

Docket files

OCT 13 1977

Docket No.: 50-269

LICENSEE: DUKE POWER COMPANY

FACILITY: OCONEE NUCLEAR STATION, UNIT NO. 1

SUMMARY OF MEETING HELD ON SEPTEMBER 20, 1977, TO DISCUSS THE STEAM GENERATOR TUBE INSPECTION AT OCONEE UNIT NO. 1

On September 20, 1977, representatives of Duke Power Company (DPC) and Babcock & Wilcox (B&W) met with the NRC staff to discuss the subject topic.

A list of attendees is attached.

Mr. Tuckman of DPC made a presentation which summarized the steam generator problems which had occurred up to the present refueling outage. These problems were those caused by flow induced vibration. The remainder of the presentation centered upon the results of the steam generator tube inspections recently performed.

The results of the inspections are shown in the attached presentation. In steam generator 1A, five tubes were found to be defective (i.e., greater than 40% wall thinning) out of 16% of the total tube inspected. In the 1B steam generator, 33% of the tubes were inspected and 31 tubes were found to be defective. In the B&W steam generator, 1% is equivalent to 150 tubes.

Two of the steam generator 1B tubes were removed for further inspection, and, further examination revealed localized wall thinning of a type not previously observed in this or other types of steam generators. It appeared that the wall thinning was caused by cavitation/erosion. These tubes are being examined in detail by B&W.

POOR ORIGINAL

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We conclude that 33% of the tubes was an adequate number of tubes to be inspected during this inspection thereby providing a good indication of the condition of the steam generator.

Duke Power Company committed to do the following for Unit No. 1:

1. Provide the results of the analysis of the two tubes which were removed in approximately two months.
2. Provide B&W burst (plugging limit) data in about two months.
3. Develop a new ISI calibration standard in view of the latest problems with the steam generator tubes.
4. At the next outage, provide the tube wear rate using the new ISI calibration standard.
5. At the next outage, inspect the outer 7-8 row of tubes as downtime permits.
6. Resubmit proposed Technical Specification considering the latest knowledge of problems with the Oconee steam generators in 60 days.

D. Neighbors, Project Manager  
Operating Reactors Branch #1  
Division of Operating Reactors

Attachments:

1. List of Attendees
2. Presentation

POOR ORIGINAL

OFFICE	ORB #1: DQB					
SURNAME	DNeighbors:rm					
DATE	10/13/77					

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MEETING SUMMARY DISTRIBUTION

ORB#1

Duke Power Company  
ATTN: Mr. William O. Parker, Jr.  
Vice President - Steam Production  
Post Office Box 2178  
422 South Church Street  
Charlotte, North Carolina 28242

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Docket File  
NRC PDR  
L PDR  
ORB#1 Reading  
NRR Reading  
E. G. Case  
V. Stello  
K. R. Goller  
D. Eisenhut  
A. Schwencer  
D. K. Davis  
G. Lear  
R. Reid  
T. Carter

L. Shao  
R. Baer  
W. Butler  
B. Grimes  
Project Manager  
Attorney, OELD  
OI&E (3)  
S. Snéppard  
R. Fraley, ACRS (16)  
T. B. Abernathy  
J. R. Buchanan  
Meeting Summary File  
NRC Participant(s)  
J. Reece  
R. Stuart  
M. Fairtile  
J. Strosnider  
B. D. Liaw  
R. Landry  
G. Zwetzig  
C. Nelson

ATTENDEES AT NRC  
MEETING WITH DUKE POWER COMPANY  
AND BABCOCK & WILCOX  
SEPTEMBER 20, 1977

NRC

J. Reese  
A. Schwencer  
L. Shao  
R. Stuart  
M. Fairtile  
J. Strosnider  
B. D. Liaw  
R. Landry  
G. Zwetzig  
C. Nelson  
D. Neighbors

B&W

C. Russell  
R. Bonsall  
F. Burke  
M. Bonaca  
C. Banwarth  
C. Pryor

DPC

W. Haller  
K. Canady  
M. Tuckman  
R. Eaker  
C. Hendrix

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SEPTEMBER 20, 1977  
STEAM GENERATOR TUBE MEETING

1. SUMMARY OF MAY 13, 1977 MEETING
2. STEAM GENERATOR TUBE LEAKS SINCE MAY 13, 1977
3. OCONEE 2 TESTING
4. OCONEE 1 TESTING
5. FUTURE INSPECTION PLANS

CHRONOLOGICAL TUBE LEAKS  
TO MAY 13, 1977

<u>DATE</u>	<u>GENERATOR</u>	<u>LOCATION</u>
JULY, 1976	3B	LANE
NOVEMBER, 1976	1A	LANE
DECEMBER, 1976	2B	LANE
DECEMBER, 1976	1B	OFF-LANE
JANUARY, 1977	1B	LANE
FEBRUARY, 1977	3B	LANE
FEBRUARY, 1977	1B	OFF-LANE
MARCH, 1977	1B	LANE-WELD LEAK
MAY, 1977	1B	LANE



