Maine Yankee
RELIABLE ELECTRICITY SINCE 1972

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March 23, 1994
MN-94-24 JRH-94-57

UNITED STATES NUCLEAR REGULATORY COMMISSION
Attention: Document Control Desk
Washington, DC 20555

Reference: (a) License No. DPR-36 (Docket No. 50-309)

Subject: Maine Yankee Licensee Event Report 94-003, Service Water Flow Measured Outside Design Basis

Gentlemen:

Please find enclosed Maine Yankee Licensee Event Report 94-003. This report is submitted in accordance with 10CFR50.73(a)(2)(ii).

Please contact us should you have any questions regarding this matter.

Very truly yours,

James R. Hebert, Manager
Licensing & Engineering Support Department

SJB

Enclosure

c: Mr. Thomas T. Martin
Mr. J. T. Yerokun
Mr. E. H. Trottier
Mr. Patrick J. Dostie

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Maine Yankee Atomic Power Company	50-309	1 OF 4

TITLE (4)
Service Water Flow Potentially Outside Design Basis

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
02	22	94	94	-- 003 --	00	03	23	94	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	7
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		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)		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	TELEPHONE NUMBER (Include Area Code)
Lisa M. Knobel, Senior Nuclear Safety Engineer	(207) 882-6321

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
X	YES (If yes, complete EXPECTED SUBMISSION DATE).		NO		07	01	94

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

The Maine Yankee Service Water system provides cooling to the Component Cooling systems which cool Emergency Core Cooling equipment. Maine Yankee's response to GL 89-13 included installing flow measuring devices in the Service Water system and a review of Service Water Operational Performance Inspections at other plants. Through this review, heat exchanger flow imbalance was identified as an issue. Further analysis of flow data collected at Maine Yankee revealed that the Service Water system is susceptible to flow imbalances due to heat exchanger inlet strainer differential pressures and design differences. The inlet strainer differential pressures lead to flow imbalances which require an increased penalty in the system's safety analysis. As a result, on February 22, 1994, Maine Yankee concluded that, in the past, Service Water flow may not have met design basis requirements with warm river water temperatures. During the winter months the river water temperatures are low enough to provide sufficient cooling to the Component Cooling water heat exchangers. However, in the summer, the river water temperatures rise above that required to sufficiently cool the Component Cooling Water heat exchangers under all design conditions. Thus, Maine Yankee may have operated the Service Water system outside its current design basis. Maine Yankee is investigating several options to assure the Service Water system meets design requirements during summer months including: improving the screening of the service water pump intake water, improving service water pump performance, improving the flow measuring instrumentation, reviewing the design basis calculations, and establishing heat exchanger differential pressure limits.

On February 22, 1994, Maine Yankee concluded that the measured Service Water system flow rates were less than that assumed in the design analysis. Service Water provides brackish river water as the ultimate heat sink for Maine Yankee's component cooling water system. Component Cooling water provides cooling for various emergency core cooling system (ECCS) and containment cooling equipment (See figure 1 for a simplified diagram of the system). The Service Water system was originally designed to provide 10,000 gallons per minute per pump at design conditions. Initial design conditions included: a design basis large break loss of coolant accident with ECCS in the recirculation mode, a loss of offsite power, service water intake water is assumed to be at its design low tide level and highest summer temperature for the duration of the accident. Additionally, since 1990, analysis flow has been conservatively reduced to allow for postulated piping failures and additional heat exchanger pressure drop. The 10,000 gpm flow requirement was based upon intake water temperatures of 90°F when the outboard heat exchangers are in service and 80°F when the inboard heat exchangers are in service. The temperature differences are due to the outboard heat exchangers being larger.

In response to Generic Letter 89-13, Maine Yankee committed to measuring service water flow rate as part of the heat exchanger performance monitoring program. The equipment to measure flow was installed during the Fall 1993 refueling outage. The flow measurement system consists of annubars. Pitot tubes were used to check the annubar readings.

Prior to installation of the GL 89-13 flow measuring equipment, Maine Yankee used ultrasonic flow measuring devices as part of the In-Service Testing (IST) program for the service water pumps. In order to set up consistent test conditions, Maine Yankee throttled flow to 5000 gpm on the pump being tested. Total discharge head was then monitored to determine pump performance. Data taken since 1980 showed no unfavorable trends in pump performance.

In September 1993, the data from the new flow measuring devices indicated that flow from three of the pumps was greater than design requirements. As reported in LER 93-019, one service water pump was found in an apparently degraded condition. In December 1993, the degraded pump was removed from service for an overhaul. The pump impeller showed some signs of cavitation damage and some clearances were out of tolerance. Following refurbishment, the pump produced sufficient flow to meet design requirements. Also during December, engineers experienced reliability problems with the flow annubars and some values appeared to be in error.

In mid-January 1994, the flow measuring reliability problems were temporarily corrected. Permanent corrections for the reliability problems may require some modifications to the flow measuring system. More service water performance data was collected under various system configurations and tide conditions. The January data included service water flows as low as 8000 gpm. Two other service water pumps were identified as potentially degraded. Because one pump would soon be due for a preventive maintenance overhaul, Maine Yankee decided to overhaul it early. Again, Maine Yankee found some evidence of cavitation and clearances out of tolerance.

Maine Yankee's response to GL 89-13 included a review of Service Water Operational Performance Inspections at other plants. Through this review, the heat exchanger flow imbalance issue was identified. Further analysis of the flow data collected revealed that the system is susceptible to flow imbalances due to heat exchanger inlet strainer differential pressures and design differences. Maine Yankee has administratively limited heat exchanger differential pressure to 20 psiD with no more than a 10 psi difference between the two heat exchangers' differential pressures. Operators have been instructed to flush a heat exchanger strainer when its differential pressure exceeds 9 psiD.

