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Writer's Direct Dial Number:

August 4, 1994  
C321-94-2123

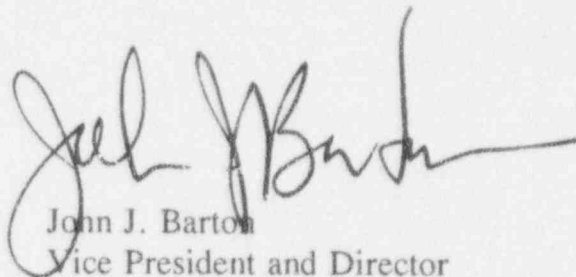
U. S. Nuclear Regulatory Commission  
Att: Document Control Desk  
Washington, DC 20555

Dear Sir:

Subject: Oyster Creek Nuclear Generating Station  
Docket No. 50-219  
Licensee Event Report 94-010

Enclosed is the Licensee Event Report 94-010.

If there are any questions please contact Mr. John Rogers at 609.971.4893.



John J. Barton  
Vice President and Director  
Oyster Creek

JJB/JJR  
Attachment

cc: Administrator, Region I  
Senior Resident Inspector  
Oyster Creek NRC Project Manager  
9408120015 940804  
PDR ADOCK 05000219  
S PDR

100097

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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

Oyster Creek, Unit 1

DOCKET NUMBER (2)

05000219

PAGE (3)

1 OF 4

TITLE (4)

Reactor Shutdown Commenced Due to Loss of Both Containment Spray Systems due to Biological Plugging

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	05	94	94	-- 010 --	00	08	04	94	FACILITY NAME	DOCKET NUMBER
										05000
										05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER LEVEL (10)	100	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
		20.405(a)(1)(i)		50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)
		20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
		20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iv)	X	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
		20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME

John Galanto

TELEPHONE NUMBER (Include Area Code)

609.971.4349

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE).

X

NO

EXPECTED SUBMISSION DATE (15)

MONTH

DAY

YEAR

ABSTRACT (16) (Limit to 1400 spaces, i.e., approximately 15 single-spaced lines)

On July 5, 1994 at approximately 1155 hours, both Containment Spray and Emergency Service Water systems were declared inoperable due to high differential pressure on the tube side of the heat exchanger due to biological plugging. A 30 hour plant shutdown was commenced per Technical Specifications. The heat exchangers were cleaned and returned to service prior to completion of the shutdown. The plant was returned to full power. The cause of this event was the release of Blue Mussel shells and other minimal biological debris into the heat exchangers.

Immediate corrective action was taken to clean, inspect, and return the heat exchangers to operability. Additional corrective actions are planned to inspect and clean the Emergency Service Water piping during the upcoming refueling outage and install inspection ports in the affected systems to assist in the early detection of possible future concerns.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION  
APPROVED BY OMB NO. 3150-0104  
EXPIRES 5/31/95

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Oyster Creek, Unit 1	05000219	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
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**DATE OF OCCURRENCE**

The event occurred on July 5, 1994, at approximately 1155 hours.

**IDENTIFICATION OF OCCURRENCE**

While performing a scheduled monthly surveillance on Containment Spray (EIS BO) and Emergency Service Water (EIS BS) system 2, heat exchanger (EIS HX) differential pressure was observed to increase beyond the operability limit specified in the procedure. Containment Spray and Emergency Service Water system 1 was then run with the same result. Both systems were declared inoperable and a 30 hour plant shutdown was commenced per Technical Specifications. This event is considered reportable in accordance with 10 CFR 50.73(a)(2)(i), 10 CFR 50.73(a)(2)(ii), and 10 CFR 50.73(a)(2)(v).

**CONDITIONS PRIOR TO OCCURRENCE**

The Reactor was operating at approximately 100% power. Containment Spray and Emergency Service Water system 2 was being operated for a normal monthly surveillance.

**DESCRIPTION OF OCCURRENCE**

On July 5, the normal monthly system operability test for Containment Spray and Emergency Service Water system 2 was commenced. Shortly after the pumps were started (one Containment Spray pump and one Emergency Service Water pump) it was noticed that both heat exchanger tube to shell differential pressure indications in the Control Room began to decrease to the alarm set point. Tube to shell differential pressure measures the inlet pressure to the heat exchangers on the Containment Spray (shell) side and the outlet pressure of the heat exchangers on the Emergency Service Water (tube) side. As the tube side of the heat exchangers plug, the tube to shell differential decreases. The operators checked the flow rate of the Emergency Service Water pump and found it to be twenty four hundred gallons per minute which is below the expected value of approximately thirty five hundred gallons per minute. The operators then checked the heat exchanger tube side differential pressures which are local gauges and found differential pressures exceeding the operability limit of 40 pounds per square inch differential (psid). The actual readings were 75 psid for the 1-3 heat exchanger and 58 psid for the 1-4 heat exchanger.

