NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

# LICENSEE EVENT REPORT (LER)



| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Dresden Nuclear Power Station, Unit 2 | 05000237 | 1 OF 6 |

TITLE (4)
Containment Cooling Service Water Temperature Outside Design Basis

| 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: Dresden Unit 3 | DOCKET NUMBER: 05000249 |
| 11 | 12 | 96 | 96 | -- 020 -- | 00 | 12 | 11 | 96 | FACILITY NAME | DOCKET NUMBER |

OPERATING MODE (9): N
POWER LEVEL (10): 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20.2201(b) | | 20.2203(a)(3)(i) | | 50.73(a)(2)(iii) | | 73.71(b) |
| | 20.2203(a)(1) | | 20.2203(a)(3)(ii) | | 50.73(a)(2)(iv) | | 73.71(c) |
| | 20.2203(a)(2)(i) | | 20.2203(a)(4) | X | 50.73(a)(2)(v) | | OTHER |
| | 20.2203(a)(2)(ii) | | 50.36(c)(1) | | 50.73(a)(2)(vii) | | (Specify in Abstract below and in Text, NRC Form 366A) |
| | 20.2203(a)(2)(iii) | | 50.36(c)(2) | | 50.73(a)(2)(viii)(A) | | |
| | 20.2203(a)(2)(iv) | | 50.73(a)(2)(i) | | 50.73(a)(2)(viii)(B) | | |
| | 20.2203(a)(2)(v) | | 50.73(a)(2)(ii) | | 50.73(a)(2)(x) | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| R. Skoglund, Design Engineer Ext. 2543 | (815) 942-2920 |

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 |
|---|---|---|---|---|---|
| X YES (If yes, complete EXPECTED SUBMISSION DATE). | NO | | 02 | 28 | 97 |

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

The Containment Cooling Service Water (CCSW) configuration was determined to be outside of design basis requirements on November 12, 1996.

Reduced CCSW flow had been identified in August, 1996, during a surveillance that was being conducted to determine if the CCSW system was meeting its design basis. The Low Pressure Coolant Injection (LPCI) Heat Exchanger performance was determined to be degraded during a detailed system review in preparation for the Independent Safety Inspection in September, 1996. Inability to maintain the 20 psi differential pressure between CCSW and LPCI was identified in November, 1996.

An operability determination on these issues identified that an administrative limit for peak service water inlet temperature of 84 degrees F will maintain the same peak suppression pool temperature and stay within the bounds of the existing containment analysis. A historical review revealed that service water inlet temperature has exceeded the 84 degree F limitation.

The root cause of the event will be investigated and reported in a supplement to this report.

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PLANT AND SYSTEM IDENTIFICATION

General Electric - boiling water reactor - 2527 MWt rated core thermal power.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1984, IEEE Recommendation Practice for System Identification in Nuclear Power Plants and Related Facilities.

EVENT IDENTIFICATION:

Containment Cooling Service Water temperature outside design basis.

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 2(3) Event Date: 11/12/96 Event Time: 1830

Reactor Mode: N(N) Mode Name: Run(Shutdown Power Level: 100(0) %

Reactor Coolant System Pressure: 993(0) psig

B. DESCRIPTION OF EVENT:

This issue is reportable pursuant to 10CFR50.73 (a)(2)(v)(B)&(D) which requires that the licensee report any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: remove residual heat, or mitigate the consequences of an accident. The Containment Cooling Service Water (CCSW)[BI] configuration was determined to be outside of design basis requirements on November 12, 1996.

On November 12, 1996, Engineering personnel were performing an operability determination on the Low Pressure Coolant Injection (LPCI) [BO] Heat Exchanger performance, CCSW flow, and the differential pressure between CCSW and LPCI. It was determined that the CCSW inlet temperature must be maintained below 84 degrees F to maintain the same peak suppression pool temperature and stay within the bounds of the existing containment analysis. Review of operator logs revealed that this temperature limit has been exceeded in the past.

