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FACIL:50-261 H. B. Robinson Plant, Unit 2, Caroline Power and Ligh 05000261
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STARKEY,R.B. Caroline Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Region 2, Atlanta, Office of the Director

SUBJECT: LER 80-022-01T:on 800918,during refueling outage,review of eddy current insp data revealed results in C-3 category defined by Tech Specs.Caused by defective tubes in A & B steam/generator inlets & outlets due to corrosion.

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	JORDAN,E./IE		1	1	LIC GUID BR	30	1	1
	LIC QUAL BR	31	1	1	MATL ENG BR	32	1	1
	MECH ENG BR	33	1	1	MPA		3	3
	NRC PDR	02	1	1	OP EX EVAL BR	34	3	3
	OR ASSESS BR	35	1	1	POWER SYS BR	36	1	1
	RAD ASSESS BR	39	1	1	REACT SYS BR	40	1	1
	[redacted]	01	1	1	REL & RISK A	41	1	1
	SFTY PROG EVA	42	1	1	STRUCT ENG BR	44	1	1
	SYS INTERAC B	45	1	1				
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LICENSEE EVENT REPORT

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EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 During refueling outage, review of eddy current inspection data on 9/18/80 revealed
03 that the B S/G results were in the C-3 category as defined by Technical Specification
04 section 4.2.5.1.2(b). After additional inspections had been performed, a similar
05 review revealed that the A S/G results were also in the C-3 category. This is
06 reportable under Technical Specification 6.9.2a in accordance with Technical
07 Specification 4.2.5.3.3. As the plant was in the cold shutdown condition, there was
08 no threat to public health or safety. (Reference: LER 80-09)

09 SYSTEM CODE: C A (11) CAUSE CODE: E (12) CAUSE SUBCODE: D (13) COMPONENT CODE: H T E X C H (14) COMP. SUBCODE: F (15) VALVE SUBCODE: Z (16)

(17) LER/RO REPORT NUMBER: EVENT YEAR: 8 0 — SEQUENTIAL REPORT NO.: 0 2 2 / OCCURRENCE CODE: 0 1 REPORT TYPE: T — REVISION NO.: 0

ACTION TAKEN: X (18) FUTURE ACTION: Z (19) EFFECT ON PLANT: Z (20) SHUTDOWN METHOD: Z (21) HOURS (22): 0 0 0 0 ATTACHMENT SUBMITTED: Y (23) NPRD-4 FORM SUB.: N (24) PRIME COMP. SUPPLIER: N (25) COMPONENT MANUFACTURER: W 1 2 0 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 The inspection of A and B S/G inlets and outlets revealed 37 and 53 defective tubes
11 respectively. Since, in each case, more than one percent of the total number of tubes
12 remaining in service (100% inspected) were found to be defective, the results were
13 categorized C-3. All defective tubes were mechanically plugged. The defective
14 tubing was the result of outside diameter tube wall corrosion. A complete report will be submitted.

15 FACILITY STATUS: A (28) % POWER: 0 0 0 (29) OTHER STATUS (30): NA METHOD OF DISCOVERY: B (31) DISCOVERY DESCRIPTION (32): Annual Inspection

16 ACTIVITY RELEASED: Z (33) CONTENT OF RELEASE: Z (34) AMOUNT OF ACTIVITY (35): NA LOCATION OF RELEASE (36): NA

17 PERSONNEL EXPOSURES NUMBER: 0 0 0 (37) TYPE: Z (38) DESCRIPTION (39): NA

18 PERSONNEL INJURIES NUMBER: 0 0 0 (40) DESCRIPTION (41): NA

19 LOSS OF OR DAMAGE TO FACILITY (43) TYPE: Z (42) DESCRIPTION: NA

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20 PUBLICITY ISSUED: N (44) DESCRIPTION (45): NA

NRC USE ONLY

NAME OF PREPARER: R. B. Starkey, Jr. PHONE: (803) 383-4524

GPO 917-926

SUPPLEMENTAL INFORMATION

FOR

LICENSEE EVENT REPORT 80-022

I. Cause Description and Analysis

During the 1980 refueling outage, a Steam Generator (S/G) Eddy Current Inspection was performed which met the requirements of Technical Specification (T.S.) sections 4.2.5.1.2 and 4.2.5.1.4. The inspection scope is shown below:

S/G	Inlet (Original)	Outlet (Original Sample)	Outlet (Expanded)
A	3032 (100%)	1587	2615
B	3106 (100%)	1859	2767
C	3075 (100%)	2132	NA

A review of E/C data on 9/18/80, after completion of the original inspection sample, revealed that 32 defective tubes had been identified by the B S/G inlet inspection. This placed B S/G results in the C-3 category as defined by Technical Specification section 4.2.5.1.2. On 9/23/80, as a result of additional defective tubes identified during the A S/G expanded outlet program, the results for this S/G placed it also in the C-3 category. The final number of defective tubes identified was 37 in A S/G and 53 in B S/G. In each case the number of defective tubes exceeded 1% of the initial inspection sample of 100% of the inlet tubes.

The defective tubes in A and B S/Gs were the result of phosphate thinning above the tubesheet on the inlet and outlet sides and local corrosion in the tubesheet crevice region on the inlet sides. The local corrosion is believed to be an intergranular attack and stress corrosion cracking phenomenon similar to that which has been observed at other plants.

Additional defective tubes in A S/G were the result of tube wall wastage at or above support plates in peripheral tubes and generalized tube wall corrosion in the U-bend regions. The U-bend corrosion has been demonstrated not to be a cracking phenomenon.

Since the unit was in the cold shutdown condition, there was never any threat to public health or safety as a result of this event.

II. Corrective Action

All tubes with eddy current indications greater than 47% (defective tubes) were taken out of service by mechanical plugging. This is consistent with the requirements of Technical Specification section 4.2.5.2.

III. Corrective Action to Prevent Further Occurrence

In order to determine the cause of U-bend tube degradation, two tube samples were removed from tubes in A S/G with known defects and subjected to destructive and non-destructive analyses. Preliminary examination results indicated a form of generalized corrosion. The non-destructive examination showed no evidence of cracking, and metallographically there was no evidence of a localized corrosion process accompanying the thinning process. Specifically, no intergranular attack or grain boundary penetration, such as might be associated with the actions of caustic on Inconel 600 was detected, and there was no intergranular attack of the kind that is attributable to stress assisted intergranular corrosion.

Evaluation of the samples and the data gathered to date is continuing in an attempt to identify the specific mechanism and/or contaminant responsible. Also sludge lancing was performed on each S/G this refueling outage, and this practice will be continued in order to minimize the phosphate thinning.

Continued close surveillance of the condition of the tube bundle via eddy current inspection will be continued. The scope of the inspection to be performed during the next refueling outage will be no less than the scope of the 1980 refueling outage inspection. In addition, continued close surveillance of S/G chemistry will be maintained.

The corrective actions described are considered adequate to ensure the continued safe condition of the H. B. Robinson Unit No. 2 steam generators for the next operating cycle. A complete report detailing this inspection, inspection results and justification for the existing plugging criteria will be submitted under separate cover.