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

APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 2	05000237	1 OF 8

TITLE (4)
Containment Cooling Service Water Configuration Outside Design Basis Due to Management Deficiencies and Inadequate Design Basis Documentation

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
									Dresden Unit 3	05000249
11	12	96	96	-- 020 --	01	05	01	97	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)
E.Connell, Design Superintendent Ext. 3379	(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

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)

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 the cumulative effect of these issues identified that an administrative limit for peak service water inlet temperature of 84 degrees F was required to maintain peak suppression pool temperature within the bounds of the existing containment analysis. The LER was initiated since historical review revealed that service water inlet temperature had exceeded 84 degrees F in the past.

Corrective actions were initiated to revise procedures to limit plant operations to service water temperatures at or below 84 degrees F.

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 Configuration Outside Design Basis Due to Management Deficiencies and Inadequate Design Basis Documentation

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)percent

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 design peak suppression pool temperature of 170 degrees and stay within the bounds of the existing containment analysis. This issue was determined to be reportable based upon review of operator logs which revealed that the 84 degree F temperature limit had been exceeded in the past.

There are multiple events which led to the November 1996 determination that the CCSW system configuration was outside of design basis requirements. The events related to this determination started in 1992 and are summarized in the subsection below entitled 1993 Notice of Violation. Issues addressed in 1996; CCSW flowrate, LPCI heat exchanger heat removal capacity and the ability to maintain a 20 psig differential pressure in the LPCI heat exchanger; are each addressed in separate subsections below.

1993 Notice of Violation

In April 1992 operations personnel observed that CCSW flows of only 5600 gallons per minute were achievable on Unit 3; 7000 gpm was expected based upon the UFSAR and Dresden Operating Procedure 1500-2 "Torus Water Cooling Mode of Low Pressure Coolant Injection System." An operability evaluation was written where engineering determined that the original CCSW design basis was intended to be 1 LPCI/1 CCSW configuration.

At approximately the same time period, efforts were made to locate the GE calculations supporting the LPCI heat exchanger name plant data in response to an NRC inspector's question. The original heat exchanger calculations could not be located but were reconstituted. The reconstituted calculations resulted in a 6% reduction in heat removal capability from the original conditions.

Clarifications were made to the UFSAR in April 1992 via 50.59 to clarify the design basis configuration of the containment heat removal system as requiring 1 LPCI and 1 CCSW pump for long term containment heat removal. Calculations performed in support of the 50.59 utilized the reconstituted LPCI exchanger heat removal capability.

A special NRC safety inspection was performed during December 1992 and January 1993 concerning the circumstances surrounding the degraded CCSW flow conditions identified in April 1992. The report noted the reduction in heat exchanger capacity as a condition outside the design basis. The report also identified the degraded CCSW flow as a significant compromise to plant safety.

In July 1993 Dresden received a Notice of Violation (NOV) related to the UFSAR changes that were processed via 50.59 in December 1992. The NRC staff concluded that implementation of the 1 LPCI/1CCSW design basis configuration would require a license amendment.

Testing performed subsequent to receipt of the NOV demonstrated that flows of 7000 gpm with 2 pumps was achievable on both the Unit 2 and Unit 3 CCSW systems. No program was initiated that time to periodically verify the capability of the system to maintain flows of 7000 gpm.

In ComEd's September 1993 response to the NOV, ComEd accepted the violations and committed to submit a license amendment to clarify the containment cooling system design basis.

No interim compensatory actions were put in place related to the decreased heat exchanger capacity. Discussions with personnel involved with the project at that time indicate that the reduced capacity was not viewed as an issue since it was felt that the impact of the reduced capacity would be negligible and the calculations performed by GE were very conservative. It was also planned to expeditiously address the reduced heat exchange capacity in the amendment which was scheduled for early 1994.

During the 26 months following ComEd's response to the NOV, the schedule for the amendment was reforecast 6 times. Reasons given for the extensions were related to diversion of resources to higher priority tasks, additional time to review the amendment with various groups, and the decision to perform an independent review of the amendment.

During the summer of 1995, following reviews of the proposed amendment, Dresden management determined that the CCSW licensing basis should remain as 2 CCSW pumps and 2 LPCI pumps required for containment cooling. The NRC was notified in November 1995 that the amendment would not be submitted. The decision was based upon the testing that demonstrated the ability of the CCSW system to maintain flows of 7000 gpm per loop. The decision also was based upon the assessment that an amendment that decreased required CCSW flows was counter to efforts to take a conservative approach to issues. The reduced heat exchanger capacity was not identified as an issue at this time.

In June 1996, CCSW/LPCI was chosen as the subject of a Dresden self-assessment. Selection of CCSW/LPCI as the subject for the assessment was partially based upon the past questions related to the system design basis. The assessment was completed in August 1996, one of the recommendations from the assessment team was performance of a 2 pump test to verify the ability to maintain 7000 gpm CCSW flow.

