CONNECTICUT YANKEE ATOMIC POWER COMPANY

HADDAM NECK PLANT

RR#1 • BOX 127E • EAST HAMPTON, CT 06424-9341

November 7, 1990
Re: 10CFR50.73(a)(2)(v)

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

Reference: Facility Operating License No. DPR-61
Docket No. 50-213
Reportable Occurrence LER 50-213/89-014-01

Gentlemen:

This letter forwards the Licensee Event Report 89-014-01, required to be submitted, pursuant to the requirements of Connecticut Yankee Technical Specifications.

Very truly yours,

John P. Stetz
Station Director

JPS/dl

Attachment: LER 50-213/89-014-01

cc: Mr. Thomas T. Martin
Regional Administrator, Region I
475 Allendale Road
King of Prussia, PA 19406

J. T. Shedlosky
Sr. Resident Inspector
Haddam Neck

IE22
1/1

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Haddam Neck	0 5 0 0 0 2 1 3	1 OF 0 4

TITLE (4)

A & B Service Water Pump Flow Determined Inadequate During Testing

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 NAMES	DOCKET NUMBER(S)
												0 5 0 0 0
0 9	0 4	8 9	8 9	—	0 1 4	—	0 1	1 1	0 7	9 0		0 5 0 0 0

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	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 (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	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
J. DeLawrence, Asst. Engineering Spvr.	AREA CODE 2 0 3 2 6 7 - 2 [illegible]

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				

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

ABSTRACT

On September 4, 1989, at approximately 1230 hours, with the plant in Mode 5 (Cold Shutdown), an In-Service Inspection Test identified the 'A' and 'B' service water pump capacities as being less than the design basis (as analyzed) for Modes 1, 2, 3, and 4. Service water pump performance below the design basis could reduce the plant's capability to respond to a variety of accident scenarios. The reduced pump performance was identified during testing in the high flow portion of the pump curve. The root cause of this event is the failure to accurately predict service water pump performance in the high flow portion of the pump curve. The 'C' and 'D' Service Water Pumps were not affected by this event and would have been available to perform their intended safety function. This event is reportable under 10CFR50.73(a)(2)(v) because a condition existed that alone could have prevented the fulfillment of the safety function of a system needed to remove residual heat and mitigate the consequences of an accident. This supplemental report is being issued to provide information on the corrective action taken.

NRC Form 366 (9-83)

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Haddam Neck	0 5 0 0 0 2 1 3	8 9	— 0 1 4	— 0 1	0 2 OF 0 4

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

BACKGROUND

The purpose of the Service Water System (EIIS Code: BI) is to provide a heat sink for numerous plant systems and components by supplying an external cooling water supply. Major loads which receive cooling from the Service Water System include emergency diesel generators (EIIS Code: EK), component cooling water (EIIS Code: CC) heat exchangers, residual heat removal (EIIS Code: BP) heat exchangers, and containment air recirculation fan cooling coils (EIIS Code: BK).

During normal plant operations, three or four of the available four service water pumps are generally in operation. During this time, service water pump data (total head versus flow rate) is obtained on a monthly basis and verified as being acceptable. Testing of the pumps in the high flow portion of the pump curve can only be conducted when the plant is shut down. This is due to heat load-considerations and flow restrictions which occur during normal operation.

EVENT DESCRIPTION

On September 4, 1989, at approximately 1230 hours, with the unit in Mode 5 (cold shutdown) in preparation for a scheduled refueling outage, an In-Service Inspection Test identified the 'A' and 'B' service water pump capacities as being below the design basis for Modes 1, 2, 3, and 4. The test was specifically conducted to verify pump performance at high flow rates which are not attainable during plant operation. During this test, the service water pump's flow rates were progressively increased with the following data obtained:

Pump	Flow Rate	Design Basis Head	Actual Head Generated
A	4100 gpm	173 feet	178 feet
A	4800 gpm	168 feet	164 feet
A	5700 gpm	162 feet	143 feet
B	4100 gpm	179 feet	177 feet
B	5000 gpm	172 feet	165 feet
B	6200 gpm	157 feet	142 feet

* U.S.GPO:1986-0-624-538/455

CAUSE OF THE EVENT

The reduced pump performance was identified during testing in the high flow rate portion of the pump curve. The need for high flow rate testing was identified following a Westinghouse Study (WCAP - 12196) on the Service Water System which determined that these high flow rates may be required for several accident scenarios.

Following the Westinghouse Study, the pump manufacturers curves were consulted and it was identified that the service water pump would meet design basis, even during high flow rates. Based upon the fact that In-Service Inspection Testing verified the service water pumps as performing similar to the manufacturers curves during normal flow rates, there was evidence to support that Haddam Necks pumps would also exceed the design basis during high flow rates.

Based upon the above, the root cause of this event has been determined to be the failure to accurately predict service water pump performance in the high flow portion of the pump curve.

SAFETY ASSESSMENT

This event is reportable per 10CFR50.73(a)(2)(v)(B) and (a)(2)(v)(D) because a condition existed that alone could have prevented the fulfillment of the safety function of a system needed to remove residual heat and mitigate the consequences of an accident.

The safety significance of this event is small. Degraded pump capacities during high flow rates would result in a slightly reduced differential pressure across the systems and components to be cooled. This drop in differential pressure would result in a reduction, and not a termination of, the heat removal capabilities of the Service Water System.

Additionally, the need for high flow rates from any one service water pump is based upon having only one of four service water pumps available. The possibility of having only one service water pump available is unlikely due to both the fact that the pumps have a reliable history and, since the service water pumps are generally running, a failed pump would immediately be identified.

The 'C' and 'D' service water pumps were not affected by this event and would have been available to perform their intended safety function.

CORRECTIVE ACTION

In an effort to restore 'A' and 'B' service water pumps to above the design basis, changes were implemented during the 1989-1990 refueling outage. These changes involved replacing the annubars used to measure flow with new annubars that were calibrated at Alden Labs in pipe runs that replicated the installed conditions at Haddam Neck. Individual 'K' constants were generated for each annubar as well as an error analysis. This data was incorporated into the Inservice Inspection test procedure used for the service water pumps. In addition, Haddam Neck processed a design change (PDCR 992) that specified a new larger size impeller for the service water pumps. The primary limiting factor in the increased impeller size was the amount of current drawn by the motors. Defining "Design Basis" as that condition above which the pumps must operate to provide the necessary flow and head to supply safety related loads in normal and accident conditions, the "A" and "B" Service Water pumps have been restored above the "Design Basis".

Service water pumps 'A' and 'B' were rebuilt using the new impellers. In addition, the pump bowls were also replaced with new bowls from stock. Full flow performance testing was conducted on each pump. The testing involved generating a performance curve starting at shutoff head and going through the original design point of 6,000 gpm. Motor current, river level, power factor, applied voltage, and RPM were also measured during these tests. The test results indicate that the new impeller configuration performs within the design change limitations relative to motor amperage. The test results indicate that the new impeller configuration provides flow greater than the minimum required from a safety analysis standpoint. Using the criteria contained in the Inservice Inspection Pump Program the new pumps are capable of meeting their intended function.

ADDITIONAL INFORMATION

None

SIMILAR EVENTS

None