Incorporating the effects of these results, Maine Yankee reperformed the system design calculations. Increased flow penalties for additional heat exchanger inlet strainer pressure drop were factored into the calculation. With the larger outboard heat exchangers in service, inlet temperature is now currently limited to 67°F. Operation with the inboard heat exchangers in service currently limits inlet temperature to 51°F. These temperatures are based on the current flow for one pump in service per train. During the winter months, inlet temperatures remain below these values. Since 1985, the highest summertime inlet temperature recorded was 80°F (in 1988) but normally, temperatures rarely exceed 75°F and the peak temperature only occurs for a brief period following low tides during daylight hours. Therefore, in previous summers Maine Yankee may have operated with the service water system in a condition that was outside its current conservative design basis.

Maine Yankee has reviewed the Emergency Diesel Loading calculations and determined that the second service water pump in each train could be loaded on the diesel during recirculation mode following a design basis event. Two operating service water pumps per train would provide higher flow to ensure additional component cooling at higher inlet temperatures.

Maine Yankee is investigating several options to assure service water system meets design requirements during summer months including: improving the screening of the service water pump intake water, improving service water pump performance, improving the flow measuring instrumentation, reviewing the design basis calculations, and establishing heat exchanger differential pressure limits. The results of Maine Yankee's improvements and design calculations will be provided in a supplemental LER by July 1, 1994.

Maine Yankee is continuing to perform tests and analyses to determine the cause and safety significance of the apparent system flow degradation. The results of our assessment will also be included in the supplemental LER.

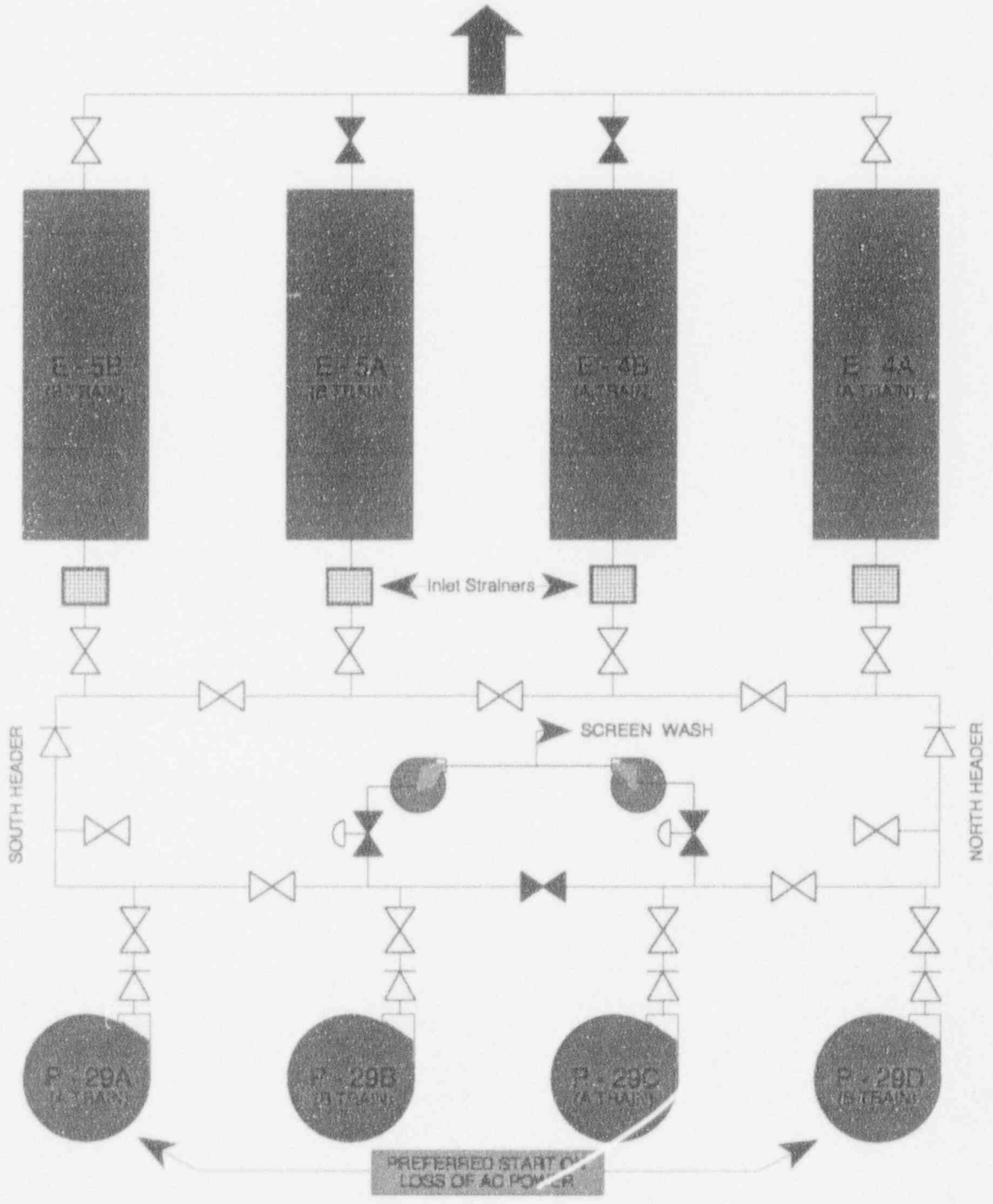

Figure 1: Simplified Service Water System Diagram