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)
Millstone Nuclear Power Station Unit 3	0 5 0 0 0 4 2 3	1 OF 0 5

TITLE (4)
Early Lifting of Pressurizer Safeties for Undetermined Reasons

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 3	1 1	8 7	8 7	—	0 0 9	—	0 2	0 9	3 0	8 8		0 5 0 0 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)			
	—	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	N / A	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 (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
Jeffry A. Langan, Associate Engineer	AREA CODE 2 0 3 4 4 4 - 5 5 4 4

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	A B	R V	C 7 1 1	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)

On March 3, 1987, Wyle Laboratories notified Northeast Utilities of an anomaly in the test results on three previously installed Pressurizer safety valves. The subject valves are required by Technical Specifications to be operable with a setting of 2500 psia +/- 1% during Modes 1, 2, and 3. Bench testing at Wyle Laboratories revealed one valve was lifting at 2448 psia, another was lifting at 2417 psia, and the third was lifting at 2402 psia.

The exact cause of the safety valves drifting from their setpoints is not known. Differences in vendor procedures may be a contributing factor, in that the valves were originally set by one vendor, and later tested by another. It is also thought that leakage of non-condensible gases past the valve seats may have contributed to the setpoint drift. The valves were subsequently reset to their proper pressure, and reworked such that no leakage was experienced when leak tested with steam and air. The safeties currently installed on the Pressurizer were removed during the Fall 1987 Refueling Outage. Two of these valves (S/N 060, 061), along with one of the subject valves (S/N 101), were sent to Wyle for testing. One valve (S/N 061) was found to be lifting outside its 1% acceptance criteria.

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I. Description of Event

On March 3, 1987, Wyle Laboratories notified Northeast Utilities of an anomaly in the test results on three previously installed Pressurizer safety valves. The subject valves are required by Technical Specifications to be operable with a setting of 2500 psia ±1% (2475 psia - 2525 psia). Bench testing at Wyle Laboratory revealed one valve (S/N N56964-07-0101) was lifting at 2448 psia, another (S/N N56964-07-0102) was lifting at 2417 psia, and the third (S/N N56964-07-0103) was lifting at 2402 psia. As the valves were not installed in the plant at the time, no operator action was required in response to this event.

The subject valves were purchased as spares by Northeast Utilities from the Long Island Lighting Company. They were subsequently reworked and reset to meet the requirements of Millstone 3 by Crosby Valve and Gage Co. During Pre-Core Hot Functional Testing in the Fall of 1985, it was observed that the original Pressurizer safety valves then installed in the system were exhibiting signs of leakage. For this reason, they were removed in November and the subject spares installed. During subsequent operation at normal operating pressure and temperature, these valves began showing signs of leakage. In July, 1986, the unit was shutdown for a snubber inspection outage. During that outage, the subject valves were removed from the Pressurizer, and the original valves, which had been tested, reset, and reworked by Crosby, were reinstalled. Because Crosby does not have the facilities for testing contaminated valves, the subject valves were sent to Wyle Laboratories in Huntsville, Alabama, for testing. It was during this testing that the valves were found to be out of spec low on their lift setpoint.

II. Cause of Event

The exact cause of the safety valves drifting from their setpoint is not known at the present time. There are, however, several factors that may have contributed to this problem. The factor having perhaps the greatest affect on setpoint drift is temperature. Research on this affect has shown that higher temperatures cause a relaxation of spring tension, resulting in early opening of the valve. It is theorized that while the valves were tested hot at Wyle, they were set and tested at some lower temperature at Crosby. This could account for as much as a 50 psi drift. A review of all available documentation pertaining to the setting of these valves has been conducted in an effort to ascertain the exact conditions under which these valves were set. This review showed that, while there is some difference in the method used to "temperature soak" the valves prior to set testing, it is probably not significant enough to account for the early lifting of the subject valves. At Crosby, the valves are placed on the test stand, and the valve inlet pressurized to 2015 psia with saturated steam. The valve is then allowed to soak for one hour to allow temperatures to stabilize. The valve bonnet is not heated in any kind of environmental chamber. After this one hour, the valve is lift tested, and adjusted as necessary until three successful successive lifts are obtained. At Wyle Laboratories, the valve is placed on the

