

**ILLINOIS  
POWER**

Illinois Power Company  
Clinton Power Station  
P.O. Box 678  
Clinton, IL 61727  
Tel 217 935-8881

U-601955  
145-92(03-27)-LP  
2C.223

March 27, 1992

10CFR50.73

Docket No. 50-461

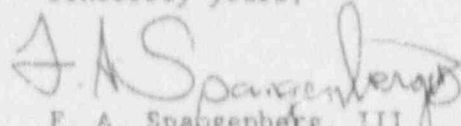
Document Control Desk  
Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: Clinton Power Station - Unit 1  
Licensee Event Report No. 91-007-01

Dear Sir:

Please find enclosed supplemental Licensee Event Report No. 91-007-01: Undetected Failure of An Air Handling Unit and Operations Lack of Understanding of the Air Handling Unit Design and Operation Resulted in Inoperable Leak Detection Instruments. This Licensee Event Report has been revised to make editorial corrections and to include the results of the investigation into the cause of the air handling unit failure. Additionally, the results of the maintenance history review of the air handling units which support leak detection instrumentation are addressed in this revision. This report is being submitted in accordance with the requirements of 10CFR50.73.

Sincerely yours,

  
F. A. Spangenberg, III  
Manager, Licensing and Safety

KWD/alh

Enclosure

cc: NRC Clinton Licensing Project Manager  
NRC Resident Office, V-690  
NRC Region III, Regional Administrator  
Illinois Department of Nuclear Safety  
INPO Records Center

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-30), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) **Clinton Power Station** DOCKET NUMBER (2) **0 5 0 0 0 4 6 1 1** PAGE (3) **1** OF **0 6**

TITLE (4) **Undetected Failure Of An Air Handling Unit And Operations Lack Of Understanding Of The Air Handling Unit Design And Operation Resulted In Inoperable Leak Detection Instruments.**

| EVENT DATE (5) |     |      | LER NUMBER (6) |                   |                 | REPORT DATE (7) |     |      | OTHER FACILITIES INVOLVED (8) |   |                  |   |   |   |   |   |   |   |      |   |   |   |   |   |
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| MONTH          | DAY | YEAR | Y. AR          | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH           | DAY | YEAR | FACILITY NAMES                |   | DOCKET NUMBER(S) |   |   |   |   |   |   |   |      |   |   |   |   |   |
| 1              | 2   | 1    | 2              | 9                 | 1               | 9               | 1   | 0    | 0                             | 7 | 0                | 1 | 0 | 3 | 2 | 7 | 9 | 2 | None | 0 | 5 | 0 | 0 | 0 |
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OPERATING MODE (9) **1**

POWER LEVEL (10) **1 0 0**

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)

|  |  |   |   |
|--|--|---|---|
| <input type="checkbox"/> 20.402(b)         | <input type="checkbox"/> 20.406(c)                 | <input type="checkbox"/> 50.73(a)(2)(vi)      | <input type="checkbox"/> 73.71(b)   |
| <input type="checkbox"/> 20.405(a)(1)(ii)  | <input type="checkbox"/> 50.38(i)(1)(i)            | <input type="checkbox"/> 50.73(a)(2)(v)       | <input type="checkbox"/> 73.71(c)   |
| <input type="checkbox"/> 20.405(a)(1)(iii) | <input type="checkbox"/> 50.38(i)(2)               | <input type="checkbox"/> 50.73(a)(2)(vii)     | <input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 305A) |
| <input type="checkbox"/> 20.405(a)(1)(iv)  | <input checked="" type="checkbox"/> 50.73(a)(2)(i) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |   |
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| <input type="checkbox"/> 20.405(a)(1)(vi)  | <input type="checkbox"/> 50.73(a)(2)(iii)          | <input type="checkbox"/> 50.73(a)(2)(ix)      |   |

LICENSEE CONTACT FOR THIS LER (12)

NAME **P. D. Yocum, Director - Plant Operations, Extension 3205** TELEPHONE NUMBER **2 1 7 9 3 5 - 8 8 8 1**

