LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1	N J O C P 1 (2)	0 0 - 0 0 0 0 0 - 0 0 (3)	4 1 1 1 1 (4)	(5)		
	LICENSEE CODE	LICENSE NUMBER	LICENSE TYPE	CAT		
CON'T 0 1	REPORT SOURCE L (6)	0 5 0 0 0 2 1 9 (7)	0 2 1 9 8 0 (8)	0 3 1 9 8 0 (9)		
		DOCKET NUMBER	EVENT DATE	REPORT DATE		

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 During the annual inspection of the containment spray heat exchangers,

0 3 it was discovered that the four heat exchangers had developed leaks.

0 4 Tube leakage will result in the leaking of torus water into the emerg-

0 5 ency service water discharge line to the discharge canal when each cont-

0 6 ainment spray system is operated once a month for approximately 15 to 30

0 7 minutes. The maximum estimated amount of torus water leaking into the

0 8 discharge canal did not exceed the limits specified by 10CFR20.

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
0 9	S B (11)	B (12)	B (13)	H T E X C H (14)	C (15)	Z (16)

(17) LER/RO REPORT NUMBER	EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
	8 0	—	0 0 9	/	0 3	L	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
X (18)	F (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	Y (24)	L (25)	M 1 8 7 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 The cause of the occurrence is attributed to component failure and to the

1 1 design of the heat exchangers. Tubes were removed and analyzed. An

1 2 eddy-current inspection of the tubes in one heat exchanger was perform-

1 3 ed. Based on the extent of tube damage and the corrosion mechanism

1 4 identified, the heat exchangers will be retubed with titanium tubes.

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
1 5	H (28)	0 0 0 (29)	NA	B (31)	Annual Inspection

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
1 6	L (33)	M (34)	Minimal	To discharge canal

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
1 7	0 0 0 (37)	Z (38)	NA

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
1 8	0 0 0 (40)	NA

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
1 9	Z (42)	NA

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PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
2 0	Y (44)	Weekly News Release - 3/20/80	

JCP&L GPU

Jersey Central Power & Light Company
Madison Avenue at Punch Bowl Road
Morristown, New Jersey 07960
(201) 455-8200

OYSTER CREEK NUCLEAR GENERATING STATION
Forked River, New Jersey 08731

Licensee Event Report
Reportable Occurrence No. 50-219/80-9/3L

Report Date

March 19, 1980

Occurrence Date

February 19, 1980

Identification of Occurrence

During the annual inspection of the containment spray heat exchangers, it was discovered that the four heat exchangers had developed tube leaks. This event was recognized as a reportable occurrence on February 19, 1980.

This event is considered to be a reportable occurrence as defined in the Technical Specifications, paragraph 6.9.2.b.4.

Conditions Prior to Occurrence

The plant was shutdown for a refueling/maintenance outage.

The reactor was subcritical.
The reactor mode switch was locked in REFUEL.
The cavity was flooded.
The primary containment was not required.

Description of Occurrence

On January 24, 1980, while performing an inspection of containment heat exchanger 1-2, it was observed that water from the containment spray system (shell side) had collected on the emergency service water system (tube side) of the heat exchanger due to tube leakage. One tube was observed to be leaking at the time. On January 29, 1980, inspection of heat exchanger 1-4 revealed that tube leaks had developed in that heat exchanger also. Subsequent inspection indicated that heat exchangers 1-1 and 1-3 in the opposite loop were also leaking.

Apparent Cause of Occurrence

The cause of this occurrence is attributed to component failure and to the design of the heat exchangers.

Analysis of Occurrence

The containment spray cooling system consists of two independent cooling loops, each loop capable of removing fission product decay heat from the primary containment after a postulated loss of coolant accident. Each independent loop has two heat exchangers and two pumps.

A review of containment spray system surveillance tests revealed the pressure on the containment spray side of the heat exchangers has been noted to exceed the pressure on the emergency service water side. The operation of this system with the tube leakage will result in the leaking of torus water into the emergency service water discharge line to the discharge canal. Each containment spray system is operated once a month for approximately 15 to 30 minutes.

The exact amount of torus water that was released during the operation of the containment spray system is virtually impossible to determine. There is not a reliable method to calculate the volume of water before and after the pump tests.

The maximum estimated amount of torus water leaking into the discharge canal did not exceed the limits specified by 10CFR20. A calculation revealed that with our minimal dilution flow, and the isotopic concentrations of the torus water, we would have to leak in excess of 250 GPM. Calculations have been performed and with the most severe reported conditions evaluated, we did not approach 250 GPM.

During the time the system is in standby condition, there is no leakage of torus water because the service water system maintains a flow through the heat exchangers. The flow is at a higher pressure than the containment spray side. In addition, torus water samples over the past few months indicate there was a rise in chloride concentration which verifies saltwater entering the torus.

The worst case evaluation for salt water in-leakage revealed there is a leak rate of 2.82×10^2 GPM. This is based on 700,000 gallons of torus water and 160 PPM of chlorides over a 6 month period since the chlorides have increased. Reversing this flow rate for the time the containment spray system is being tested (ΔP is actually lower during test than during usual operation, but the higher known value will be used for calculations) and a 500,000 dilution rate, the total concentration discharged is 3.16×10^{12} µCi/ml. This concentration is well below allowable release rate.

Corrective Action

The leaking tubes were temporarily plugged and the heat exchangers were completely drained. On February 14, 1980, one tube from heat exchangers 1-2 and 1-4 was removed for analysis of the cause for the tube failures. The analysis revealed that the tubes were perforated from the saltwater side by an apparent deposit attack. This mechanism forms pits underneath porous deposits via an oxygen differential cell. Any oxygen aeration cell is formed with the oxygen difficient area below the deposit becoming the anode resulting in extensive corrosion underneath the deposit. Another form of deposit attack that may have been caused by anaerolsic bacteria. These bacteria reduce the natural sulfate in seawater to sulfides. The sulfides then cause pitting by reacting with copper alloys to form a non-protective corrosion product.

In parallel with this analysis, an eddy-current inspection of the tubes in heat exchanger 1-4 was performed to determine the extent of tube damage. A total of 650 tubes were inspected and revealed that 96 tubes (approximately 15%) were definitely bad with an additional 58 tubes showing signs of corrosion on the inside diameter.

Based on the extent of tube damage and the corrosion mechanism identified, it has been decided to completely retube the containment spray heat exchangers with titanium tubes which are highly resistant to corrosion and erosion. The retubing will be completed during the current outage.

Failure Data

Manufacturer:	McQuay-Perfex, Inc.
Type:	AFM Vertical Heat Exchanger
Tubes:	90-10 CuNi
S/N:	936101-1, 936101-2, 936101-3, 936101-4