II. Cause of Event (Continued)

test stand, and the valve inlet is pressurized to 90% of the lift setpoint (2235 psig) with saturated steam. The valve bonnet is placed in an environmental chamber and heated to 140 degrees F. Once temperatures have stabilized, as determined by two readings taken 30 minutes apart not differing by more than 5 degrees, the valve is held at these temperatures for an additional 30 minutes. The valve is then lift tested and adjusted as required until three successful, successive lifts are obtained.

Another factor possibly affecting valve performance is leakage. At the time the subject valves were initially set, a seat leakage test was performed. The test consisted of pressurizing the valve to approximately 90% of valve nameplate with saturated steam, and checking for evidence of leakage (i.e., tail piece temperature increasing). Test pressure was maintained for three minutes. When the subject valves were subjected to this leak test, some leakage was observed. The valves were reworked and subsequently passed a leak test. However, under operating conditions in the plant, the valves exhibited signs of leakage. Investigation revealed that leakage was apparently due to non-condensible gases stripped from the Reactor Coolant System in the Pressurizer leaking by the seat. Subsequent testing on the original safety valves revealed that a valve which passed a steam leak test would not necessarily pass an air leak test. It is thought that this leakage, over time, may have caused some of the setpoint drift.

III. Analysis of Event

This event is reportable in accordance with the requirements of 10CFR50.73 (a)(2)(i)(B). Plant Technical Specification 3.4.2.2 requires all Pressurizer safety valves be operable with a lift setting of 2500 psia ±1% during Modes 1, 2, and 3. The lift setting pressure shall correspond to ambient conditions of the valve at nominal operating temperature and pressure.

This event posed no threat to plant safety during normal or accident conditions. Pressurizer code safety valves are sized to prevent the Reactor Coolant System from being pressurized above its safety limit of 2750 psia. Specifically, the combined relief capacity of all valves is greater than the maximum surge rate resulting from a 100% load rejection assuming no reactor trip until the first Reactor Trip System trip setpoint is reached. The ability of the safety valves to perform this function is not affected by their lifting early. It is possible that, if all three safety valves lifted prior to the Pressurizer high pressure trip setpoint being reached, the Pressurizer high pressure trip setpoint may not be reached. In that case, protection would be provided by the Overtemperature ΔT trip and/or Pressurizer high level trip. Normal operating pressure in the Reactor Coolant System is 2250 psia. The worst as-found safety valve was lifting at 2402 psia. This leaves a margin of

III. Analysis of Event (Continued)

152 psia. Pressure transients during normal operating evolutions (e.g., design step or ramp load rejections) are well within this 152 psi envelope. Therefore, the safeties would not be challenged during normal operations, and the setpoint drift on the safeties would have no safety implications.

IV. Corrective Action

The subject valves were reset to within their specified tolerance. In addition, they were steam and air leak tested. During the Fall of 1987 Refueling Outage, the original valves installed on the Pressurizer were removed, and the subject valves installed. The original valves were sent to Wyle for set pressure testing and leak testing following completion of the refueling outage.

During the heatup coming out of the refueling outage, one of the subject valves (S/N 101) lifted. This valve was replaced with one of the original valves (S/N 059). The remaining two original valves (S/N 060, 061) and the subject valve which had lifted early were sent to Wyle for testing. As received testing revealed that one valve (S/N 061) did not lift within its acceptance criteria. This valve lifted at 2558 psig. Subsequent to this failure, the valve was partially disassembled, and the nozzle and disc insert seats lapped. The valve was then inspected, cleaned, dimensional measurements taken, and reassembled for testing. This process was repeated three times until the valve met the acceptance criteria for pre- and post-test steam leakage, set pressure, and nitrogen leak testing. Subsequent to as received testing of valve S/N 101, the valve was completely disassembled, cleaned and inspected. No anomalies were noted. The nozzle and disc insert seats were lapped, dimensional measurements taken, and the valve reassembled for testing. The valve failed its post-test steam leakage test. This cycle of testing, refurbishment, and retesting was repeated three times until the valve passed all its tests. These valves were subsequently returned to the site, where they will be installed on the Pressurizer during the next refueling outage.

