

50-269

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FILE NUMBER
INCIDENT REPORT

TO:
Mr. Norman C. Moseley

FROM:
Duke Power Company
Charlotte, North Carolina
William O. Parker, Jr.

DATE OF DOCUMENT
5/23/77

DATE RECEIVED
6/13/77

LETTER
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DESCRIPTION

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PLANT NAME: (1-P)
Oconee Unit No. 1

RJL 6/14/77

ACKNOWLEDGED

ENCLOSURE

Licensee Event Report (RO 50-269/77-16) on 5/7/77 concerning primary-to-secondary system leakage in "1B" Once-through steam generator..

(4-P)

NOTE: IF PERSONNEL EXPOSURE IS INVOLVED SEND DIRECTLY TO KREGER/J. COLLINS

FOR ACTION/INFORMATION

BRANCH CHIEF:	<i>SCHWENGER</i>
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LIC. ASST.:	<i>SHEPPARD</i>
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EXTERNAL DISTRIBUTION

LPDR: <i>WABHALLASC.</i>			
TIC:			
NSIC:			

CONTROL NUMBER

771660035

R aj

DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

May 23, 1977

TELEPHONE: AREA 704
373-4083

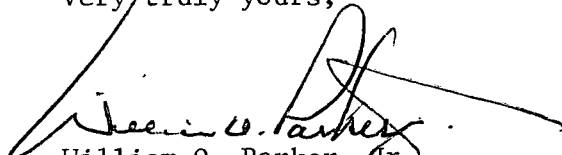
Mr. Norman C. Moseley, Director
U. S. Nuclear Regulatory Commission
Suite 818
230 Peachtree Street, Northwest
Atlanta, Georgia 30303

Re: Oconee Unit 1
Docket No. 50-269

Dear Mr. Moseley:

Pursuant to Sections 6.2 and 6.6.2 of the Oconee Nuclear Station Technical Specifications, please find attached Reportable Occurrence Report RO-269/77-16.

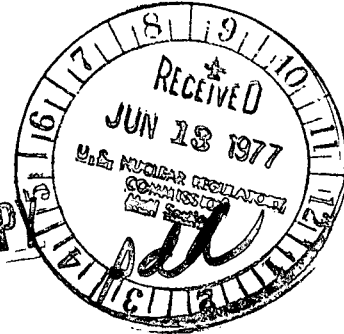
Very truly yours,


William O. Parker, Jr.

LJB:ge
Attachment

cc: Director, Office of Management Information
and Program Control

REGULATORY DOCKET FILE COPY



771660035

DUKE POWER COMPANY
OCONEE UNIT 1

Report No.: RO-269/77-16

Report Date: May 20, 1977

Occurrence Date: May 7, 1977

Facility: Oconee Unit 1, Seneca, South Carolina

Identification of Occurrence: Primary-to-secondary system leakage in "1B"
Once-through steam generator

Conditions Prior to Occurrence: Unit at 100 percent full power

Description of Occurrence:

On May 7, 1977, an increase in radiation levels as registered by air ejector monitor RIA-40 indicated a possible primary-to-secondary system leak occurring in the "1B" once-through steam generator (OTSG). A reactor shutdown was initiated within six hours, and operating procedures for control of secondary contamination were commenced. Within an additional 2 hours from the time that increasing readings were observed on RIA-40, the reactor was in hot shutdown and preparations were made to drain the Reactor Coolant System and investigate the source of the steam generator leakage.

The Reactor Coolant System was cooled and drained and an internal inspection of the "1B" OTSG was initiated within 4 days of the high radiation indication. One leaking tube and one tube with a questionable eddy current indication were plugged. In addition, one tube previously plugged was removed along with its stabilizing rod. The Nuclear Regulatory Commission was informed of these actions prior to plugging and stabilizing the tubes.

Apparent Cause of Occurrence:

Eddy current testing was performed and revealed one leaking tube, identified as tube number 15 in row 77. The leaking tube was discovered to have a circumferential crack approximately one fourth inch below the upper tube sheet. Eddy current examinations of 507 other tubes revealed no additional tube leaks. However, an eddy current signal distortion was found on tube 5 of row 17. Therefore, as a precautionary measure, this tube was plugged. Also, one tube, tube 18 of row 75, previously plugged in December, 1976 was removed along with its stabilizing rod to examine the integrity of the tube and rod. This tube was also plugged.

With regard to this and previous Oconee steam generator tube leaks, evaluation by Duke and the OTSG vendor, the Babcock & Wilcox Company, is continuing. However, there is no evidence to date to indicate that the leaks have resulted from tube wastage/thinning, chemical attack, or intergranular stress-corrosion cracking. Studies indicate, however, that leaks occurring in the tube lanes are caused by propagation of a local defect by high cycle fatigue due to vibration.

Analysis of Occurrence:

Primary-to-secondary system leakage, resulting from this occurrence, was calculated to be approximately 16 gallons per minute after the reactor shutdown. This was detected by installed radiation monitoring equipment. The leakage exceeded the operational limits of Oconee Technical Specification 3.1.6.1. A reactor shutdown was initiated within six hours of the initial radiation indication and immediately upon indication of a rapid increase of the radiation monitor. The calculated gaseous activity released to the environment via the air ejectors was 160 curies. This amount is considered insignificant in comparison to the station's annual release limit.

