PSE&G

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Hope Creek Operations

FEB 1 2 1996

LR-N96046

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

Dear Sir:

HOPE CREEK GENERATING STATION
DOCKET NO. 50-354
UNIT NO. 1
LICENSEE EVENT REPORT 96-001-00

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v).

Sincerely,

M. E. Reddemann
General Manager -
Hope Creek Operations

RAR/tcp

Attachment
SORC Meeting 96-019
c Distribution

IE22

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
HOPE CREEK GENERATING STATION	05000354	1 OF 6

TITLE (4)

Safety and Turbine Auxiliaries Cooling System Heat Exchangers Fouled with Grass due to a Failed Service Water Strainer

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
01	13	96	96	-- 001 --	00	02	12	96		05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER LEVEL (10)	0		20.2201(b)	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(viii)
			20.2203(a)(1)	20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)	20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)	50.36(c)(1)	X	50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Robin Ritzman, Lead Engineer - Operational Licensing	(609) 339-1445

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)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO		XX	XX	XX

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

On 1/10/96, during planned maintenance, the 'C' Service Water Pump Outlet Strainer was discovered to be damaged. On 1/13/96, at 1530, during a planned 'A' Service Water loop outage, both 'A' loop Safety and Turbine Auxiliaries Cooling System (STACS) Heat Exchangers were discovered to be partially fouled with river detritus on the Service Water side. STACS consists of two redundant loops, with two 50% capacity heat exchangers in each loop. Approximately one-third of the tubes were covered with detritus on one of the 'A' loop STACS Heat Exchangers, and approximately 5% of the tubes on the other one. The normal configuration of Service Water is to cross-tie the 'A' and 'B' loops; therefore, the potential existed for debris to have flowed through the failed 'C' Service Water Pump Outlet Strainer and to foul the two 'B' loop STACS Heat Exchangers. A four hour report was made to the NRC on 1/13/96, at 1739, in accordance with 10CFR50.72(b)(2)(iii). The cause of the detritus in the STACS Heat Exchangers was a failed Service Water Strainer. The cause of the strainer failure is believed to be high differential pressure due to detritus overloading the strainer elements. The overloading was caused by detritus carryover from the Service Water Traveling Screens. The Service Water Traveling Screen carryover was caused by inadequate Screen Wash Spray flow. Corrective Actions include replacing the failed strainer, inspections on the redundant equipment, enhanced maintenance and design modification. This LER is being submitted in accordance with 10CFR50.73(a)(2)(v).

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)
Safety Auxiliaries Cooling System, EIIS Identifier: CC
Station Service Water, EIIS Identifier: BI

IDENTIFICATION OF OCCURRENCE

Discovery Date: January 13, 1996
Report Date: February 12, 1996
Problem Report: 960113246

CONDITIONS PRIOR TO OCCURRENCE

Plant in OPERATIONAL CONDITION 5 (REFUELING)

DESCRIPTION OF OCCURRENCE

On January 10, 1996, during planned maintenance, the 'C' Service Water Pump Outlet Strainer was discovered to be damaged. This failure consisted of a strainer rupture that allowed an unfiltered path of river water to reach the Safety and Turbine Auxiliaries Cooling System (STACS) Heat Exchangers. On January 13, 1996, at 1530, during a planned 'A' Service Water loop outage, both 'A' loop STACS Heat Exchangers were discovered to be partially fouled with river detritus. Approximately one-third of the tube sheet was covered with detritus on one of the 'A' loop STACS Heat Exchangers, and approximately 5% of the tube sheet on the other one. The normal operation of Service Water is alignment of the four STACS Heat Exchangers (two loops) to a common header. Therefore, the potential existed for debris to have flowed through the failed 'C' Service Water Pump Outlet Strainer. A remote possibility existed to affect the two 'B' loop STACS Heat Exchangers.

A four hour report was made to the NRC on January 13, 1996, at 1739, in accordance with the Event Classification Guide and the requirements of 10CFR50.72(b)(2)(iii). This report was made based on the discovery of fouling of the 'A' STACS Heat Exchangers and the potential to have fouled the 'B' STACS Heat Exchangers. It should be noted that the 'B' loop was in service at the time and was effectively removing all decay heat loads.

ANALYSIS OF OCCURRENCE

STACS consists of redundant loops that provide closed loop cooling to safety related and non-safety related equipment. Each of the loops has two 50% capacity heat exchangers. The Service Water system provides the ultimate heat sink for STACS and the non-safety related Reactor Auxiliaries Cooling System (RACS). During normal plant operation, the two Service Water loops are fed from a common header. The header is signaled to split into two loops upon receipt of an accident signal. RACS remains in service during Loss of Power conditions, but is isolated during Loss of Coolant Accident conditions.

Each Service Water Pump and Intake Bay has a dedicated traveling screen that is designed to remove large items and debris prior to entry into the pump bay and potentially into the pump inlet. Each traveling screen is supplied with a Screen Wash Booster Pump that supplies spray water to a set of headers and nozzles. The spray wash system removes debris from the traveling screen for disposal into the traveling screen trough.

