

Commonwealth Edison Company
LaSalle Generating Station
2601 North 21st Road
Marseilles, IL 61341-9757
Tel 815-357-6761



January 16, 1997

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Licensee Event Report #96-020-00, Docket #050-373 is being submitted to your office in accordance with 10 CFR 50.73(a)(2)(ii).

Respectfully,

A handwritten signature in dark ink, appearing to read "D. J. Ray", is written over a horizontal line.

D. J. Ray
Station Manager
LaSalle County Station

Enclosure

cc: A. B. Beach, NRC Region III Administrator
M. P. Huber, NRC Senior Resident Inspector - LaSalle
C. H. Mathews, IDNS Resident Inspector - LaSalle
F. Niziolek, IDNS Senior Reactor Analyst
INPO - Records Center

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LICENSEE EVENT REPORT (LER)

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 (MNBB 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): LaSalle County Station Unit One									DOCKET NUMBER (2): 05000373		PAGE (3): 1 of 5			
TITLE (4) Potential Water Hammer Concerns of Residual Heat Removal Service Water System Division 2 Piping														
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			
12	17	96	96	020	00	1	16	97	LaSalle County Station Unit Two		05000374			
									FACILITY NAME		DOCKET NUMBER			
OPERATING MODE (9)		4		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)										
POWER LEVEL (10)		000												
			<input type="checkbox"/>	20.2201(b)		<input type="checkbox"/>	20.2203(a)(3)(i)		<input type="checkbox"/>	50.73(a)(2)(iii)		<input type="checkbox"/>	73.71(b)	
			<input type="checkbox"/>	20.2203(a)(1)		<input type="checkbox"/>	20.2003(a)(3)(ii)		<input type="checkbox"/>	50.73(a)(2)(iv)		<input type="checkbox"/>	73.71(c)	
			<input type="checkbox"/>	20.2203(a)(2)(i)		<input type="checkbox"/>	20.2003(a)(4)		<input type="checkbox"/>	50.73(a)(2)(v)		<input type="checkbox"/>	OTHER	
			<input type="checkbox"/>	20.2203(a)(2)(ii)		<input type="checkbox"/>	50.36(c)(1)		<input type="checkbox"/>	50.73(a)(2)(vi)		(Specify in Abstract below and in Text, NRC Form 366A)		
			<input type="checkbox"/>	20.2203(a)(2)(iii)		<input type="checkbox"/>	50.36(c)(2)		<input type="checkbox"/>	50.73(a)(2)(vii)(A)				
			<input type="checkbox"/>	20.2203(a)(2)(iv)		<input type="checkbox"/>	50.73(a)(2)(i)		<input type="checkbox"/>	50.73(a)(2)(viii)(B)				
			<input type="checkbox"/>	20.2003(a)(2)(v)		<input checked="" type="checkbox"/>	50.73(a)(2)(ii)		<input type="checkbox"/>	50.73(a)(2)(x)				
LICENSEE CONTACT FOR THIS LER (12)														
NAME: Daniel Schmit, Engineering									TELEPHONE NUMBER (Include Area Code): (815) 357-6761 Extension 2986					
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)														
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC				
SUPPLEMENTAL REPORT EXPECTED (14)														
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)					<input checked="" type="checkbox"/> NO					EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR

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

During a review of the Residual Heat Removal service water system (RHRWS) for water hammer concerns, Division 2 piping supplying an RHR heat exchanger on Units 1 and 2 was found to be outside of its design basis in Modes 1, 2, and 3. Due to the vertical height difference between the top of the piping and the cooling lake level, a vapor pocket can form. Design basis conditions and starting of the Division 2 RHRWS pump(s), could then result in a significant water hammer. Evaluations have not demonstrated that the Div. 2 RHRWS piping system will remain intact during this event.

The original design did not address this condition. The root cause is indeterminate. A contributing cause is that in the past LaSalle failed to recognize that under design basis conditions the piping system would not fulfill design basis requirements.

Corrective actions include: 1) installation of a keep fill system for each unit (Division 2) to eliminate the potential for water hammer during design basis events, which will be operable prior to either Unit 1 or 2 entering Modes 1, 2, or 3, 2) completion of a design review of the Core Standby Cooling System, which includes RHRWS, prior to restart, and, 3) a review for systems important to safety or utilized within the actions of the emergency operating procedures. Additionally, LaSalle is preparing a response to U. S. NRC Generic Letter 96-06, which will address water hammer issues discussed in the Generic Letter. These reviews will be completed prior to restart from the current outages (L1F035, L2R07).

