CONNECTICUT YANKEE ATOMIC POWER COMPANY

HADDAM NECK PLANT
362 INJUN HOLLOW ROAD • EAST HAMPTON, CT 06424-3099

March 23, 1994
Re: 10CFR50.73(a)(2)(i)
10CFR50.73(a)(2)(vii)

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 50-213/94-006-00

Gentlemen:

This letter forwards the Licensee Event Report 94-006-00, required to be submitted, pursuant to the requirements of the Haddam Neck Plant's Technical Specifications.

Very truly yours,

John P. Stetz
Vice President

JPS/mlg

Attachment: LER 50-213/94-006-00

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

William Raymond
Sr. Resident Inspector
Haddam Neck

280030

IE22 1/1

1026-3 REV. 2-91

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 5

TITLE (4): Main Steam Safety Valves Exceeded Lift Setpoint Criteria

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 2	2 3	9 4	9 4	0 0 6	0 0	0 3	2 3	9 4		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): 5
POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (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)	X 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)	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
M. Fiala, Asst. Engineer	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
B	S B	R V	A 4 1 5	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

X YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15): MONTH 0 3, DAY 0 1, YEAR 9 5

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

ABSTRACT

On February 23, 1994, at 1600 hours, with the plant in Mode 5 (cold shutdown), it was determined that five active pilot valves associated with four main steam safety valves (MS-SV-14, 24, 34, and 44) exceeded the Technical Specification acceptance criteria for their lift setpoint. The cause of the event appears to be a disc and nozzle adhesion in the pilot valves. Short term corrective action being evaluated is to regularly exercise the pilot valves to prevent the adhesion. In support of this, the valves were sent to an off-site facility for additional setpoint testing, simulating normal operating conditions, in order to establish a baseline testing frequency . Long term corrective action is to attempt to determine the type of adhesion present on the valves and evaluate the potential for material changes to the pilot valve seating area. This event is reportable under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications and under 10CFR50.73(a)(2)(vii)(D) as a common mode failure.

NRC Form 366 (9-83)

BACKGROUND INFORMATION

Each of the four steam generators' main steam lines contains a common header supplied with four safety valves (setpoints 985,1015,1025,and 1034 psig). During the 1993 refueling outage, four Anderson Greenwood Power Operated Safety Relief Valves (one per steam generator) were installed in place of four spring loaded main steam (EIIS Code: SB) safety valves (EIIS Code: RV) which had the highest set pressure. This modification allowed for self-actuation of the main valve via a dual pilot valve assembly and remote actuation of the main valve via a solenoid valve energized from the Control Room. The purpose for the modification was to mitigate the effects of a steam generator tube rupture (SGTR) without reliance on the RCS loop stop valves, off-site power, or non-QA balance of plant equipment. This report addresses the self-actuation function. The pilot valve malfunction had no effect on the ability to remotely actuate the valves.

Each of the four safety relief valves is equipped with a dual pilot assembly. Each pilot valve provides for the self-actuation of the main valve during an over-pressure event. During normal operation, one pilot valve is on-line and subject to system conditions, while the other pilot is isolated off-line The on-line pilot valve is referred to as the "active" pilot valve and the off-line pilot valve is referred to as the "inactive" pilot valve. During normal operation, the active pilot is responsible for the over-pressure protection. The self-actuating set pressure for the pilot valves is 1034 psig ± 3 percent and the relief capacity of the main valve is 639,240 lb/hr.

In November of 1993, one of the safety relief valves (MS-SV-14) was removed from service due to body/bonnet leakage and replaced with a spare. This valve was returned to the vendor for testing. As part of the investigation, setpoint testing was performed on the vendor's boiler to simulate normal plant conditions. The setpoint results revealed that the active pilot valve associated with the main valve was above the setpoint acceptance criteria (+38 percent). A reportability evaluation was performed by Engineering which concluded, that based on time of discovery, this event was not reportable. However, to determine if a common-mode failure existed, testing of the in-service safety valves would be performed in Mode 3 at the next available testing opportunity. Subsequently, follow-up testing was performed in Mode 5 with the valves cooled down.

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Haddam Neck	0 5 0 0 0 2 1 3	9 4	— 0 0 6 —	0 0	0 3 OF 0 5

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

EVENT DESCRIPTION

On February 23, 1994, at 1600 hours, with the plant in Mode 5 (cold shutdown), it was determined that the active pilot valves associated with four main steam safety valves (MS-SV-14, 24, 34, and 44) exceeded the Technical Specification acceptance criteria for their lift setpoint. On-site testing commenced on February 14,1994 and concluded on February 20,1994. The results revealed that four of four active pilot valves were outside the acceptance criteria of 1034 psig ± 3 percent (between +6.6 percent to +48.9 percent).