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**DESCRIPTION OF THE OCCURRENCE (Cont.)**

System 2 was run for approximately twenty minutes prior to being shutdown and declared inoperable.

As a result of the plugging in Containment Spray system 2 heat exchangers, Containment Spray and Emergency Service Water system 1 was run to determine its operability. Within minutes of starting the Emergency Service Water pump the tube side differential pressure began to increase quickly and pump flow began to decrease. Heat exchanger differential pressures exceeded the operability limit of 40 psid. The system was shutdown and declared inoperable. This resulted in both Containment Spray systems being inoperable at the same time which required a reactor shutdown within 30 hours per plant Technical Specifications.

**CAUSE OF THE OCCURRENCE**

The cause of the heat exchanger high differential pressures was a result of biological plugging mostly consisting of blue mussel shells deposited on the first pass tube sheet. The mussels were nearly all found dead, with very little tissue left in the shells. It is strongly believed that the mussel shells found in the heat exchangers had been growing inside the Emergency Service Water piping and were released when the Intake water exceeded the temperatures which can support life. This can occur each summer when the Intake water reaches approximately 80 °F. The amount of biological plugging which occurred during this event is greater than any which had been previously experienced, and may have been aggravated by previous loss of the chlorination system.

**ANALYSIS OF OCCURRENCE AND SAFETY SIGNIFICANCE**

Oyster Creek has two Containment Spray and Emergency Service Water systems. Emergency Service Water pumps take suction at the Intake Structure (EIIS-NN) and supply Barnegat Bay water to the tube side of the Containment Spray heat exchangers. Plugging of the heat exchangers is an event typically experienced during the summer months and causes tube side differential pressures to increase. Past experience has shown that differential pressures trend up from test to test during the normal monthly surveillance but have never exceeded eleven psid from one test to the next. When differential pressures reach approximately 20 psid the heat exchangers are scheduled for cleaning. The operability limit is 40 psid. Data have been collected in the past for several days of Emergency Service Water system operation during the summer months with typically very little increase in heat exchanger differential pressure (several psid). The Emergency Service Water systems are chlorinated when idle.

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**ANALYSIS OF OCCURRENCE AND SAFETY SIGNIFICANCE (Cont.)**

The Emergency Service Water systems provide for the long term heat removal of the energy released from the primary containment (EHS BD) during a design basis Loss of Coolant Accident. Partial plugging of the heat exchangers does not cause a problem for the heat removal capability because they are four pass heat exchangers and are over designed. Also the flow rates are not reduced significantly when the units are plugged to normally expected levels. Although the indicated flow rate was twenty four hundred gallons per minute, the discharge pressure of the pump running at the time indicated a flow rate of approximately thirty two hundred gallons per minute. The lower indicated flow was a result of a plugged flow sensing element causing an indicated flow rate lower than the actual flow rate. The required flow rate for a design basis accident is three thousand gallons per minute. Even with the very high differential pressures, flow rate through the heat exchangers was above the required flow.

The structural limit for differential pressure across the heat exchanger baffle plates has been calculated to be seventy psid. The 1-3 heat exchanger reached a differential of seventy five psid. The baffle plates were inspected and found normal.

Continued operation of the Emergency Service Water systems under the plugged condition could have eventually caused structural damage to one or more of the baffle plates rendering the heat exchanger less effective for heat removal. There would have been no failure of the pressure boundary of the system.

This event has been determined to be potentially safety significant in that excessive heat exchanger plugging could interfere with heat removal during an accident and require operators to implement contingency procedures. Additionally, as corrective actions were initiated and completed prior to the complete dislodging of all the dead mussels, the final differential pressure which might have occurred across the heat exchanger tube sheet is not known.

**CORRECTIVE ACTION**

The System 2 heat exchangers were cleaned and placed back in service on July 6, 1994 within the thirty hour shutdown window. The shutdown was terminated and a return to full power was commenced. The System 1 heat exchangers were then cleaned, inspected, and placed back in service on July 8, 1994.



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**CORRECTIVE ACTIONS (Cont.)**

Additional corrective actions will include: 1) Performing an internal piping inspection on the Emergency Service Water system before the end of the upcoming refueling outage (15R) to determine if biological fouling of the piping still exists; 2) cleaning the Emergency Service Water piping in 15R if necessary to eliminate any growth that has occurred; 3) installing piping inspection ports during cycle 15 to assist in the early detection of any future biological growth inside the piping; and 4) determining, by the end of December 1994, the effectiveness of the chlorination system in each Emergency Service Water system.

**SIMILAR OCCURRENCES**

LER 85-018      Emergency Service Water Pipe Coating Failure