CONNECTICUT YANKEE ATOMIC POWER COMPANY
HADDAM NECK PLANT
RR#1 • BOX 127E • EAST HAMPTON, CT 06424-9341

October 24, 1990
Re: 10CFR50.73(a)(2)(ii)
10CFR50.73(a)(2)(i)(B)

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-

Gentlemen:

This letter forwards the Licensee Event Report 89-006-01, 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 50-213/89-006-01

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)

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TITLE (4)

Heating Steam Containment Isolation Valves Failed Surveillance Test

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 4	1 4	8 9	8 9	0 0 6	0 1	1 0	2 4	9 0		0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1	20.402(b)	20.405(c)	73.71(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
1 0 0	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)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	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
P. F. L'Heureux, Engineering Supervisor (Mechanical)	AREA CODE 2 0 3 — 2 6 7 - 2 5 5 6

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	
X	J M	I S V	C 6 3 0	Y							

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 April 14, 1989, at 0805, with the plant in Mode 1 at 100% power, the two containment isolation valves for heating steam to containment (HS-TV-380 and 381) failed to operate during quarterly surveillance testing. These failures constituted a loss of containment integrity. The operators immediately closed the manual isolation valves for this penetration and commenced a load reduction at 0903. One of the valves was verified operable at 0905 and the load reduction was terminated at 0911. At the time of the original LER, the cause of this event was unknown. An engineering evaluation has since determined the cause of the event to be a combination of an undersized air operator and the use of a seat material that requires increased operating torque at higher temperatures. Short term corrective action consisted of locking the two containment trip valves in the closed position. Long term corrective action consists of evaluating whether the valves should be eliminated, modified or replaced.

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

BACKGROUND INFORMATION

The containment heating steam system (see Figure 1) provides heating of the containment during winter outages and provides a constant steam bleed to control tritium levels inside containment.

The normal supply path for containment heating is blanked off during power operation. A 6 inch spool piece is installed for refueling activities.

A bypass line containing two, 1 1/2 inch air operated ball valves (HS-TV-380 and 381) supplies steam for tritium control. These valves close automatically on a high containment pressure isolation signal (EIIS Code: JM). These valves were recently placed on a quarterly surveillance to insure containment integrity. These valves were last tested post-installation during the 1987/1988 Refueling Outage.

There are four other similar valves currently in use as containment isolation valves. Valves CC-TV-917 and 920, which are identical to HS-TV-380 and 381, serve as containment isolation valves for component cooling water supply to the neutron shield tank cooler (Figure 2). Valves CH-TV-240 and 241 are of the same design as HS-TV-380 and 381 but are a larger size (4 inch vs. 1 1/2 inch) and utilize a larger air operator. Valves CH-TV-240 and 241 serve as containment isolation valves on the reactor coolant pumps seal water return header (Figure 3). These four valves were also installed and post-installation tested during the 1987/1988 Refueling Outage.

Valves CC-TV-917 and 920 close automatically on a high containment pressure isolation signal (EIIS Code: JM). These valves are inservice tested on a cold shutdown/refueling basis, not to exceed a 24 month interval. These valves were last tested during the 1989/1990 Refueling Outage.

Valves CH-TV-240 and 241 are remote manually operated from the control room and do not receive a containment isolation signal. These valves are inservice tested on a cold shutdown/refueling basis, not to exceed a 24 month interval. These valves were last tested during the 1989/1990 Refueling Outage.

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EVENT DESCRIPTION

At 0805, on April 14, 1989, with the plant in Mode 1 at 100% power, the two containment isolation valves for heating steam to containment (HS-TV-380 and 381) failed to operate during quarterly surveillance testing. These failures constituted a loss of containment integrity. Operators immediately closed the two manual isolation valves in this line (HS-V-382 and 385) and commenced a load reduction at 0903 due to the inoperability of HS-TV-380 and 381.

At 0905, operators verified satisfactory operation of HS-TV-380 by testing. This valve was shut via normal means and the air supply line to the valve was disconnected to administratively ensure it remained closed due to the inoperability of HS-TV-381. Since HS-TV-380 was secured in the closed accident condition and HS-V-382 was closed, containment integrity was restored.

At 0911, the load reduction was terminated and load was increased.

CAUSE OF THE EVENT

Plant Engineering has investigated the root cause of the failure of the containment isolation valves and has determined that the air operators on the 1 1/2 inch ball valves (HS-TV-380/381 and CC-TV-917/920) are undersized for these applications. This conclusion was reached after detailed review of the valve design and in-situ testing conducted on HS-TV-380 and 381 during the 1989/1990 Refueling Outage.

