



**CENTERIOR  
ENERGY**

**PERRY NUCLEAR POWER PLANT**

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**Michael D. Lyster**  
VICE PRESIDENT - NUCLEAR

May 24, 1991  
PY-CEI/NRR-1361 L

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

Perry Nuclear Power Plant  
Docket No. 50-440  
LER 90-035-01

Dear Sir:

Enclosed is Licensee Event Report 90-035-01 for the Perry Nuclear Power Plant.

Sincerely,

Michael D. Lyster

MDL:SC:njc

Enclosure: LER 90-035-01

cc: NRC Project Manager  
NRC Sr. Resident Inspector  
NRC Region III

Operating Companies  
Cleveland Electric Illuminating  
Toledo Edison

9106030067 910524  
PDR ADGCK 05000440  
S PDR

## 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 RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555 AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

PAGE (3)

Perry Nuclear Power Plant, Unit 1

0 5 0 0 0 4 4 0 1 OF 0 4

TITLE (4) Design Error Results in the Potential for a Loss of the Control Complex Chilled Water System

| 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 NAMES | DOCKET NUMBER(S)   |   |   |   |   |   |   |   |   |   |  |           |
| 1                  | 2   | 0     | 4              | 9   | 0               | 9                | 0   | 0                             | 0              | 3  | 5 | 0 | 1 | 0 | 5 | 2 | 4 | 9 | 1 |  | 0 5 0 0 0 |
| OPERATING MODE (9) |     | 4     |                | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50. (Check one or more of the following) (11) |                 |                  |     |                               |                |  |   |   |   |   |   |   |   |   |   |  |           |
| POWER LEVEL (10)   |     | 0 0 0 |                | 20.402(a)   |                 | 20.406(a)        |     | 50.73(a)(2)(iv)               |                | 73.71(a)   |   |   |   |   |   |   |   |   |   |  |           |
|                    |     |       |                | 20.406(a)(1)(i)   |                 | 50.36(a)(1)      |     | 50.73(a)(2)(v)                |                | 73.71(a)   |   |   |   |   |   |   |   |   |   |  |           |
|                    |     |       |                | 20.406(a)(1)(ii)  |                 | 50.36(a)(2)      |     | 50.73(a)(2)(vi)               |                | <input checked="" type="checkbox"/> OTHER (Specify in 402(a)(1)(ii) and in Text NRC Form 366A) |   |   |   |   |   |   |   |   |   |  |           |
|                    |     |       |                | 20.406(a)(1)(iii)   |                 | 50.73(a)(2)(i)   |     | 50.73(a)(2)(vii)(A)           |                |  |   |   |   |   |   |   |   |   |   |  |           |
|                    |     |       |                | 20.406(a)(1)(iv)  |                 | 50.73(a)(2)(ii)  |     | 50.73(a)(2)(vii)(B)           |                |  |   |   |   |   |   |   |   |   |   |  |           |
|                    |     |       |                | 20.406(a)(1)(v)   |                 | 50.73(a)(2)(iii) |     | 50.73(a)(2)(viii)             |                |  |   |   |   |   |   |   |   |   |   |  |           |
|                    |     |       |                | 20.406(a)(1)(vi)  |                 | 50.73(a)(2)(iv)  |     | 50.73(a)(2)(ix)               |                |  |   |   |   |   |   |   |   |   |   |  |           |

LICENSEE CONTACT FOR THIS LER (12)

NAME

TELEPHONE NUMBER

AREA CODE

Henry L. Hegar, Compliance Engineer, Extension 6185

211 6 215 91-1317 1317

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 |
|-------|--------|-----------|--------------|-------------------|-------|--------|-----------|--------------|-------------------|
|       |        |           |              |                   |       |        |           |              |                   |
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SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

☐ YES (if yes, complete EXPECTED SUBMISSION DATE)☒ NO

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

On December 4, 1990 at 1600, the Perry Nuclear Power Plant (PNPP) Architect Engineer, Gilbert/Commonwealth Inc. informed PNPP that a design deficiency may exist within the Control Complex Chilled Water (CCCW) System (P47). A deficiency of this type could result in the loss of the CCCW system following a seismic event with the resultant loss of chilled water to the Control Room Emergency Recirculation (CRER) System. Technical Specification 3.7.2 requires that the CRER system be Operable in all Operational Conditions.

Following the identification of this discrepancy by Gilbert the CRER system was declared inoperable and several system operational changes were made to allow interim operation. A further evaluation of the non-safety related portion of the CCCW system by Stevenson and Associates was then conducted. This seismic dynamic analysis showed that although the non-safety related portion of this system is not specifically qualified seismically, it is built such that it will maintain pressure integrity following a Safe Shutdown Earthquake (SSE). A guillotine break in the piping or at the juncture of the piping and the cooling coils will not occur as had been originally assumed, and the CRER system will remain operable following an SSE. Thus, the immediate corrective actions taken are no longer needed, and the CCCW system has been restored to its original configuration. System restoration was completed on February 27, 1991.

Because the CCCW system has been shown to be able to maintain pressure integrity following an SSE, a design deficiency does not exist and this event is no longer considered reportable under 10CFR50.73.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

|                                   |                   |                |                   |                 |          |          |
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| Perry Nuclear Power Plant, Unit 1 | 0500044090        | —              | 035               | —               | 01       | 02 OF 04 |

TEXT (If more space is required, use additional NRC Form 365A's) (17)

On December 4, 1990 at 1600, the Perry Nuclear Power Plant (PNPP) Architect Engineer, Gilbert/Commonwealth Inc. informed PNPP that a design deficiency may exist within the Control Complex Chilled Water (CCCW) System. This deficiency could result in the loss of the CCCW system following a seismic event with the resultant loss of cooling water to the Control Room Emergency Recirculation (CRER) System. Technical Specification 3.7.2 requires that the CRER system be Operable in all Operational Conditions. At the time of discovery, the Plant was in Operational Condition 4 (Cold Shutdown). Reactor pressure vessel (RPV) temperature was 145 degrees F and reactor pressure was atmospheric.