Each Service Water Pump also has a dedicated self-cleaning strainer installed at the discharge of the pump. The strainer is designed to remove smaller debris from the Service Water system. The strainer initiates a backwash cycle whenever the differential pressure across the strainer reaches its setpoint. When the setpoint is reached, the backwash blowdown valve opens a discharge path to the river.

The failure of the 'C' Service Water Strainer is believed to have occurred sometime between December 28, 1995 and January 10, 1996. The cause of the strainer failure is believed to be high differential pressure due to overloading on the strainer. The overloading was caused by detritus carryover from the Service Water Traveling Screens.

The Service Water Traveling Screen carryover was caused by inadequate Screen Wash Spray flow. Silt and debris had accumulated in the Spray Wash Header, causing the nozzles to become clogged. The failure of the strainer backwash valve, low Traveling Screen Spray Wash flow, and the inability of the Service Water Strainers to withstand pump shutoff head also contributed to the event.

The Spray Wash Header nozzles can become plugged, resulting in a lack of spray wash on the area of the screen serviced by the plugged nozzle. This can allow detritus to be carried into the intake bay and ultimately to the pump suction. Plugged spray nozzles on the 'C' Spray Wash header were discovered after the strainer failure was identified.

PRIOR SIMILAR OCCURRENCES

There has been a previously reported event that affected the Service Water System Traveling Screens. LER 94-018 was submitted as a voluntary report to discuss a design discrepancy that was associated with the Spray Wash Booster Pump flow sensing device. This deficiency could have resulted in the operation of the Service Water System Traveling Screens without having the booster pumps in service. This previous occurrence was similar in that it involved a design deficiency in the Service Water system. There is no direct correlation between the two issues. The corrective actions associated with LER 94-018 could not have been expected to prevent this event from occurring.

CAUSE OF THE OCCURRENCE

The cause of the strainer failure is believed to be high differential pressure due to detritus overloading the strainer elements. The overloading was caused by detritus carryover from the Service Water Traveling Screens.

The Service Water Traveling Screen carryover was caused by inadequate Screen Wash Spray flow. Silt and debris had accumulated in the spray wash header, causing the nozzles to become clogged. The causes of the accumulation of debris are inadequate design for flushing the spray wash header and the lack of a preventive maintenance activity to flush the debris from the spray wash header. The failure of the strainer backwash valve, low Traveling Screen Spray Wash flow, and the inability of the Service Water Strainers to withstand pump shutoff head also contributed to the event.

SAFETY SIGNIFICANCE

STACS consists of two redundant loops. Each loop has two 50% capacity pumps and two 50% capacity heat exchangers. During normal operation of the STACS system, two STACS pumps are utilized. During summer operating conditions, with high ultimate heat sink temperature, three pumps are typically utilized to provide cooling to the safety related and non-safety related heat loads. At the time of discovery of this event, only two pumps were in service.

SAFETY SIGNIFICANCE

Since discovery of the strainer failure and detritus in the heat exchangers, a flow test has been performed on the 'B' loop heat exchangers. This flow test indicates that for each of the 'B' STACS Heat Exchangers, the current flow rate is greater than 12,000 gpm. This flow rate provides reasonable assurance that these heat exchangers were not adversely impacted by the strainer failure.

An evaluation was conducted to determine the safety significance associated with this event. As part of this evaluation, a design basis accident was postulated to have occurred during the time that the heat exchanger was fouled. The maximum expected STACS heat load for the postulated accident was calculated to be 77,120,000 Btu/hr. Under the conditions that existed from December 28, 1995 to January 10, 1996, the heat removal rate of a single SACS Heat Exchanger was evaluated to be 268,570,000 Btu/hr. This evaluation assumed a 34°F ultimate heat sink temperature and the then-current decay heat loading.

An evaluation of the safety significance associated with this event, had it occurred at power, with a high ultimate heat sink temperature (Technical Specification maximum of 88.6°F), and assuming two operable heat exchangers, has determined that the maximum expected STACS heat load is calculated to be 100,700,000 Btu/hr per heat exchanger and that the heat removal rate of each SACS Heat Exchanger is evaluated to be 102,360,000 Btu/hr.

Prior to the discovery of the event, the system was in service and the strainer failure was undetected. Therefore, the remote potential existed that an undetected strainer failure could have allowed detritus to affect each heat exchanger and result in degraded heat removal capability.

CORRECTIVE ACTIONS

The failed strainer has been replaced.

The 'C' Spray Wash Header nozzles and pressure transmitter sensing lines have been cleaned. The remainder of the Spray Wash Header nozzles and pressure transmitter sensing lines will be cleaned prior to the end of the current refueling outage.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

CORRECTIVE ACTIONS

The 'B' STACS Heat Exchangers will be inspected prior to the end of the current refueling outage.

The remaining Service Water Strainers will be inspected for damage prior to the end of the current refueling outage.

As planned prior to this event, the Spray Wash system will be modified to add nozzles and to facilitate debris removal. These modifications will be completed during the next Service Water System Traveling Screen outages.

As planned prior to this event, preventive maintenance activities will be initiated to periodically flush the spray wash header and nozzles.

Normal operation of the Service Water System with the loops inter-connected will be re-evaluated prior to the end of the current refueling outage.

A method for earlier detection of Service Water Strainer failures will be investigated.