The testing which was conducted showed that the torque required to operate 1 1/2 inch ball valves HS-TV-380 and 381 could exceed the torque available from the air operator under certain conditions. Measurements of the torque required to operate these valves under all conditions were consistently higher than predicted by the manufacturer.

The valve seat material which is normally used by the manufacturer for this type valve is reinforced teflon. The valve seat material used in the subject valves is tefzel. Tefzel is a thermoplastic fluoropolymer, similar to teflon, manufactured by Dupont, which was selected because it is significantly more resistant to radiation effects than teflon. However, it was determined during testing that significantly (approximately 25%) more torque was required to operate these valves with tefzel seats than with reinforced teflon seats. Furthermore, the testing showed that the torque requirements, in general, increased with temperature and time (at the elevated temperature). At the heating steam

operating temperature (250'F), operating torques were measured which exceed the torque rating of the air operator.

Process system cleanliness also contributes to valve operability. Disassembly of HS-TV-380/381 revealed a buildup of rust particles on the valve ball that would have increased the torque required to operate the valve. A controlled test using "clean" steam resulted in successful valve stroking at temperatures as high as 280'F. The trip valves HS-TV-380/381 are located at the end of a long length of carbon steel piping, at a low elevation, and thus particularly susceptible to particulate build up.

SAFETY ASSESSMENT

This event was reportable under 10CFR50.73 (a)(2)(i)(B) because it involved a condition prohibited by the plant's Technical Specifications. This event was also reportable under 10CFR50.73 (a)(2)(ii) as a degradation of a containment boundary.

The failure of the valves to operate constituted a loss of containment integrity. The piping upstream of these containment isolation valves is a closed system with 100 pound steam pressure at the reducer. If a LOCA occurred when 15 pound steam was being supplied to containment, a potential leak path to the environment would exist. This leak path consists of valve packing leaks, blank flange leaks and other similar leaks. Gross leakage would only result from a failure of the non-QA pipe upstream of the containment isolation resulting in a 1 1/2 inch diameter leak path.

If these valves failed during a LOCA, the operators would determine that a potential leak path existed by the valve indicating lights in the control room. However, due to the location of the valves, an operator would not be able to close the valves due to high radiation that would develop in this area.

Due to these factors, there is no assurance that in the event of a LOCA that the radioactive release to the environment through the untested penetrations, fittings, valves etc. would be consistent with the assumption used in the LOCA analysis.

Since HS-TV-380 was closed under its own power and secured in its accident condition, this valve was considered operable since the only safety function is containment isolation. The air supply had been removed to secure the valve in the closed position. Manual valve HS-V-382 was in the closed position. These actions comply with the plant's Technical Specifications and insure that containment integrity of the heating steam penetration was maintained.

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CORRECTIVE ACTION

When the valves failed to operate, the manual isolation valves (HS-V-382 and 385) were closed. The operability of HS-TV-380 was verified by testing and HS-TV-381 was manually closed. After HS-TV-381 was exercised, it started to operate normally. Nonetheless, HS-TV-381 was shut normally, disabled in its shut position and satisfactorily leak tested. Manual valve HS-V-382 was also kept shut, in compliance with Technical Specifications.

Engineering and Operations Department personnel then tested the operability of similar containment isolation valves (CC-TV-917 and 920) and they tested satisfactory. These valves are identical to the failed valves and are the containment isolation valves for component cooling water to the neutron shield tank.

The actions taken to correct these failures and prevent recurrence are as follows:

First, valves HS-TV-380 and 381 have been disabled in the closed position, for the duration of the current operating cycle. These valves were closed under their own power and leak tested, then the air supply to the valves was removed and a locking plate was placed on each valve operator. These valves are considered operable since their only safety function is containment isolation. These actions comply with the Plant's Technical Specifications and ensure that the integrity of the heating steam penetration is maintained. It has been determined that discontinuing steam bleed to containment would not cause significant health physics concerns based on review of past tritium levels in containment.

Second, valves CC-TV-917 and 920 were modified by changing the valve seats from tefzel to reinforced teflon. Testing conducted on HS-TV-380 and 381 show that this material change should sufficiently reduce the operating torque of the valve to insure that the air operator will be able to close these valves when required. These valves were successfully tested for operability and leak tightness following the material change. These valves operate at a significantly lower temperature (less than 100°F) and utilize a cleaner process fluid than the heating steam valves. The component cooling system is a closed loop of inhibited carbon steel piping, with continuous purification. With this modification, CC-TV-917 and 920 are not expected to exhibit the operating failures experienced by HS-TV-380 and 381.