Gilbert/Commonwealth Inc. identified a design deficiency at the V.C. Summer Nuclear Station in October, 1990 which was reportable under 10CFR21. This deficiency involved the potential failure of non-seismic piping resulting in a complete loss of the Chilled Water System following a seismic event. The V.C. Summer Chilled Water System supplies cooling water to both safety and non-safety related HVAC systems. In the event of a seismic occurrence, the piping to the non-safety related systems is assumed to fail. The non-safety related systems are automatically isolated upon a loss of water in the Chilled Water System, in order to maintain flow and water inventory to the safety related systems supplied by the Chilled Water System. The V.C. Summer design did not allow the isolation of the non-safety systems to occur in time to prevent loss of chilled water to the safety related systems. The system should have been designed to withstand a loss of the non-seismic piping without the resultant loss of chilled water to the safety related systems. Following the reporting of this event, Gilbert reviewed the designs of other plants they have designed for similar deficiencies. They identified a similar potential deficiency in the PNPP design and reported it to the Plant on December 4, 1990.

Following the identification of the problem, the PNPP CRER system was declared inoperable on December 4, 1990. The plant was in Cold Shutdown following a refueling outage and Technical Specification Action Statement 3.7.2.b.2 was met. An engineering analysis was performed and interim corrective actions were taken to ensure system operability. These corrective actions included lowering the normal operating level in the CCCW expansion tanks such that a low level isolation would occur in a shorter period of time following a break, throttling the CCCW isolation valves to 60 degrees open rather than 90 degrees (full) open and rebalancing flow to restrict the loss of inventory and to allow the isolation valves to close faster. The CRER system was declared operable again on December 20, 1990, with the interim corrective actions evaluated to be sufficient for winter conditions until at least March 22, 1991.

The PNPP CCCW system provides mechanically chilled water to the cooling coils associated with the HVAC systems which service the Control Complex. Three of these systems: Control Room HVAC and Control Room Emergency Recirculation; MCC, SWGR and Misc. Area HVAC; and Emergency Closed Cooling Pump Area Cooling are safety related HVAC systems and the piping and cooling coils associated with these systems are seismically qualified. The other two systems: Control Access Area HVAC and

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

Computer Rooms HVAC are not safety related and the cooling coils and piping associated with these two systems are not specifically designed to be seismically qualified. Thus, it was initially assumed that a seismic event would result in a break at the interface between the pipe and the cooling coils. The CCCW system was designed to accommodate this failure by isolating the portion of CCCW which services the two non-safety related HVAC systems from the portion of the CCCW system which services the three safety related systems, on a low expansion tank level before the three safety related HVAC systems could be adversely affected.

The design discrepancy identified by Gilbert was that guillotine breaks in the piping to cooling coil interfaces following a seismic event resulted in the excessive loss of CCCW system inventory prior to the automatic isolation of the piping associated with the non-safety related HVAC systems and thus affected the ability of the CCCW system to adequately cool the remaining three safety related systems. Technical Specification 3.7.2 requires that the Control Room Emergency Recirculation System be operable during all Operational Conditions and Technical Specification 4.7.2.a requires that the Control Room air temperature be maintained at less than or equal to 90 degrees F. Analysis has shown that a loss of CCCW would not allow the Control Room air temperature to rise to greater than 90 degrees F in less than 2 hours.

Following the identification of this discrepancy by Gilbert, Stevenson and Associates was commissioned to perform a seismic dynamic analysis of the non-safety related air handling units to determine the potential for failure of the piping or the cooling coils during a seismic event, both Operating Basis Earthquake (OBE) and Safe Shutdown Earthquake (SSE). They evaluated the primary potential failure modes including failure of the flanged connections of the chilled water piping to the coils, failure of the stub pipe connection to the coil manifolds and failure of the manifold/tube connections. In addition, the piping between the isolation valves and the cooling coils for the Computer Rooms HVAC units was evaluated for seismic loading, because it had originally been designed to the ANSI-B31.1 Power Piping Code for deadweight, thermal, and pressure loads only (the Control Access Area HVAC system piping had originally been designed to accommodate seismic loading and therefore did not require reevaluation). Loadings for these evaluations included seismic OBE and SSE inertial loads, dead loads, and nozzle loads and pressure from the attached piping. Finite element analysis and response spectra modal analysis were used to determine the dynamic properties of the units.

This evaluation showed that although the non-safety related portion of this system is not specifically qualified seismically, it is built such that it will maintain pressure integrity following a Safe Shutdown Earthquake (SSE). A guillotine break in the piping or at the juncture of the piping and the cooling coils will not occur as had been originally assumed, and the CRER system will remain operable following an SSE. Thus, the immediate corrective actions described above are no longer needed, and the CCCW system has been restored to its original configuration. System restoration was completed on February 27, 1991.

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| Perry Nuclear Power Plant, Unit 1 | 0500044091        | —              | 035               | —               | 00       | 04 OF 04 |

TEXT: If more space is required, use additional NRC Form 366A's (17)

Because the CCCW system has been shown to be able to maintain pressure integrity following an SSE, a design deficiency does not exist and this event is no longer considered reportable.

Energy Industry Identification System Codes are identified in the text as [XX].