



PECO ENERGY

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10CFR 50.73

December 12, 1995
Docket No. 50-352
License No. NPF-39

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 1

This LER concerns pressure setpoint drift of two Main Steam System safety relief valves due to corrosion induced bonding within the valves such that a common cause resulted in two independent trains becoming inoperable in a single safety system.

Reference:	Docket No. 50-352
Report Number:	1-95-009
Revision Number:	00
Event Date:	November 13, 1995
Report Date:	December 12, 1995
Facility:	Limerick Generating Station P.O. Box 2300, Sanatoga, PA 19464-2300

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(vii).

Very truly yours,

DMS:cah

cc: T. T. Martin, Administrator Region I, USNRC
N. S. Perry, USNRC Senior Resident Inspector, LGS

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LICENSEE EVENT REPORT (LER)

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

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 (MNB 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.

FACILITY NAME (1) Limerick Generating Station, Unit 1		DOCKET NUMBER (2) 05000352	PAGE (3) 1 OF 6
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TITLE (4) Corrosion Induced Bonding Results in Main Steam System Safety Relief Valve Setpoint Drift.

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
11	13	95	95	009	0	12	12	95	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(vii)	OTHER						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)								

LICENSEE CONTACT FOR THIS LER (12)

NAME J. L. Kantner, Manager - Experience Assessment	TELEPHONE NUMBER (Include Area Code) (610) 718-3400
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS
B	SB	RV	T020	YES					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO				

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

On 11/13/95, a station Engineer was notified of pressure setpoint testing results for 5 Main Steam System safety relief valves (SRVs) that were removed during the September 11, 1995 Unit 1 forced outage. The results revealed that 2 SRVs did not lift within the limit of $\pm 1\%$ of the nameplate setpoint as required by Technical Specifications (TS) Section 3.4.2. The SRVs are Target Rock Corporation, Model 7567F, pilot operated 2-stage valves. These conditions resulted in 2 independent trains becoming inoperable in a single safety system due to a common cause. The 5 subject SRVs were replaced with refurbished/recertified SRVs prior to reactor startup from the Unit 1 forced outage. There were no safety consequences regarding overpressurization protection as a result of the 2 out-of-tolerance SRVs. The cause for the setpoint drift was identified as corrosion induced bonding between the pilot disc seating surfaces. To resolve this issue, several modified SRV pilot discs containing a platinum catalyst have been installed on Unit 1 and Unit 2 as recommended by the BWROG SRV Setpoint Drift Fix Program. Installation of additional modified SRVs is scheduled for both units.

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TEXT CONTINUATION

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

Background

On September 11, 1995, Unit 1 was manually shutdown in response to the unexpected opening of the 'M' Main Steam System safety relief valve (SRV) (EIIS:RV). The 'M' SRV opened while in service at the normal reactor operating pressure of 1005 psig. Subsequently, the unit entered a 15 day forced outage. This event was reported in LER 1-95-008 dated October 11, 1995. During this outage, a total of 5 SRVs (including the 'M' SRV) were removed due to high tailpipe temperatures indicative of through valve leakage. The 5 SRVs are Target Rock Corporation, Model 7567 F, pilot operated 2-stage valves, and were installed in the Main Steam System during the fifth Unit 1 operating cycle. Analysis revealed that leakage induced erosion caused the failure of the 'M' SRV. All 5 SRVs were sent to an offsite testing facility and were replaced with refurbished/recertified SRVs prior to startup from the forced outage.

Description of the Event:

On November 13, 1995, a station Engineer received preliminary results from the as-found pressure setpoint testing performed by the offsite testing facility on the 5 SRVs. These preliminary results indicated that 2 of the 5 SRVs did not lift within the limit of $\pm 1\%$ of the nameplate setpoint as required by Technical Specifications (TS) Section 3.4.2.

The as-found SRV pressure setpoint test results for the 5 subject SRVs are as follows:

• Unit 1 SRV Results:

Valve	SRV S/N	NamePlate Setpoint	As Found Setpoint	% Drift
D	509	1140	1169	+2.5%
L	512	1130	1244**	+10.1%
S	514	1140	1139	-.09%
M	527	1140	*	*
F	535	1150	*	*

* SRV had pilot valve leakage which did not permit as-found testing due to the limitation of the offsite testing facility.

** SRV did not lift on initial steam pressure test ramp.

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Reactor overpressure protection for the LGS Nuclear Steam Supply System (NSSS) is provided by the nuclear pressure relief system which includes 14 pilot-operated SRVs manufactured by Target Rock Corp. and supplied by General Electric (GE). TS Section 3.4.2 requires 11 out of 14 SRVs to be within $\pm 1\%$ of their nameplate set pressure. Nominal set pressures for the SRVs are as follows: four at 1130 psig, five at 1140 psig, and five at 1150 psig. The safety function of the SRVs is to prevent steam pressure excursions from causing the reactor coolant system pressure to exceed the ASME Section III Level B Service (i.e., Upset) limit. This limit is 110% of the design pressure rating of the protected vessel, which for LGS is 1375 psig (i.e., 1.10 X 1250 psig).

On November 13, 1995, the reportability evaluation was completed and determined that these conditions resulted in 2 independent trains becoming inoperable in a single safety system due to a common cause. This report is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(vii).