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Third, an evaluation was performed to assess the operability of reactor cooling pump seal water return header containment isolation valves CH-TV-240 and 241. Valves CH-TV-240 and 241 are the same design as HS-TV-380/381 and CC-TV-917/920 except that they are larger (4 inch) valves and have significantly larger air operators. Valves CH-TV-240/241 were successfully tested during the 1989/1990 refueling outage for operability and leak tightness. These valves also operate at a lower temperature than the heating steam valves (less than 170°F) and utilize a pure process fluid (reactor coolant). Unlike the heating steam valves, no operability test failure has occurred for either CH-TV-240 or 241 since their installation during the 1987/1988 refueling outage.

ADDITIONAL INFORMATION

Plant ID: HS-TV-380 & 381 and CC-TV-917 & 920
Component: 1 1/2" full port 3-piece ball valve
Manufacturer: Contromatics
Actuator: Model #375 SRV

Plant ID: CH-TV-240 & 241
Component: 4" 600 psi standard port 3-piece ball valve
Manufacturer: Contromatics
Actuator: Model #500 SRV

PREVIOUS SIMILAR EVENTS

None

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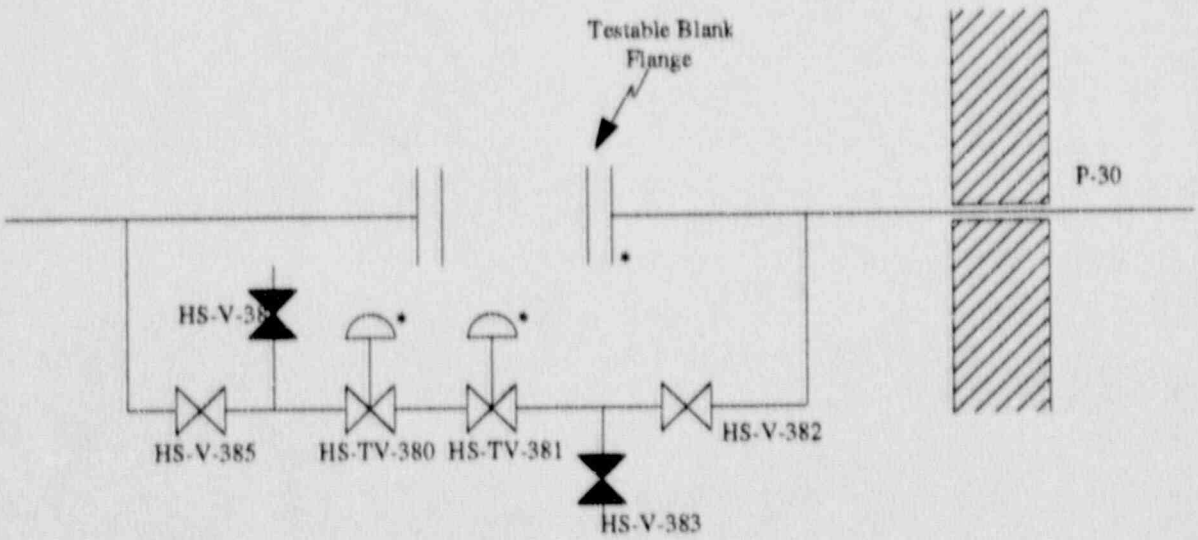
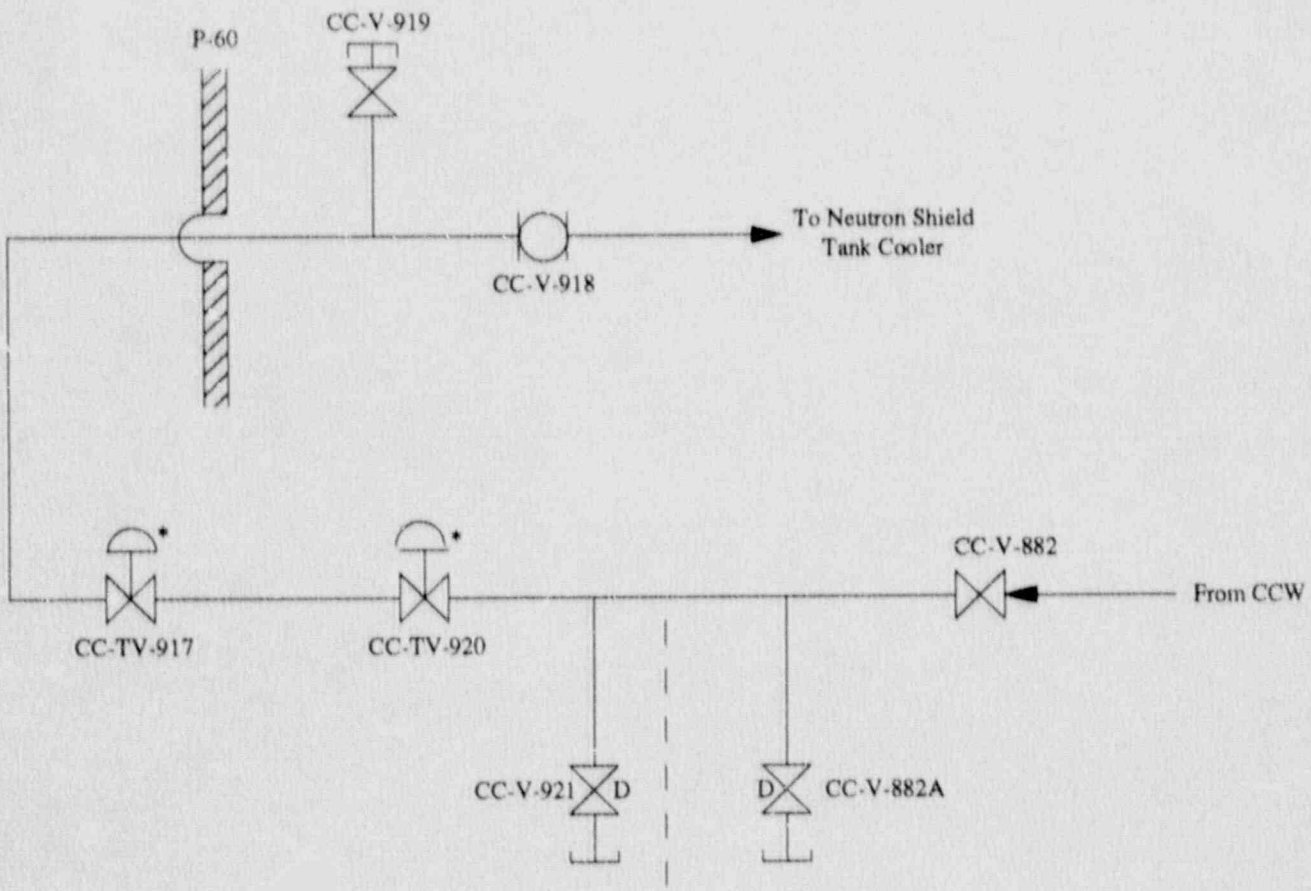
Figure 1
Containment Heating Steam Penetration