The spurious lift of valve S/N 101 was an isolated occurrence. The behavior of valve S/N 061 was typical of a valve that had seen service on the Pressurizer. For these reasons, no further corrective action is deemed necessary at this time.

V. Additional Information

Both sets of Pressurizer safety valves are Crosby Model Number HB-BP-86 6M6 safety valves. A search of the NPRDS indicates the problem of setpoint drift is a common problem in the industry. Information from this search indicates the setpoints may drift high or low. No specific failure mechanism was identified in any of the reports. Millstone 3's original safety valves, which were removed from the system in November, 1985, and tested at Crosby in June, 1986, also failed their set pressure test. Whether these valves failed high or low cannot be determined from the vendor test records. Since these valves were removed from the Pressurizer prior to issuance of the facility Operating License, their failure was not reportable.

V. Additional Information (Continued)

No other LER's have been generated by Millstone 3 as a result of Pressurizer safety valve setpoint drift. A similar problem was discovered with the Main Steam Safety Valves in 1987. This was reported to the NRC in LER 87-036-00. In this incident, 11 Main Steam Safety valves were lifted outside their +/- 1% Technical Specification allowed band. No failure mechanism was defined for this problem, nor was there any corrective action specified other than to reset the subject valves, and test or replace the other Main Steam Safeties.

In the interest of clarity, the following is a chronology of Millstone 3 Pressurizer safety valves:

11/85 - Original safety valves (S/N 0059, 0060, and 0061) are removed due to their leaking during Pre-Core Hot Functional Testing.

Subject valves (S/N 0101, 0102, and 0103), which were purchased as spares from LILCO, are reworked and set by Crosby. A steam leak test is performed. These valves are installed in the system in December.

6/86 - Original valves are sent to Crosby for testing. Valves failed their set pressure test. It cannot be determined whether these valves failed high or low. Valves are reworked and reset. A steam and air leak test is performed.

7/86 - Subject valves are removed due to their leaking during Post-Core Hot Functional Testing and initial months of power operation.

Original valves are re-installed. There is no evidence of leakage in these valves during the period they were installed.

3/87 - Subject valves fail their set pressure test at Wyle Labs. Valves are reworked and reset. A steam and air leak test was performed.

Fall 1987 - Original valves were removed, and the subject valves reinstalled. Original valves will be sent to Wyle for testing after completion of refueling outage.

2/1/88 - Supplemental LER submitted addressing differences in vendor procedures and results of the Summer 1986 testing of the original safeties.

2/88 - Valve S/N 101 lifts during plant heatup. This valve was replaced by valve S/N 059. Valves 060, 061, 101 sent to Wyle for testing/ refurbishment. Valve S/N 061 was found to be lifting outside its acceptance criteria. Valves S/N 060 and S/N 101 were found to be lifting within the acceptable limit.

EIIS CODES

System	Components
Reactor Coolant System - AB	Relief Valve - RV
	Pressurizer - PZR

NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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September 30, 1988
MP-12278
Re: 10CFR50.73(a)(2)(i)

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

Reference: Facility Operating License No. NPF-49
Docket No. 50-423
Licensee Event Report 50-423/87-009-02

Gentlemen:

This letter forwards Licensee Event Report 87-009-02 required to be submitted by October 1, 1988, in accordance with LER 87-009-01, and pursuant to 10CFR50.73(a)(2)(i), any operation or condition prohibited by the plant's Technical Specifications.

Yours truly,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: Stephen E. Scace
Station Superintendent
Millstone Nuclear Power Station

BY: John S. Keenan
Unit 2 Superintendent
Millstone Nuclear Power Station

SES/JAL:mo

Attachment: LER 87-009-02

cc: W. T. Russell, Region I Administrator
D. H. Jaffe, NRC Project Manager, Millstone Unit Nos. 2 and 3
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3

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