CCSW Flowrate

During the recent forced outage on Unit 3, it was determined that the CCSW 3A loop was unable to reach its design basis flow rate of 7000 gpm. An operability determination was written to administratively control the service water inlet temperature to ensure that the design basis of the Units is maintained with a lower CCSW flow rate. The actual observed flow rate was 6975 gpm. However, to provide operating margin, the operability determination assumed a degraded flow rate down to 6750 gpm. However, CCSW flow is also impacted by the Differential Pressure issue discussed below. As a result of the reduced CCSW flowrate, administrative controls were taken to ensure that the peak suppression pool temperature would remain below the design basis value of 170 degrees F.

Heat Exchangers

The UFSAR section 6.2.2.2 currently has a requirement for all of the LPCI Heat Exchangers to have a heat transfer rate of 102 Million BTU/hr for a 2LPCI/2CCSW pump combination during containment cooling mode. The original heat exchanger data sheet identified the heat transfer rate for the heat exchangers to be 105 Million BTU/hr. During a review of the system design basis, it was determined that General Electric (GE) reconstituted the design basis of the heat exchanger in 1992 since the original heat exchanger calculation was not retrievable. GE's calculation determined the heat removal rate for the 2LPCI/2CCSW pump combination is 98.6 Million BTU/hr. This calculation provides the appropriate conservatism if a heat exchanger were being designed today. Although the results of the original calculation and the new calculation are within 6 percent for the 2LPCI/2CCSW case, the original calculation cannot be reviewed. Therefore, the operability of the LPCI heat exchanger was questioned as a result of the lower heat removal rate and administrative controls were taken to ensure that the peak suppression pool temperature would remain below 170 degrees F.

Differential Pressure

UFSAR Section 9.2.1.2 and Technical Specification Bases 4.5 requires a 20 psi differential pressure be maintained between the tube and shell side of the LPCI Heat Exchangers. The intent of the 20 psid requirement is to prevent LPCI water from leaking into the CCSW system in the event of a heat exchanger tube leak which could result in an unmonitored radioactive release. In order to maintain the 20 psid during a DBA LOCA with a containment pressure of 17 psig, CCSW flow must be reduced to 5600 gpm. Therefore, administrative controls were taken to ensure that the peak suppression pool temperature would remain below 170 degrees F.

Summary of effects

The issues that are identified above were evaluated together to determine the operability of Dresden Units 2 and 3 LPCI/CCSW systems since they are all related to suppression pool peak temperature post-accident. It should be noted that these issues were not all discovered at the same time.

The reduced 3A CCSW flow was first identified in August during a surveillance of the CCSW system. The surveillance was being conducted to determine if the design basis of the CCSW system was being achieved. An operability determination was written for this condition. The LPCI Heat Exchanger performance issue was identified during a detailed system review in preparation for the Independent Safety Inspection (ISI) in September, 1996. The operability determination was subsequently revised to incorporate this issue. The inability to maintain the differential pressure between CCSW and LPCI was identified in November, 1996. Once again, the operability determination was revised to incorporate this issue.

The operability determination evaluated a reduction in service water inlet temperature to maintain the same peak suppression pool temperature and stay within the bounds of the existing containment analysis. The combination of these issues required lowering the maximum allowable service water inlet temperature from 95 degrees F to 84 degrees F in order to maintain the peak suppression pool temperature below 170 degrees F during a design basis Loss of Coolant Accident. A historical review of service water inlet temperatures has shown that actual service water inlet temperature has been as high as 92 degrees F in 1991. Since 1994, the inlet temperature has not been higher than 89 degrees F. These temperatures are all within the plant design parameter that assumes that the service water inlet temperature stays below 95 degrees F. However, the Heat Exchanger performance, CCSW flow, and LPCI/CCSW dP issues require that administrative controls be taken on service water inlet temperature to ensure that the plant stays within the existing containment analysis. The current administrative limit of 84 degrees F that was established by the operability determination has been exceeded in the past. During these situations, the CCSW system should have been declared inoperable and appropriate Limiting Conditions for Operation should have been entered.

No system or component inoperabilities have been identified which contributed to the event. In addition, no manual or automatic engineered safety feature (ESF) actuation occurred as a result of this event.

