

(4/95)

**LICENSEE EVENT REPORT (LER)**

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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) **CONSUMERS ENERGY COMPANY  
PALISADES NUCLEAR PLANT**

DOCKET NUMBER (2)  
**05000255**

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**TITLE (4)**

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
03	05	98	98	006	00	04	06	98	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) <b>N</b>	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check one or more)</b>					
	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(iii)		
POWER LEVEL (10) <b>100</b>	20.2203(a)(1)	20.2203(a)(3)(i)	x 50.73(a)(2)(ii)	50.73(a)(2)(x)		
	20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71		
	20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER		
	20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A		
	20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)			

**LICENSEE CONTACT FOR THIS LER (12)**

NAME **Barbara E. Dotson, General Technical Analyst**

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**(616) 764-2265**

**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

**SUPPLEMENTAL REPORT EXPECTED (14)**

x YES. If yes, COMPLETE EXPECTED COMPLETION DATE. NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR  
**07 31 98**

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewriter lines) (166) On March 5, 1998, with the plant operating at 100% power, station personnel determined that operating procedures lacked specific guidance for operator actions necessary to ensure the availability of High Pressure (HP) Air in the event of a Small Break Loss of Coolant Accident (SBLOCA) with a coincident Loss of Offsite Power (LOOP).

Both original and existing HP Air System design bases address the Large Break Loss of Coolant Accident (LBLOCA), yet do not address, in detail, the SBLOCA. Since EOPs are developed from a translation of design basis requirements, they have not been written with specific manual operator actions to assure the reliability of HP Air to support Emergency Core Cooling System (ECCS) switchover to the recirculation mode for the SBLOCA.

As an interim measure, Alarm Response Procedure (ARP) 7 was revised to include guidance on restoring the HP Air compressors in the event of a Loss of Coolant Accident (LOCA) to support recirculation. System Operating Procedure (SOP) 20 was also revised to provide direction on repowering the HP Air compressors and cross-tying receiver tanks, if necessary. Operator training on the procedure changes has been completed.

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

**EVENT DESCRIPTION**

On March 5, 1998, with the plant operating at 100% power, station personnel determined that operating procedures lacked specific guidance for operator actions necessary to ensure availability of High Pressure (HP) Air in the event of a Small Break Loss of Coolant Accident (SBLOCA) with a coincident Loss of Offsite Power (LOOP).

The original design bases, and subsequent design reviews, for the HP Air System address the Large Break Loss of Coolant Accident (LBLOCA), yet do not address, in detail, the SBLOCA. Since Emergency Operating Procedures (EOPs) are developed from a translation of design basis requirements, EOPs have not been written with specific manual operator actions to assure the reliability of HP Air to Support Emergency Core Cooling System (ECCS) switchover to the recirculation mode for the SBLOCA.

HP Air System testing has demonstrated that the HP Air receivers can supply sufficient air for one hour to operate the control valve required to realign ECCS to the recirculation mode when the Recirculation Actuation Signal (RAS) occurs. This bounds the expected time frame for RAS initiation following LBLOCA events. However, SBLOCA events can be postulated, wherein RAS initiation occurs beyond the one hour time frame. It was determined on March 5, 1998, that the HP Air System compressors must be returned to service within one hour for postulated events where RAS initiation occurs more than one hour into the event.

**ANALYSIS OF THE EVENT**

The original design bases for Palisades focused on the LBLOCA, since it was considered to be the most limiting accident in terms of its effects and challenges imposed on mitigating systems. Over the years, SBLOCAs have been evaluated and their effects identified. Design basis reconstitution and Design Basis Document (DBD) development is ongoing, and has been completed for approximately 85% of the systems categorized as safety significant within our Maintenance Rule Program. Through design reconstitution, the challenges specific to a SBLOCA have been considered and documented in the DBDs, and manual operator actions have been added to procedures, as appropriate.

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The original HP Air System design basis and subsequent design reviews also focused on the LBLOCA event, and did not address the SBLOCA. As a result, the impact of a loss of the HP Air compressors on the ability to supply air needed to align valves for sump recirculation during a SBLOCA, and the need to incorporate manual operator actions in EOPs to assure HP air reliability were not considered. The design basis reconstitution for the HP Air System identified the need for procedural guidance to direct manual operator actions to restore the HP Air System during a SBLOCA.

The HP Air System supports ECCS realignment to the recirculation mode by providing air required to operate control valves needed to switch the suction of the ECCS pumps from the Safety Injection Refueling Water Tank (SIRWT) to the containment sump. During a LOCA with LOOP, the HP Air System compressors are load shed from safety-related electrical buses and must be manually repowered at their respective motor control centers (MCCs). When the air compressors are without power, the receiver tanks are not being charged. During this time, the HP Air System pressure experiences a gradual decay due to air bleed-off from pressure regulators and air leakage through seals in piston-driven control valve actuators. The LBLOCA event progresses rapidly so that normal air pressure decay would not reduce the HP Air System receiver pressure below that needed for recirculation valve operation. For a LBLOCA, RAS is expected to occur within one hour after onset of the initiating event. HP Air System testing has demonstrated that the HP Air receivers can supply sufficient air for one hour, without being charged by the HP Air compressors, to operate the control valves required to realign ECCS to the recirculation mode, when RAS occurs.