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PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

A. CONDITION PRIOR TO EVENT

Unit(s): 1/2

Event Date: 12/17/96

Event Time: 1230 Hours

Reactor Mode(s): 4/N

Mode(s) Name: Cold

Power Level(s): 0%/0%

Shutdown/Defueled

B. DESCRIPTION OF EVENT

A U. S. NRC Service Water System Operational Performance Inspection (SWSOPI) was conducted at LaSalle in September, 1996. An NRC comment questioning the potential for a water hammer in the RHR heat exchanger tubes was received, and led to a review of the RHR service water system (RHRWS) for potential water hammer concerns. As a result of the review, the Division 2 piping supplying cooling water to the tube side of the RHR heat exchanger on both Units 1 and 2 was found to be outside of its design basis. This is due to a vertical height difference between the top of this piping (a vertical loop) and the cooling lake level (see attached Figure). Service water leakage out of this portion of the system would cause a vapor pocket to form in the piping loop. Design basis conditions and subsequent starting of the Division 2 RHRWS pump(s), could then result in a significant water hammer. Evaluations have not demonstrated that the Division 2 RHRWS piping system will remain intact during this event. This condition places the Division 2 RHRWS system outside its design basis in Modes 1, 2 and 3 on both Units 1 and 2, since initial plant operation.

This condition does not exist for Division 1 on either unit because the corresponding RHRWS piping does not contain the same vertical loop. In addition, analytical evaluations have been performed which indicate that stresses in the RHR heat exchanger for both Division 1 and 2 on both Unit 1 and Unit 2 are within design basis code allowables for the increase in pressure due to a potential water hammer in the RHR heat exchanger tubes. In Modes 4, 5, and defueled, the Division 2 RHRWS pumps are either running for shutdown cooling, in which case voids cannot form, or if not running, are started per RHRWS system operating procedure steps that start the pumps in a manner which gradually fills the system.

Each division of the RHRWS provides cooling water to an RHR heat exchanger, and two RHR pump seal coolers. At 1230 hours on December 17, 1996, LaSalle Operations performed the Emergency Notification System (ENS) notification under 10CFR50.72(b)(2)(i), 'Degraded Condition Discovered While Shutdown'. This event is reportable per 10 CFR 50.73(a)(2)(ii) due to the discovery of a condition that was outside the design basis of the plant.

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C. CAUSE OF EVENT

The original design did not address this condition. The root cause is indeterminate. The vertical piping loop in Division 2 of the RHRWS system (both units) was provided during the original design and construction phase of LaSalle Station to accommodate straight pipe length requirements associated with a flow element, and space limitations in the Division 2 RHR heat exchanger rooms. Void formation due to leakage through closed valves and/or the full impact of a piping change to provide the straight length of pipe for the flow element may not have been considered.

Systems were designed to withstand water hammer and hydraulic transients when such conditions were expected to exist and be significant during operation of the plant. For example, the Circulating Water (CW) system is designed for the hydraulic transients that are expected to occur as the system fills during initial startup of the pumps; the Main Steam (MS) system is designed for stop valve closure/turbine trip transients; and the Feed Water (FW) system is designed for pump trip/check valve closure transients. Other water systems were designed with features such as manual or automatic high point air vents to eliminate the formation of voids that could result in water hammer. In some cases, keep-fill systems (water leg pumps) were provided as part of the original design to eliminate void formation.

A contributing cause of this event is that in the past LaSalle failed to recognize that under design basis conditions the Division 2 piping system would not meet design basis requirements. Water hammer in the Unit 2 Division 2 RHRWS piping vertical loop was investigated in 1990 but did not result in identification of the subject piping being outside its design basis for the conditions described above.

D. ASSESSMENT OF SAFETY CONSEQUENCES

Under design basis conditions, Division 2 of the RHRWS piping system could have failed, and as a result, only one RHR heat exchanger cooling loop (Division 1) would have been available for cooling purposes. This scenario has safety significance since a single failure in Division 1, concurrent with the aforementioned sequence of events, could have resulted in no RHR heat exchanger loops being available for post accident containment heat removal purposes.

E. CORRECTIVE ACTIONS

Corrective actions as a result of this event include:

- 1) During the current outages on both units, a keep fill system is being installed (an independent one for each unit) which will eliminate the potential for water hammer during design basis events in Modes 1, 2, and 3. These keep fill systems will be installed and operable prior to either Unit 1 or 2 entering Modes 1, 2, or 3.

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- 2) The Core Standby Cooling System (CSCS), of which RHR service water is a subsystem, has been selected for a review prior to startup of LaSalle Units 1 and 2. This review is being conducted to verify adequate design implementation, that there is a clearly documented analytical basis for the design, that no important design features have been overlooked, and that the design provides for the necessary functional operating requirements.

The review for the CSCS will consider the potential for water hammer in the discharge piping of the various CSCS pumps, and any additional water hammer problems identified will be resolved prior to startup.

- 3) LaSalle is reviewing systems important to safety or utilized within the actions of the emergency operating procedures to identify and correct similar problems. Additionally, LaSalle is preparing a response to U. S. NRC Generic Letter 96-06, which will address water hammer issues discussed in the Generic Letter. These reviews will be completed prior to restart from the current outages(L1F035, L2R07).

F. PREVIOUS OCCURRENCES

None.

G. COMPONENT FAILURE DATA

Since no component failure occurred, this section is not applicable.

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**Elevation Sketch of RHR Service Water Piping Loop
Division 2**