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFAC TURER | REPORTABLE TO NRC | CAUSE | SYSTEM | COMPONENT | MANUFAC TURER | REPORTABLE TO NRC |
|-------|--------|-----------|---------------|-------------------|-------|--------|-----------|---------------|-------------------|
| X     | K, M   | A, H, U   | T, J, 6, 5    | N                 |       |        |           |               |                   |

SUPPLEMENTAL REPORT EXPECTED (14)

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

EXPECTED SUBMISSION DATE (15)

| MONTH | DAY | YEAR |
|-------|-----|------|
|       |     |      |

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

On December 12, 1991, with the plant in Power Operation, the 'B' Reactor Water Cleanup (RWCU) heat exchanger (Hx) room air handling unit (AHU) fan failed resulting in inoperable leak detection (LD) differential temperature (delta T) instrumentation. The Shift Supervisor noted the 'B' RWCU Hx room temperature increasing and the delta T recorder indicating zero, indicating a possible problem with the LD system. During the event, the LD instruments were initially declared inoperable and then incorrectly declared operable due to Operations lack of understanding of the AHU design and operation. Subsequent to this event, a review of the delta T recorder strip chart showed that the fan failed approximately two hours and twenty-five minutes before the Shift Supervisor had indication of the failure. Therefore, the requirements of Technical Specification 3.3.2 to isolate the HX within one hour were not met. No remote indication is available to identify the failure of the AHU within one hour. The causes of this event are an undetected failure of a fan resulting in inoperable LD instruments and Operations lack of understanding of the effect of the fan failure on the LD instruments. Corrective actions include submitting a proposed Technical Specification change, reworking the failed fan, and training Operations personnel on this event.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (if more space is required, use additional NRC Form 200A-1 (1))

## DESCRIPTION OF EVENT

On December 12, 1991, with the plant at 100 percent power in Mode 1 (POWER OPERATION), at approximately 0925 hours, the Shift Supervisor noted an increasing trend in the 'B' (east) Reactor Water Cleanup system (RWCU) [CE] heat exchanger [HX] room temperature, as indicated by the equipment area ambient temperature recorder (1E31R608) [TR]. The Shift Supervisor noted the increasing temperature trend while pointing out specific drywell temperatures to an engineer. The Shift Supervisor immediately checked the differential temperature for the 'B' Hx room by checking the equipment area differential temperature recorder (1E31R611) [TR] which was indicating zero. This reading was indicative of a possible problem with the Leak Detection (LD) System [IJ]. Both the equipment area ambient and differential temperature instruments are part of the LD system. In response to this indication, the Shift Supervisor instructed the control room operators to dispatch a non-licensed operator to check the status of the air handling unit.

At 0933 hours, before the control room operators were able to dispatch a non-licensed operator to the area, the 'C' area non-licensed operator, conducting a routine containment tour, reported that the fan [FAN] shaft in the 'B' RWCU heat exchanger room air handling unit (1W005SM) [AHU] had apparently come out of its bearing housing.

At 0958 hours, after discussing the situation with the Supervisor - Licensing Operations, the Shift Supervisor determined it was necessary to declare the LD differential temperature instrumentation (1E31N618A) inoperable and isolate the 'B' RWCU heat exchanger within two hours as required by Technical Specification 3.3.2 action statement C.1. The Shift Supervisor made this decision based upon the incorrect understanding that the LD differential temperature instrumentation measured the differential temperature of the air through the air handling unit and that only one division of LD differential temperature instrumentation was affected.

At 1015 hours, after reviewing electrical and mechanical drawings, the Shift Supervisor correctly determined that the LD differential temperature instruments actually measured the differential temperature between the inlet and outlet Chilled Water (CW) [KM] flow through the air handling unit. The Shift Supervisor instructed the control room operators to dispatch a non-licensed operator to verify that the bypass valve [V] for the air handling unit temperature control valve [TCV] was open, thus verifying that chilled water was available to the air handling unit. The Shift Supervisor incorrectly believed that the LD differential temperature instruments were operable without air flow if full chilled water flow was available to the air handling unit.