Analysis of the Event:

There were no actual adverse consequences associated with the SRV setpoint drifting since no overpressure transients occurred during the fifth Unit 1 operating cycle that would have caused the SRVs to open based on set pressure. Prior to the failure of the 'M' SRV, adequate overpressure protection would have been provided by the 'M' SRV lifting below its setpoint and the remaining 10 operable SRVs, assuming the 'D', 'L', and 'F' SRVs would not have lifted at their nameplate set pressure. There was no release of radioactive material as a result of this event.

SRV setpoint drift which affected 2 of the SRVs would have had no impact on either the Automatic Depressurization System (ADS) function or the manual action mode of the SRVs based on studies performed by GE under guidance of the Boiling Water Reactor Owners' Group (BWROG) SRV Setpoint Drift Fix Program. In both cases, the SRV is opened by actuation of the air operator which lifts the pilot rod above the pilot disc and allows main steam pressure to lift the pilot disc and open the valve. In the case of an overpressure situation, plant procedures instruct the Reactor Operator to reduce reactor pressure below 1020 psig by reducing reactor power and/or recirculation flow rate. If reactor pressure increases above 1020 psig, a reactor high pressure alarm sounds. A scram is automatically initiated if reactor pressure increases above 1037 psig. In the event reactor pressure

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continues to increase, the Reactor Operator has manual control of the SRVs.

The generic concern of SRV setpoint drift is addressed within the BWROG Setpoint Drift Fix Program. A sensitivity study of BWR plants using the Target Rock Corp. two-stage SRVs was performed by GE as documented in Report No. NED0-22210. This study enveloped LGS and determined that sufficient overpressure protection margin existed at all plants to tolerate an upward total average setpoint drift of 10% for 14 SRVs during the limiting pressurization transient. The most severe pressurization transient event was conservatively assumed to be the simultaneous closure of all Main Steam Isolation Valves (MSIVs) with a coincident failure of the MSIV position scram signal. In this case, a reactor scram subsequently occurs on a high neutron flux signal. Since the SRV pressure setpoint data is bounded by the sensitivity study, peak reactor vessel pressure would have remained well below the 1375 psig design pressure rating. Therefore, there were no safety consequences regarding overpressurization protection as a result of the 2 out-of-tolerance SRVs.

Cause of the Event:

The cause for the setpoint drift of the 2 SRVs has been identified as corrosion induced bonding between the pilot disc seating surfaces. The corrosion arises from oxidation build-up in the presence of moisture and a heated environment.

The offsite testing of the 'L' SRV (i.e., serial no. #512) showed that the pilot failed to lift on its initial diagnostic test (i.e., nitrogen pressure test). This diagnostic test is performed to determine if the pilot disc is stuck. The initial test using steam did not lift the pilot valve at 1250 psig. The second ramp of steam pressure opened the pilot valve at 1244 psig. Subsequent valve actuations occurred at considerably lower pressures, approximately 1149 psig.

The offsite testing facility was unable to perform an initial diagnostic test on the 'D' SRV (i.e., serial no. #509). As-found leakage of the pilot precluded performing this test. The initial lift pressure using steam was 1169 psig. Subsequent lift pressures on this pilot valve were approximately 1125 psig.

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In both cases, the sequence of test pressure lift points was characteristic of a corrosion bonded pilot disc since subsequent valve performance after the first lift improved once the bond was broken. In addition, the SRV pilot discs showed visible signs of a light corrosion film on the surfaces exposed to steam. This is in contrast to refurbished pilot discs that are lapped to a mirror finish and do not exhibit pilot sticking.

Corrective Actions:

To resolve the occurrence of SRV setpoint drift, PECO Energy Company is currently implementing the solution recommended by the BWROG Setpoint Drift Fix Program. PECO Energy Company has recently installed a special 'modified' pilot disc in several SRVs. The modified disc contains a platinum catalyst which inhibits the corrosion formation between the pilot disc seating surfaces. If this special pilot disc option does not resolve the occurrence of SRV setpoint drift, then the secondary BWROG Setpoint Drift Fix Program option will be pursued. The second option is to investigate having the SRVs actuate using an automatic pressure switch. Below is a listing of the completed and future actions to address the SRV setpoint drift concern.

Completed Actions:

1. The five Unit 1 SRVs were replaced with certified spare valves meeting the required setpoint.
2. Seven Unit 2 SRVs currently have modified pilot valves installed.
3. One Unit 1 SRV currently has a modified pilot valve installed.
4. Six SRV pilot spares have modified pilot discs installed and are recertified for installation during the sixth Unit 1 refueling outage (i.e., 1R06) scheduled to begin on February 2, 1995.

Future Actions:

1. Six modified pilot valves will be installed in Unit 1 during 1R06.
2. Modified pilot discs will be installed in at least 7 pilot assemblies removed from Unit 1 during 1R06. These assemblies

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will be recertified for use during the fourth Unit 2 refueling outage (i.e., 2R04) expected to begin in February 1997.

- The success of this modification will be monitored based on industry reporting to the BWROG and on the results of as-found testing of pilots removed from Unit 2 during 2R04.

Previous Similar Occurrences:

LERs 1-87-034, 1-89-036, 1-91-015, 1-92-017, 2-92-010, and 2-95-009 reported Main Steam System SRV setpoint drift.

The cause of each of these events is the same and the issue of resolving the SRV setpoint drift problem is being addressed through the BWROG SRV Setpoint Drift Fix Program.