* Containment Isolation Valves/Flange

Figure 2
Neutron Shield Tank Cooling Water Supply Penetration



* Containment Isolation Valves

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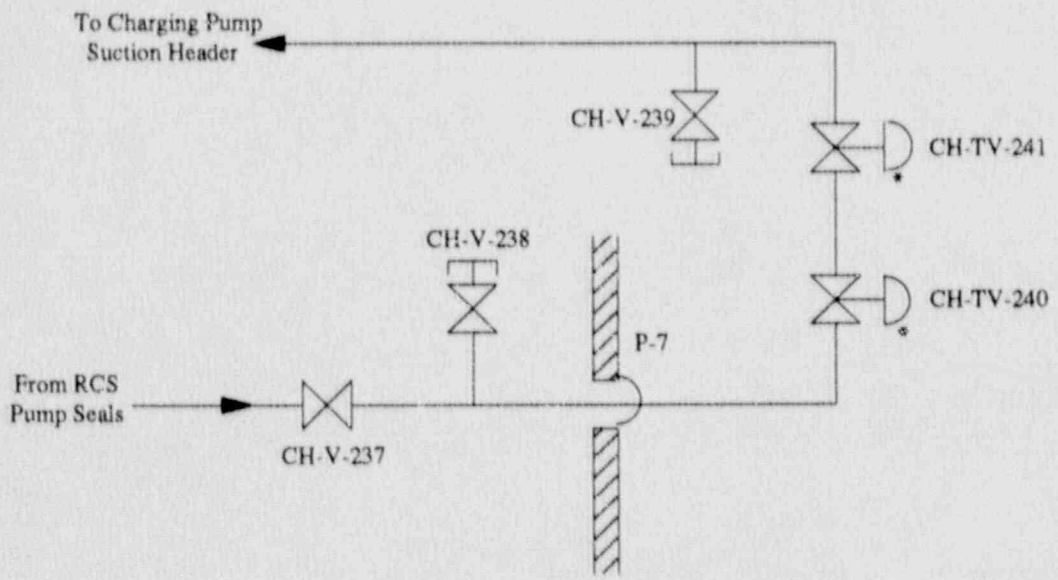
Figure 3
RCS Pumps Seal Water Return Penetration



* Containment Isolation Valves