At 1020 hours, the non-licensed operator verified the bypass valve for the air handling unit temperature control valve was in the full open

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TEXT (If more space is required, use additional NRC Form 305A's (17))

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position. Since the bypass valve was fully open, the Shift Supervisor incorrectly declared the LD differential temperature instruments operable.

At 1040 hours, the Shift Supervisor informed the Supervisor - Licensing Operations that based upon having full chilled water flow he had declared the LD differential temperature instrumentation operable. The Supervisor - Licensing Operations and the Director - Plant Operations recommended that the 'B' RWCU heat exchanger be isolated because some unanswered questions remained about the operational requirements of the air handling unit in support of the LD differential temperature instrumentation.

By 1056 hours, operators had isolated the 'B' RWCU heat exchanger.

At 1130 hours, the Supervisor - Licensing Operations, after consulting with the architect engineer (Sargent and Lundy), notified the Shift Supervisor that both divisions of the LD differential temperature instruments were incapable of performing their intended function without air flow through the 'B' RWCU room air handling unit. The Shift Supervisor declared both divisions of the LD differential temperature instruments (1E31N618A/B) inoperable and verified that the 'B' RWCU heat exchanger had been isolated as required by Technical Specification 3.3.2 action statement C.2.

By 2000 hours, the 'B' RWCU heat exchanger room air handling unit had been repaired and the LD differential temperature instruments were declared operable.

Subsequent to the event, a review of the strip chart from the equipment area differential temperatures recorder determined that the 'B' RWCU heat exchanger room air handling unit fan had failed at approximately 0700 hours on December 12, 1991. Since the 'B' RWCU heat exchanger was not isolated until 1056 hours (approximately three hours and fifty six minutes after the fan had failed), this event constituted operation prohibited by Technical Specification 3.3.2 action statement C.2 which would have required the heat exchanger to be isolated within one hour.

No automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. In addition, no other equipment or components were inoperable at the start of this event such that their inoperable condition contributed to this event.

CAUSE OF THE EVENT

The causes of this event were an undetected failure of a fan in the 'B' RWCU heat exchanger air handling unit which resulted in inoperable LD differential temperature instrumentation and Operations lack of understanding of the effect of the fan failure on the operability of the LD differential temperature instrumentation. The cause of the failure of

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EXPIRES: 8/31/88

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the fan is believed to be long-term degradation of the fan shaft. A loose locking screw on the drive end bearing caused the bearing to be worn, resulting in the fan shaft degradation.

At approximately 0700 hours, the fan shaft in the 'B' RWCU heat exchanger room air handling unit failed, which rendered both divisions of the LD differential temperature instruments inoperable. The broken fan was not discovered until 0933 hours and compensatory action was not taken until 1056 hours (when the 'B' RWCU heat exchanger was isolated). Therefore, the requirements of Technical Specification 3.3.2 action statement C.2 to isolate the RWCU heat exchanger were not met within one hour of both divisions of the LD differential temperature instruments becoming inoperable. Failure of the air handling unit may be identified in the main control room by the differential temperature recorder indicating zero or by the equipment area ambient temperature recorder showing an increase in temperature. Both of the indications depend on the heat load in the room. However, the Technical Specification surveillance requirements only require a channel check to be performed for the LD differential temperature instruments at least once every twelve hours, whereas the Technical Specification action statement requires action to be taken within one hour. Therefore, no means exist to ensure that a failure of the air handling unit is identified within the one-hour time limit specified by the Technical Specification action statement.

The LD differential temperature instrumentation was incorrectly determined to be operable based on Operations lack of understanding of how the LD differential temperature instrumentation is affected by the operation of the air handling unit. Both air flow and chilled water flow through this type of air handling unit are needed to maintain both divisions of the LD differential temperature instruments operable. This lack of understanding has resulted in the failure to meet Technical Specification requirements for this event, when performing past preventive maintenance on the RWCU heat exchanger air handling unit, and when performing corrective maintenance on the RWCU pump room air handling units (which have a similar design).