C. CAUSE OF EVENT:

This event continues to be under investigation in accordance with Station investigative reporting procedures and will be reported in a supplement to this LER. Preliminary findings indicate design limitations have been present since initial operation of the plant. Additionally, during the 1993 investigation regarding the Dresden Notice of Violation, an opportunity to identify/resolve these issues was missed (Cause Code E).

D. SAFETY ANALYSIS:

As stated above,the LPCI, Core Spray, CCSW, and Primary Containment Systems are operable as long as administrative controls ensure that the service water inlet temperature is maintained at or below 84 deg F. The analysis that supports the 84 degree F temperature limit contains conservatism. Additional margin (a higher service water inlet temperature) is available if more rigorous evaluations are performed to include the actual values for heat exchanger tube plugging which are less than the assumptions used in the analysis.

These values are well within the 6 percent tube plugging margin for each heat exchanger and could be included in the supporting evaluations to provide additional margin. The current CCSW flow rates to the 2A, 2B, and 3B Heat Exchangers exceed the 7000 gpm requirement. The flow measured through the 3A Heat Exchanger is 6975 gpm. 5600 gpm was the flow rate used in this to ensure that the 20 psid is maintained between CCSW and LPCI and ensure the operability of the CCSW system.

An analysis has been performed to understand the impact that these issues have on the containment analysis and the performance of equipment important to safety. The analysis shows that the peak suppression pool temperature with a CCSW inlet temperature of 95 degrees F and a CCSW flow rate of 5400 gpm (less flow than the 5600 gpm flow required) would be 175 degrees F. A preliminary review of plant equipment requirements has shown that the limiting component in terms of temperature are the LPCI and Core Spray motor bearing coolers. The motor bearings for the LPCI and Core Spray pumps are cooled with oil which is cooled by water from the suction of the pump. As long as the peak suppression pool temperature stays at or below 175 degrees F, there are no operability concerns for the pumps.

Preliminary analysis indicates that the safety significance of this event is minimal since the systems important to safety, primarily the Emergency Core Cooling Systems (ECCS), would have performed their intended function. A preliminary review of plant systems and components has shown that the increase in peak suppression pool temperature that would result in the reduced heat exchanger performance and reduced CCSW flow to ensure that the dP requirements are met does not adversely impact any systems or components. A comprehensive review of plant systems and components is being performed to ensure that all impacts of the increase in suppression pool temperature are identified (see corrective actions).

E. CORRECTIVE ACTIONS:

1. Revised station procedures to reflect the 84 degree F temperature limit for service water inlet temperature. (Complete)

2. Provided training for licensed station operators on the operability determination that is administratively controlling the service water inlet temperature. (Complete)

3. A license amendment will be submitted resolving the issues identified in this report on the LPCI and CCSW systems. (2371009620100.40)

4. A review will be conducted on the design parameters of affected systems and components to ensure that an increase in peak suppression pool temperature does not adversely impact their safety function. (23722596R12-96144A)

5. The results of the root cause investigation and any significant corrective actions will be reported in a supplement to this LER. (2371809602001)

F. PRIOR SIMILAR OCCURRENCES:

| LER Number/ Docket Number | Title |
|---|---|
| 92-038/050237 | Containment Cooling Service Water (CCSW) Found Outside Technical Specification Limits Due to an Inadequate Systems Interaction Analysis. |

CCSW pump testing showed the pumps could not meet Technical Specification requirements because design changes did not consider the impact of added flow requirements. Though the root cause analysis identified inadequate systems interaction analysis as the primary contributor, none of the documented corrective actions addressed this concern.

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| 93-015/050249 | A&B CCSW Pumps Only Producing 6000 Gallons Per Minute. |

While performing special testing on CCSW pumps, it was determined that they could not meet the FSAR minimums for allowable flow because the valve design drawing was not consistent with the FSAR design requirements. Though the root cause was identified as inaccurate design drawings, none of the documented corrective action addressed this concern.

G. COMPONENT FAILURE DATA:

Not Applicable.