## SUMMARY

- 8 ACTUAL LEAKS                      1 WELD LEAK
- 5/8 LEAKS IN 1B GENERATOR
- 6/8 LEAKS IN OPEN TUBE LANE
- LANE LEAKS AT TOP (15TH) SUPPORT PLATE OR TUBESHEET
- OFF-LANE LEAKS AT 14TH SUPPORT PLATE
- VISUAL EXAM OF 5/6 LANE TUBES - CRACKS NO VISUALS OF OFF-LANE LEAKS

OCONEE TUBE REMOVALS  
THROUGH MAY, 1977

<u>DATE</u>	<u>GENERATOR</u>	<u>TUBE</u>	<u>COMMENT</u>
DEC, 1976	2B	77/23	LEAK-CRACK
DEC, 1976	2B	77/27	E.C. INDICATION
MAR, 1977	1B	77/25	LEAK-CRACK
MAY, 1977	1B	75/18	TUBE AND STABILIZER



## CONCLUSIONS

1. TUBE LEAK PROBLEM APPEARS TO BE RESTRICTED TO OCONEE.
  - OTHER PLANTS HAVE OPERATED PAST TIME OF OCONEE FAILURES
  - EDDY-CURRENT SIGNALS APPEAR NOT TO BE INDICATION OF IMPENDING LEAKS
2. LEAKS IN LANE TUBES CAUSED BY PROPOGATION OF LOCAL DEFECT BY HIGH-CYCLE FATIGUE FROM VIBRATION.
3. LOCAL DEFECTS TO START CRACKS MAY HAVE DIVERSE CAUSES.
4. LEAKS OCCUR PREDOMINANTLY IN LANE TUBES BECAUSE FLOW IS HIGHER.
  - GREATER POTENTIAL FOR VIBRATION EXISTS
  - LARGE CAMPLITUDES COULD RESULT FROM TEMPORARY FLOW INCREASES
5. NO EVIDENCE OF INTERGRANULAR STRESS CORROSION.
6. NO EVIDENCE OF PROBLEMS ASSOCIATED WITH RECIRCULATING STEAM GENERATORS (WASTAGE AND DENTING).
7. NO DIRECT EVIDENCE AVAILABLE ON CAUSE OF OFF-LANE LEAKS.

AGREEMENTS MADE IN  
MAY 13, 1977 MEETING

1. SUBMIT TECHNICAL SPECIFICATIONS ON S.G. LEAKAGE  
AND IODINE LIMITS

COMPLETED JUNE 21 AND JULY 8, 1977

2. KEEP NRC INFORMED OF TUBE LEAKS, INSPECTION RESULTS,  
AND PLANS

CONTINUING

3. SAFETY ASSESSMENT OF OTSG LEAKS

SUBMITTED AUGUST, 1977

4. PLANS FOR RESOLUTION OF OTSG TUBE PROBLEM

SUBMITTED AUGUST, 1977

STEAM GENERATOR LEAKS  
SINCE MAY, 1977

<u>DATE</u>	<u>STEAM GENERATOR</u>	<u>TUBE</u>
JUNE, 1977	3B	78/1
JULY, 1977	3B	77/2

NO LEAKS ON OCONEE 1 OR 2.

OCONEE 2 INSERVICE INSPECTION  
JUNE - JULY, 1977

GENERATOR 2A

SAMPLE	SIZE	LOCATION	RESULTS
1	3%	RANDOM AND OPEN LANE	NO DEFECTS

GENERATOR 2B

1	3%	RANDOM AND OPEN LANE	4 TUBES
2	3%	PERIPHERY AND AROUND DEFECTS	NO DEFECTS

DEFECTS	LOCATION	CORRECTIVE ACTION
75/5	15TH	STABILIZED
75/9	15TH	REMOVED
112/29	12TH	PLUGGED
78/2	15TH	STABILIZED

OCONEE 1 INSERVICE INSPECTIONS  
AUGUST - SEPTEMBER, 1977

GENERATOR 1A

<u>SAMPLE</u>	<u>SIZE</u>	<u>LOCATION OF SAMPLE</u>	<u>RESULTS</u>
1	7%	OPEN LANE AND ADJACENT TOTALLY RANDOM RANDOM PERIPHERY	3
		1 1/2% 3% 2 1/2%	
2	3%	RANDOM PERIPHERY AND AROUND DEFECTS	1
3	<u>6%</u>	RANDOM PERIPHERY WX XY	1
TOTAL	16%		

OCONEE 1 INSERVICE INSPECTIONS  
AUGUST - SEPTEMBER, 1977

GENERATOR 1B

<u>SAMPLE</u>	<u>SIZE</u>	<u>LOCATION OF SAMPLE</u>	<u>RESULTS</u>
1	7%	OPEN LANE AND ADJACENT TOTALLY RANDOM RANDOM PERIPHERY	1 1/2%, 3% 2 1/2% 5
2	3%	RANDOM PERIPHERY AND AROUND DEFECTS	10
3	6%	PERIPHERY WX XY	10
4	6%	RANDOM PERIPHERY YZ ZW QUAD.	2
5	<u>11%</u>	ALL TUBES PERIPHERY WZ XY QUAD	8 4
TOTAL	33%		