## CORRECTIVE ACTION

The 'B' RWCU heat exchanger room air handling unit has been reworked in accordance with Maintenance Work Request D16874 to correct the fan failure.

Illinois Power will prepare proposed changes to the Technical Specifications to increase the allowed out-of-service time of the LD differential temperature instrumentation and thus permit additional time to detect air handling unit failures and effect repairs. The proposed changes are justified based upon the availability of other LD instrumentation to perform isolations and alarms in the event of a system breach. The proposed changes apply to the LD instrumentation associated

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with the main steam tunnel, RWCU pump [P] rooms, RWCU heat exchanger rooms, Residual Heat Removal (RHR) [RO] heat exchanger rooms, and the Reactor Core Isolation Cooling (RCIC) [BW] equipment room. The proposed Technical Specification changes are currently scheduled to be submitted to the Nuclear Regulatory Commission by November 15, 1992.

Operations shift crews have been informed of this event through issuance of an Operations Night Order. The review of this event by Operations shift personnel has resulted in a heightened awareness of the support system function of the air handling unit on the operability of the LD instrumentation. In addition, this Licensee Event Report has been routed to appropriate Operations personnel as required reading in order to enhance their understanding of how the air handling units support operability of the associated differential temperature instrumentation. Finally, this Licensee Event Report will be incorporated into Operations requalification training. Since requalification training will be suspended prior to and during the third refueling outage, requalification training on this event is scheduled to be completed by November 21, 1992.

The Nuclear Station Engineering Department (NSED) has verified which air handling units have Technical Specification-related LD differential temperature instrumentation. The preventive maintenance tasks which require removal of the air handling unit from service were revised to identify that removing the air handling unit from service renders LD instruments inoperable and action is required in accordance with Technical Specification 3.3.2.

The preventive maintenance tasks for the RWCU heat exchanger room air handling units have been revised to require that the locking screw be inspected in accordance with the vendor manual. This preventive maintenance task currently has a six-month frequency.

ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73(a)(2)(1)(B) because the plant was operated in a condition prohibited by Technical Specifications.

The LD differential temperature instrumentation was inoperable approximately two hours and twenty-five minutes prior to discovery.

A review of the maintenance history from initial criticality to December 1991 was performed to determine if the performance of previous preventive maintenance may have resulted in inoperable LD instruments. This review determined that the air handling units for the RWCU heat exchangers were shut down for preventive maintenance at various frequencies. The current preventive maintenance tasks for the RWCU heat exchanger room air handling units are performed on a six-month frequency. Based on current maintenance practices, the time required to complete these preventive

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maintenance tasks and return the air handling unit to service should not have exceeded the one-hour Technical Specification time limit unless the belts needed to be replaced. The maintenance history review identified that the belts were replaced three times while the plant was in an applicable operating mode for Technical Specification 3.3.2 [i.e., Modes 1, 2, and 3] during which times the required Technical Specification action statement was not entered. In two of these cases, the belts were found to be broken, and in the remaining case, the belt was found to be worn.

Additionally, one case was identified where the RWCU "B" pump room air handling unit was shut down for corrective maintenance while the plant was in one of the applicable operating modes. In this instance also, the one-hour Technical Specification action statement may not have been met.

Analysis of the safety consequences and implications of these events indicates that the events were not nuclear safety significant. Taking air handling units out of service does not affect the operability of the ambient room temperature LD instruments, and the differential flow instruments were operable and able to provide isolations and alarms in the event of a system breach. During these events, no system breach occurred.

ADDITIONAL INFORMATION

The RWCU air handling unit 1W005SM is model number CLCH No. 10MPV manufactured by TEANE Company.

LER 88-024 identified a failure to recognize that an inoperable damper resulted in an inoperable Control Room Ventilation System which required the initiation of a Technical Specification required shutdown.

For further information regarding this event, contact P. D. Yocum, Director - Plant Operations at 217-935-8881, Extension 3205.