The EOPs were written assuming adequate HP Air would be available from the HP Air receiver tanks for necessary valve operation, without the need to restore the HP Air compressors. This assumption stems from FSAR statements, which indicate that adequate HP Air would be available from the HP Air receiver tanks; which is the case for the LBLOCA. However, the length of time the stored air is available is not discussed in the FSAR.

During a SBLOCA, where RAS may occur after an elapsed time of greater than one hour following the event initiation, manual operator actions would be required to repower the HP Air compressors, or utilize the Instrument Air System as a backup, to supply the control valves that realign the ECCS to the recirculation mode. A preliminary evaluation indicates that Instrument Air pressure is adequate to operate recirculation valves. Guidance to restart the HP Air System

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compressors is provided in station EOPs, but the step would not be accomplished until greater than one hour into the event. However, it is likely, during immediate assessment of post-trip conditions, that Control Room Operators would restore power to the Instrument Air System within one hour. Other EOP actions which direct manual actions to start Instrument Air compressors, if vital auxiliaries (air) are not available, are described in the "Safety Significance" Section.

**SAFETY SIGNIFICANCE**

The safety significance of this event is low. EOPs do not provide specific guidance for restoring HP Air compressor power within one hour after the occurrence of a SBLOCA with LOOP to support the ECCS recirculation function. However, it is likely, during immediate assessment of post-trip conditions, that Control Room Operators would restore power to the Instrument Air System within one hour. A preliminary evaluation indicates that Instrument Air pressure is adequate to operate the recirculation valves.

EOPs which would serve to provide required air to control valves effecting ECCS recirculation are:

EOP 1.0, "Standard Post Trip Actions", directs Operators to verify vital auxiliaries (air) by verifying that Instrument Air pressure is greater than 85 psig. If this criteria is not satisfied, then direction is given to start available Instrument Air compressors, or utilize Feedwater Purity air. By maintaining Instrument Air, a backup supply of air is available to the HP Air operated valves which need to open to align the ECCS pump suction for recirculation. The Safety Injection and Refueling Water Tank (SIRWT) recirculation valves, which are required to close upon RAS, have a nitrogen backup supply, rather than Instrument Air.

EOP 9.0, "Functional Recovery", ensures that 480V Motor Control Centers (MCCs) are energized, as appropriate. MCC 7 powers the left channel HP Air compressor and MCC 8 powers the right channel HP Air compressor. By energizing MCC 7 and MCC 8, HP Air compressors are repowered, ensuring adequate HP Air pressure. Also, entry into Off Normal Procedure (ONP) 2.1, "Loss of AC Power", directs the same action to be taken.

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EOP 4.0, "Loss of Coolant Accident", and EOP 9.0, "Functional Recovery", direct that if the SIRWT level falls below 2%, or RAS initiates, then Operators are to ensure that Containment Sump Isolation Valves open and the SIRWT valves close. Any actions required to open the sump valves and close the SIRWT valves would be performed at this point.

The Probabilistic Safety Assessment (PSA) group has evaluated a SBLOCA event with concurrent LOOP, and failure to repower the HP Air compressors. The PSA normally credits operator actions to repower the HP Air power supply buses from their Class 1E power sources following load shedding. However, PSA evaluated the scenario of a SBLOCA with coincident LOOP, assuming that the Operator did not repower the HP Air power supply buses. In this scenario, recirculation is never achieved. The probability of this scenario is very low and results in a negligible change to the plant baseline core damage frequency. Therefore, this scenario is classified as non-safety significant.

We have also considered the scenario where a SBLOCA and LOOP occur simultaneously with a single failure such as the loss of an Emergency Diesel Generator. Although we believe that proceduralized actions are adequate to respond to this event, we plan to continue our evaluation to determine if any further actions, such as plant modifications, are desirable. We will provide the results of this evaluation in a supplement to this LER.

**CAUSE OF THE EVENT**

The LBLOCA was addressed by the plant's original design bases, since it was considered the most limiting accident. The SBLOCA was not addressed in detail. As a result, EOPs, which are developed, in part, by translation of requirements from design bases, do not provide the manual operator actions necessary to restore power to HP Air System compressors in a timely manner to assure reliability of HP Air in support of ECCS realignment during all postulated SBLOCA with LOOP events.

**CORRECTIVE ACTIONS COMPLETED**

1. Alarm Response Procedure (ARP) 7 was revised to include guidance on restoring the HP Air compressors in the event of a LOCA to support recirculation. System Operating Procedure (SOP) 20 was also revised to provide direction on repowering the HP air

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compressors and cross-tying receiver tanks, if necessary. Operator training on the procedure changes has been completed.

**CORRECTIVE ACTIONS TO BE COMPLETED**

1. EOPs will be revised to provide guidance on re-energizing MCC-7 and MCC-8 to ensure adequate High Pressure Air is available to reposition control valves before recirculation actuation occurs.
2. SBLOCA event initial conditions and sequence of events will be reviewed and action taken, as necessary, to reconfirm that Palisades plant design and procedural guidance for operator actions are consistent with the assumptions of the accident analysis.
3. The FSAR and the Compressed Air Design Basis Document are being updated to provide HP Air System design bases. The FSAR revision will include a discussion of post-DBA operation of the HP Air system.
4. Evaluate the scenario where a SBLOCA and LOOP occur simultaneously with a single failure such as the loss of an Emergency Diesel Generator, and determine if any further actions, such as plant modifications, are desirable. Provide the results of this evaluation in a supplement to this LER.