degradation between 20%-40% at the 15th SP but were not plugged.

C. June 1978 - 160 EFPD since last refueling inspection

Steam Generator 3A

Number of tubes inspected: 882 (5.68%)

Number of tubes plugged prior to this ISI: 0

Number of tubes plugged this ISI: 0

Metalurgical Exam Results: No evidence of degradation in excess of 20%.

Steam Generator 3B

Number of tubes inspected: 1107 (7.13%)

Number of tubes plugged prior to this ISI: 20 (0.13%)

Number of tubes plugged this ISI: 0

Metalurgical Exam Results: 7 lane tubes showed evidence of degradation of between 20% - 40% at the 15th SP but were not plugged. Two other tubes in the bundle showed degradation of between 20 - 40% (at the 9th SP and between the 12th and 13th SP respectively) but were not plugged.

D. May 1979 - 264 EFPD since last refueling inspection

OTSG 3A

Number of tubes inspected: 825 (5.31%)

Number of tubes plugged prior to this ISI: 0

Number of tubes plugged this ISI: 1 (0.01%)

Eddy-current exam results: Six tubes exhibited degradation of 20% to 30%, one each at the 9th and 10th SP, three at the 15th SP, and one between the 15th SP and the UTS Tube 75-3 was stabilized due to a through-wall indication of approximately 60%.

OTSG 3B

Number of tubes inspected: 825 (5.31%)

Number of tubes plugged prior to this ISI: 20 (0.13%)

Number of tubes plugged this ISI: 0

Eddy-current exam results: Thirteen tubes exhibited degradation of 20% to 30%, ten at the 15th SP and three at the UTS. Tube 77-10, with a through-wall indication of 30% at the UTS, was plugged.

E. December 1980 - 308 EFPD since last refueling inspection

OTSG 3A

Number of tubes inspected: 3800 (10%)

Number of tubes plugged prior to this ISI: 1

Number of tubes plugged this ISI: 0

Eddy-current exam results: Four tubes exhibited degradation of 20% to 30%, one each at the 11th, 12th, 14th, and 15th SP. No tube indications exceeded the 40% through wall plugging limitations.

OTSG 3B

Number of tubes inspected: 5230 (21%)

Number of tubes plugged prior to this ISI: 20 (0.13%)

Number of tubes plugged this ISI: 4

Eddy-current exam results: Twenty five tubes exhibited degradation equal to or greater than 20%, one between the LTS and 1st SP, two between the 2nd and 3rd SP, one between the 8th and 9th SP, one between the 9th and 10th SP, one at the 10th SP, one at the 13th SP, eight at the 14th SP, two between the 14th and 15th SP. Four tubes (150-14 at the 10th SP and 4-4, 58-2, 62-113 at the 14th SP) exceeded the 40% through wall indication level and had to be plugged.

REGION IDENTIFICATION

Region	# Tubes Within Region
Periphery of Bundle (1)	6806 (43.82%)
Tube Lane (2)	382 (2.46%)
Interior	8342 (53.72%)
Total	15,530

Allowed wall thinning before plugging 40%

(1) Defined as tubes outside a 12 sided polygon connecting support rod positions (~20 rows)

(2) Defined as tubes within 3 rows of open tube lane

VIII. ABNORMAL OPERATIONAL EVENTS

A. July 21, 1976 RO-287/76-10 OTSG 3B

Number of tubes leaking	1
Number of other tubes inspected	not available
Number of tubes plugged/removed	3

Summary

a) Tube 77-11 was plugged due to leakage at the 15th SP.

b) Tubes 81-63, 37-6 were also plugged.

B. February 14, 1977 RO-287/77-2 OTSG 3B

Number of tubes leaking	1
Number of other tubes inspected	142
Number of tubes plugged/removed	11

Summary

a) Tube 77-19 was plugged due to leakage from crack at 15th SP

b) Tubes 75-2 and 77-12 thru -21 were also plugged.

C. June 10, 1977 RO-287/77-8 OTSG 3B

Number of tubes leaking	1
Number of other tubes inspected	133
Number of tubes plugged/removed	1

Summary

Tube 78-1 was plugged due to leakage at 15th SP

D. July 14, 1977 RO-287/77-10 OTSG 3B

Number of tubes leaking	1
Number of other tubes inspected	120
Number of tubes plugged/removed	2

Summary

a) Tube 77-2 was plugged due to leakage at bottom of upper tube sheet

b) Tube 77-1 was also plugged

E. June 14, 1980 RO-287/80-10 OTSG 3A

Number of tubes leaking	1
Number of tubes inspected	360
Number of tubes plugged/removed	1

Summary

a) Tube 77-3 was plugged and stabilized due to leakage at the upper tube sheet.

IX. CONDENSER INFORMATION

As stated earlier in Section V of this report, water from Lake Keowee is used to provide condenser cooling. Condenser tubes are made of 304 Stainless Steel. During operation, tube leakage is detected by secondary chemistry analysis for silica; a maximum of 20 ppb is allowed. A search for a tube leak occurs whenever the silica concentration in the secondary begins to increase.

Condenser tube leakage:

Date	Remarks
August 1976	Two tubes plugged
October 1976	Identified cause of previous leakage as a broken bypass line support member causing steam to impinge directly on condenser tubes. Plugged approximately 150 tubes that were bent
February 1977	One tube plugged
April 1977	One tube plugged
May 1977	Three tubes plugged
December 1977	One tube plugged

X. RADIATION EXPOSURE WITH RESPECT TO STEAM GENERATORS

Date	Generator	Dose (Exam & Repair) (1)	Comments:
7/76	B	7	OTSG B leak
10/76	A & B	6.2	First Refueling ISI
2/77	B	10.7	OTSG B leak
6/77	B	3.7	OTSG B leak
7/77	B	6.9	OTSG B leak
10/77	A & B	39.3	Second Refueling ISI
6/78	A & B	14.3	Third Refueling ISI
5/79	A & B	15.9	Fourth Refueling ISI
6/80	A	7.5	OTSG A leak
12/80	A & B	17.9	Fifth Refueling ISI
Total	A & B	129.4	

(1) Dose in person-rem: testing & repair were not always separable.

XI. DEGRADATION GROWTH

OTSG 3B

Tube Number	Location	11/77	6/78	5/79	12/80
75-5	15th SP	25	25	25	20-30
75-6	15th SP	30	30	30	20-30
75-9	15th SP	30	25	25	25
75-10	15th SP	30	25	25	20-25
75-11	15th SP	30	25	25	<20
78-6	15th SP	35	30	25-30	25

No evidence of significant degradation growth in tubes for which data is available.

Approximately 160 EFPD elapsed between 11/77 and 6/78; approximately 264 EFPD elapsed between 6/78 and 5/79.

There are no tubes in OTSG 3A for which degradation growth data is available.