

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)

Clinton Power Station

DOCKET NUMBER (2)

05000461

PAGE (3)

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(1) (1) (4)

Plant Outside Design Basis Due to Inadequate Tornado Missile Protection Caused by Design Error

| 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 |
| 09 | 29 | 86 | 97 | 032 | 00 | 01 | 02 | 98 | None | 05000 |
| | | | | | | | | | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | None | 05000 |
| OPERATING MODE (9) | | | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | | | |
| 5 | | | 20.2201(b) | | 20.2203(a)(2)(v) | | 50.73(a)(2)(i) | | 50.73(a)(2)(viii) | |
| POWER LEVEL (10) | | | 20.2203(a)(1) | | 20.2203(a)(3)(i) | | X 50.73(a)(2)(ii) | | 50.73(a)(2)(x) | |
| 000 | | | 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) | | X 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

D. L. McMillan, Corrective Action Team Lead Engineer

TELEPHONE NUMBER (Include Area Code)

(217) 935-8881, Extension 3902

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 |
|-------|--------|-----------|--------------|------------------------|-------|--------|-----------|--------------|------------------------|
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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 15 single-spaced typewritten lines) (16)

On December 2, 1997, at approximately 1840 hours, Plant Operations determined that portions of the High Pressure Core Spray (HPCS) pump suction piping, Reactor Core Isolation Cooling (RCIC) pump suction piping, and RCIC tank level instrumentation standpipe, located outside of a missile protected building, were not designed to withstand missiles generated by a design basis tornado. The Updated Safety Analysis Report (USAR) identifies that these components should be designed to withstand the effects of a missile generated by a design basis tornado. Because portions of the HPCS and RCIC pump suction piping and the RCIC tank level instrumentation standpipe are not provided missile protection, the design of these systems was not in accordance with the design basis of the plant. The cause of this event was determined to be design engineering oversight. The corrective actions for this event include providing missile protection for the portions of the HPCS and RCIC pump suction piping, and RCIC tank level instrumentation standpipe located outside a missile protected building, and investigating other portions of the plant for similar tornado missile design deficiencies. This condition is also reportable under 10CFR21.

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

DESCRIPTION OF EVENT

On December 2, 1997, at approximately 1840 hours, Clinton Power Station (CPS) was in Mode 4 (COLD SHUTDOWN), and reactor [RCT] coolant temperature was being maintained between 100 and 120 degrees Fahrenheit (F) at atmospheric pressure. The sixth refueling outage was in progress. Plant Operations determined that portions of the High Pressure Core Spray (HPCS) [BG] pump [P] suction piping, Reactor Core Isolation Cooling (RCIC) [BN] pump suction piping, and RCIC tank [TK] level instrumentation standpipe were not designed to avoid damage from the effects of a design basis tornado missile. Section 6.3.2.2.1 of the Updated Safety Analysis Report (USAR) identifies HPCS components and piping as being positioned to avoid damage from the physical effects of design-basis accidents, such as pipe whip, missiles, high temperature, pressure, and humidity. Additionally, section 3.1.2.1.4 of the USAR identifies that structures, systems, and components important to safety are designed to withstand the effects of missiles from events and conditions outside the nuclear unit. Because portions of the HPCS and RCIC pump suction piping and the RCIC tank level instrumentation standpipe are important to safety and not provided missile protection for a design basis tornado, their design was not in accordance with the design basis of the plant. This condition has existed since September 29, 1986, when the plant was in Mode 5 (REFUELING) for initial fuel loading, and reactor coolant temperature was ambient and pressure was atmospheric.

On October 10, 1997, at approximately 0945 hours, a station engineer was performing a walkdown in the RCIC storage tank room to investigate if missile protection was provided for RCIC instrumentation. This walkdown was prompted by information that another facility found safety-related components unprotected from tornado generated missile hazards. During the walkdown, the engineer identified that portions of the HPCS pump suction piping, RCIC pump suction piping and RCIC tank level instrumentation standpipe outside a missile protected building appeared to be unprotected from missile hazards. Condition Report (CR) 1-97-10-184 was written to investigate and track this issue. The Operations Shift Supervisor was informed of this issue and he directed Nuclear Station Engineering to evaluate this concern and report the results to the Operations Shift Supervisor.

The HPCS and RCIC pumps supply reactor grade water to the reactor vessel from the RCIC tank during postulated accident conditions. In the event that the RCIC storage tank water supply becomes exhausted or is not available, the RCIC tank level instrumentation provides input to automatically transfer the water source from the RCIC tank to the suppression pool. This capability assures a closed cooling water supply is available for continuous operation of the HPCS and RCIC systems. Portions of the HPCS and RCIC system suction piping, and the RCIC tank level instrumentation standpipe are contained in the RCIC storage tank building located between the RCIC storage tank and the Fuel Building. The RCIC storage tank building is not designed to withstand missiles generated by a design basis tornado, however, the HPCS and RCIC systems are required to have missile protection. Therefore, on December 2, 1997, Plant Operations determined that these systems were not in accordance with the design basis of the plant and entered a restraint from changing modes until this issue was resolved.

No automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. This event was not affected by other inoperable equipment or components.

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CAUSE OF EVENT

The cause of this event is oversight by design engineers who failed to provide a design that protects the HPCS and RCIC pump suction piping, and RCIC tank level instrumentation standpipe from missile hazards generated by a design basis tornado. Illinois Power did not recognize this design discrepancy during initial plant design review.

CORRECTIVE ACTIONS

Prior to plant startup, missile protection will be provided for the portions of HPCS and RCIC pump suction piping and RCIC tank level instrumentation standpipe located outside of a missile protected building.

IP is investigating other portions of the plant for similar tornado missile design deficiencies.

ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73 (a) (2) (ii) (B) due to the HPCS and RCIC piping and RCIC standpipe not having tornado missile protection in accordance with the design basis of the plant.

The HPCS and RCIC components and piping were not positioned to avoid damage from the physical effects of missiles generated by a design basis tornado. Two accident scenarios are postulated which result in the HPCS and RCIC systems not being capable of performing their safety-related functions. In the first scenario, a tornado missile could pinch the RCIC tank level instrumentation standpipe closed, preventing the level instrumentation from sensing a low level in the RCIC tank during a design basis accident. The pinched standpipe would prevent the automatic transfer of supply water from the RCIC tank to the suppression pool. As a result the HPCS and/or RCIC pump would lose suction pressure, interrupting the water supply to the reactor vessel, and damaging the pump(s) if not promptly diagnosed and corrected by control room operators. The second scenario postulates that a tornado missile severs the unprotected HPCS and/or RCIC pump suction piping without a failure of the RCIC tank or RCIC tank level instrumentation standpipe. In this scenario the pump(s) would continue to operate without sufficient suction flow or net positive suction head until sufficient water was lost from the RCIC storage tank through the ruptured line(s) to reach the low level trip for the system(s) transfer to the suppression pool water supply. This condition could also interrupt the water supply to the reactor vessel during a design basis accident and damage the pump(s).

An assessment of the safety consequences and implications of this event identified this condition as potentially safety significant. A loss of either the HPCS and/or RCIC system operability is a significant contributor to risk in the Probability Risk Assessment. However, the probability of the failure of these lines due to tornado missiles is expected to be considerably smaller than other failure mechanisms for the HPCS and RCIC systems.

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ADDITIONAL INFORMATION

No equipment or components failed as a result of this event.

Clinton Power Station reported a similar event regarding inadequate missile protection for safety-related equipment in LER 88-027.

For further information regarding this event, contact D. L. McMillan, Corrective Action Team Lead Engineer, at (217) 935-8881, extension 3920.

10CFR21 REPORT 21-97-057

On December 2, 1997, IP determined that portions of the HPCS and RCIC pump suction piping, and the RCIC tank level instrumentation standpipe were not designed to withstand missiles generated by a design basis tornado. This condition was determined to be potentially reportable under the provisions of 10CFR21 on December 5, 1997. IP has completed an evaluation of this issue and concludes that it is reportable under the provisions of 10CFR, Part 21.

IP is providing the following information in accordance with 10CFR21.21 (c) (3) within 2 days of the date the responsible officer approves this report.

- (i) J. G. Cook, Senior Vice President of Illinois Power Company, Clinton Power Station, Highway 54, 6 Miles East, Clinton, Illinois, 61727, is informing the NRC of a condition reportable under the provisions of 10CFR21 by means of this report.
- (ii) The basic component involved in this report is the design of portions of the HPCS and RCIC pump suction piping, and the RCIC tank level instrumentation standpipe for protection against design basis tornado generated missiles.
- (iii) The design for the HPCS/RCIC pump suction piping, and the RCIC tank level instrumentation standpipe was supplied by Sargent and Lundy.
- (iv) As discussed in the DESCRIPTION OF EVENT portion of this report, the nature of the reportable condition is a portion of the HPCS and RCIC pump suction piping, and the RCIC tank level instrumentation standpipe are not designed to withstand missiles generated by a design basis tornado as required by USAR sections 6.3.2.2.1 and 3.1.2.1.4. As discussed in the ANALYSIS OF EVENT portion of this report, the safety hazard created is a loss of supply water for the RCIC and/or HPCS pump(s).
- (v) On December 2, 1997, IP identified that portions of the HPCS and RCIC pump suction piping, and the RCIC tank level instrumentation standpipe were not designed to withstand missiles generated by a design basis tornado. This issue was determined to be potentially reportable under the provisions of 10CFR21 on December 5, 1997.

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- (vi) This issue affects the design of the HPCS and RCIC systems at CPS. IP is aware of the Perry Nuclear facility having similar missile protection issues. IP has no information regarding the applicability of this issue to any other purchasers or licensees.
- (vii) The corrective action that IP is taking for this event is discussed in the CORRECTIVE ACTION section of this report.
- (viii) IP has no additional information to offer.