This report describes the eighth occurrence of steam generator tube leakage experienced on the three Oconee units. In the first three occurrences and the fifth, sixth and eighth occurrences, the defective tubes edged an open tube lane (a radial row with no tubes, used for inspection purposes). In the fourth instance, the leaking defective tube was angularly located approximately 150° counterclockwise from the locations of the other defective tubes and was not adjacent to an open tube lane. In the seventh instance, the leaking tube was located approximately 45° clockwise from the open tube lane. Table 1 provides a summary of the major OTSG tube experience at Oconee.

It is considered that this incident did not affect the health and safety of the public.

Corrective Action:

The leaking tube, tube 15 of row 77, and one other tube with questionable eddy current signals, tube 5 of row 17 were explosively plugged at both ends. Tube 18 of row 75 was removed along with its stabilizing rod for inspection. This tube was plugged at both ends with explosive plugs.

As stated in RO-269/77-2 submitted by my letter of January 31, 1977, the OTSG vendor, Babcock & Wilcox, is currently involved in a program to further evaluate the cause of the tube failures. This program includes a review of deposit samples, a computer evaluation of all available eddy current data, a review of visual observations from fiber-optics and videotapes, and macro-microscopic analysis of two of the defective tubes that were removed from the Oconee Unit 2 "2B" OTSG, one which was removed from the Unit 1 "1B" OTSG, and one tube removed along with its stabilizing rod from the Unit 1 "1B" OTSG. Additionally, the open lane flow characteristics are being analyzed and a detailed stress/vibration analysis is being conducted on the tubes in rows 75 and 77. A review has been made of the Oconee station operating history, the Oconee steam generator manufacturing history and previously conducted OTSG analysis and testing results.

TABLE 1
SUMMARY OF MAJOR OTSG TUBE EXPERIENCE AT OCONEE

GENERATOR	ROW	TUBE	ELEVATION	DATE	LANE TUBE	LEAKER	CONDITION	ACTION	RO#	# TUBES EXAMINED (excludes leakers)
1-A	77	17	Tubesheet	11/76	Yes	Yes	Crack	Plugged	RO-269/76-17	15
1-A	77	18	Tubesheet	11/76	Yes	No	Distorted Eddy Current Signal	Plugged		
1-B	114	109	14th Plate	12/76	No	Yes	No Visual Inspection	Nailed	RO-269/76-19	139
1-B	113	115	14th Plate	12/76	No	No	Distorted Eddy Current Signal	Plugged		
1-B	113	110	14th Plate	12/76	No	No	Similar to 114/109	Nailed		
1-B	75	18	Tubesheet	12/76	Yes	No	300° Crack	Nailed		
1-B	75	12	Tubesheet	1/77	Yes	Yes	350° Crack	Nailed	RO-269/77-2	140
1-B	81	128	Tubesheet	1/77	No	No	Eddy Current Indication	Nailed		
1-B	32	13	14th Plate	2/77	No	Yes	Eddy Current Indication	Nailed	RO-269/77-8	3%
1-B	33	14	14th Plate	2/77	No	No	Eddy Current Indication	Nailed		
1-B	77	25	14th Plate	2/77	Yes	No	Eddy Current Indication	Removed		
1-B	2	7	13th Plate	2/77	No	No	Eddy Current Indication	Plugged		
1-B	2	8	13th Plate	2/77	No	No	Eddy Current Indication	Plugged		
1-B	101	40	4th Plate	2/77	No	No	Eddy Current Indication	Plugged		

TABLE 1
SUMMARY OF MAJOR OTSG TUBE EXPERIENCE AT OCONEE (Cont'd)

GENERATOR	ROW	TUBE	ELEVATION	DATE	LANE TUBE	LEAKER	CONDITION	ACTION	RO#	# TUBES EXAMINED (excludes leakers)
1-B	77	25	Tubesheet	3/77	Yes	Yes	Weld Crack	Replug- ged	RO-269/77-11	100
1-B	77	3,5,8, 22,29	---	3/77	Yes	No	Distorted Eddy Current Signal	Plugged		
1-B	77	15	Tubesheet	5/77	Yes	Yes	Crack	Plugged	RO-269/77-16	507
1-B	77	18	---	5/77	Yes	No	--	Removed		
1-B	17	5	---	5/77	No	No	Distorted Eddy Current Signal	Plugged		
2-B	77	23	Tubesheet	12/76	Yes	Yes	270° Crack, Hole	Removed	RO-270/76-15	133
2-B	77	27	15th Plate	12/76	Yes	No	Wear Appearance	Removed		
2-B	124	42	12th Plate	12/76	No	No	Eddy Current Indication, 40-60%	Plugged		
2-B	118	52	12th Plate	12/76	No	No	Similar to 124/42, 15%	Left		
3-B	77	11	15th Plate	7/76	Yes	Yes	No Visual Inspection	Plugged	RO-287/76-10	9
3-B	77	19	15th Plate	2/77	Yes	Yes	Eddy Current 45° Crack	Nailed	RO-287/77-2	142
3-B	77	12,13,14,15 16,17,18,20, 21		2/77	Yes	No	Eddy Current	Nailed		
3-B	75	2		2/77	Yes	No	Eddy Current	Nailed		

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