The final conclusion reached was that five of five active pilot valves (one on main valve returned to the vendor and four on the main valves in service) had lifted above setpoint tolerance. It should be noted that only the initial lifts for the active pilots were consistently outside the acceptance criteria. Results of repeated lifts showed consistent values within setpoint acceptability.

CAUSE OF THE EVENT

Evidence from the first setpoint failure at the vendor facility suggested disk and nozzle adhesion as the cause of the event. Subsequent testing of the in-service pilot valves has reinforced this evidence.

The cause of the adhesion cannot be positively identified with the present information available. Two independent investigations (one by the valve vendor and one in-house) have revealed that the evidence presented does not give a definitive conclusion of the type of adhesion causing the over-set condition.

The following mechanisms are potential root causes for the adhesion problem suggested by the results of the investigations:

1. Corrosive behavior or corrosion contaminants due to oxygen depleted environment and breakdown of passive protective oxide film
2. Deposition of an oxide build-up on both the inner and outer surfaces of the disk/nozzle
3. Diffusion bonds between similar disk/nozzle materials and a loss of passive protective oxide layer

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

The degree to which these separate causes have contributed to the setpoint failures is yet unknown. Because of the relatively small areas subjected to the above conditions, it is conceivable that drifts experienced as high as 49 percent can be attributed to a combination of the above factors. These causes are all time, pressure, and temperature dependent.

SAFETY ASSESSMENT

This event is reportable under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications and 10CFR50.73(a)(2)(vii)(D) as a common mode failure.

The limiting postulated scenario for secondary system overpressurization is a loss of load from 100 percent power with the main condenser unavailable. In this event, the self-actuated operation of the steam generator PORVs (MS-SV-14, 24, 34, and 44) (one per steam generator) is not required unless one of the 3 spring loaded main steam safety valves (3 per generator) fails to open. Technical Specification 3.7.7.1 requires that the 3 spring loaded safety valves have a lift setpoint pressure of 985, 1015, and 1025 psig, respectively, whereas, the PORVs have the highest lift setpoint pressure of 1034 psig. Therefore, from a system overprotection standpoint, the safety significance of this event is small.

The steam generator PORVs are used in the emergency operating procedure for steam generator tube rupture to rapidly cool down the reactor coolant system. In this accident scenario the PORV would be remotely actuated. The failure mechanism of these valves does not affect the remote actuation, therefore, there is no safety significance in the steam generator tube rupture accident scenario.

Based on the above the overall safety significance to this event is minimal.

CORRECTIVE ACTION

Short Term Corrective Action

The preliminary corrective action to address the three mechanisms listed above is to regularly exercise the pilot valves to prevent any potential bonding of the disc and nozzle.

As a means of establishing a baseline testing frequency, two sets of pilot valves (one set of six pilots and one set of eight pilots) were sent off-site for additional setpoint testing. The two sets of valves (one with an oxide build-up and one without the oxide build-up) were subjected to steam (simulating normal operating conditions of the valve) for a ten day period. The valves were cycled at the end of this time period and the results provided assurance of a weekly testing frequency prior to start-up of the plant.

Evidence of adhesive behavior between the seat and disc of pilot valves has been seen industry-wide. Use of similar materials exacerbates the adhesion problem. Presently, the disk and nozzle of the pilot valves are made from a similar stainless steel material (SST 17-4 PH). The behavior of this material is consistent with the three mechanisms previously discussed. A concentrated effort has already been developed with the vendor to evaluate different combinations of dissimilar materials.

Long Term Corrective Action

Long term corrective action includes gathering and evaluating information obtained from in-house testing. This information will be provided from testing of the pilot valves placed back in service as well as testing of pilot valves with alternate seating materials in an attempt to relax, if not eliminate, the necessity to exercise the pilot valves. Recommendations on the testing frequency of the valves on-line and seating area material changes will be made upon a thorough evaluation of the results of this testing effort. A supplemental report detailing the results of this evaluation will be issued by March 1,1995.

ADDITIONAL INFORMATION

Component	Manufacturer	Model No.
Power Operated Safety Relief Valve	Anderson-Greenwood Co.	72712Q68/51

PREVIOUS SIMILAR EVENTS

None.