During a fall 1996 forced outage on Unit 3, testing was performed to verify the capability of the CCSW pumps to attain 7000 gallons per minute per loop. The test showed that the CCSW 3A loop was unable to reach its design basis flow rate of 7000 gpm. An operability determination was written to evaluate the impact of the flow reduction which resulted in administrative control of the service water inlet temperature to ensure that peak post-LOCA torus water temperature would remain within design with the lower CCSW flow rate.

Administrative controls were taken to limit service water inlet temperature to 91.5 degrees F to ensure that the peak suppression pool temperature would remain below the design basis value of 170 degrees F. Inspection of the CCSW 3A valve internals was performed in April 1997 to determine if a mechanical problem with the valve is causing the reduced CCSW capability. No mechanical problems were found that would cause flow reductions.

LPCI Heat Exchangers Heat Removal Capacity

During 1996 reviews of the system design basis in preparation for the NRC ISI inspection, it was noted that General Electric (GE) reconstituted the design basis of the heat exchanger in 1992 since the original heat exchanger calculation was not retrievable. Although the results of the original calculation and the new calculation are within 6 percent for the 2 LPCI/2 CCSW case, the capability of the LPCI Heat Exchanger to remove sufficient heat to maintain torus temperature within design limits was questioned and an operability evaluation was performed. The operability evaluation, which incorporated the reduced CCSW flow capability, resulted in establishment of an administrative limit of 88 degrees F on service water inlet temperature.

LPCI Heat Exchangers 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. While responding to questions raised during the NRC ISI in November of 1996, the ability to maintain a 20 psi differential pressure across the LPCI heat exchanger during all expected conditions was questioned. Calculations were performed that showed in order to maintain the 20 psid during a DBA LOCA with peak containment pressure, CCSW flow must be throttled to 5600 gpm. An operability was performed to address the reduced CCSW flow requirement which resulted in administrative controls to ensure that the peak suppression pool temperature would remain below 170 degrees F, with a CCSW flow of 5600 gpm, by limiting service water inlet temperature to 84 degrees F. The limit of 84 degrees F incorporated the combined effects of the reduced CCSW flows (testing results and 20 psi issues) and the reduced LPCI heat exchanger duty.

It is noted that discoveries of discrepancies in the head loss across the ECCS suction strainers in December 1996 resulted in further reduction of the maximum technical specification service water temperature to 75 degrees F. Events associated with the suction strainer head loss discovery are described in LER 96022/05000237.

Summary of effects

Subsequent to the completion of the above operabilities, analysis was performed to reconstitute the design basis of the Dresden containment heat removal system. Based on this analysis, a license amendment was submitted to the NRC for approval on February 17, 1997 which will restore the maximum Technical Specification service water temperature to 95 degrees F. The analysis supporting the amendment is based upon the reduced (reconstituted) LPCI heat exchanger capacity, a minimum required CCSW flow of 5000 gpm, the increased ECCS strainer head loss (LER 96022/05000237 and maintains the 20 psi differential pressure requirement at the LPCI heat exchangers. NRC approval of the amendment is expected by April 30, 1997. Unit 2 analysis has been completed which shows that no physical modifications are required to support operations, within UFSAR allowables, with 95 degree service water inlet temperatures. Unit 3 analysis will be completed prior to startup from the Unit 3 refueling outage which started in March 1997.

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:

The root causes of this event are Design Deficiency (NRC Cause Code B) and Management Deficiency (NRC Cause Code E).

Inadequate design documentation led to confusion concerning the original Dresden design basis CCSW/LPCI configuration:

a. If the original design basis required 2 CCSW/2 LPCI pumps, the requirement of 7000 gpm minimum CCSW flow was incompatible with the requirement to maintain the 20 psi differential pressure across the LPCI heat exchanger.
b. The requirement of 7000 gpm was inconsistent with a design basis of 1 CCSW/1 LPCI pump for containment cooling.

Inadequate Management oversight and design control led to low expectations, which resulted in:

a. Poor problem identification and resolution of design basis issues
b. Inadequate implementation of compensatory actions to deal with operability issues

D. SAFETY ANALYSIS:

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 review of plant systems and components has shown that the increase in peak suppression pool temperature, that would result from the reduced heat exchanger performance and reduced CCSW flow required to ensure that the dP requirements are met, does not adversely impact any systems or components. A comprehensive review of plant systems and components has been performed for Unit 2 which verified that all impacts of the increase in suppression pool temperature are within UFSAR allowables. Unit 3 analysis has been completed except for the torus attached piping and associated supports/structural attachments. Unit 3 analysis will be completed prior to return to service from the refueling outage which began in March 1997.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

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 was submitted resolving the issues identified in this report on the LPCI and CCSW systems. (Complete)

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. (Complete for Unit 2, Unit 3 NTS #2311239700208B/C)

5. Inspect the internals of the CCSW 3A valve during D3R14 to verify that if that valve problems are not adversely impacting CCSW flows. (Complete)

6. The Nuclear Engineering Procedures were revised to provide specific direction on action to be taken whenever a potential design basis discrepancy is identified. (Complete)

7. A design basis reconstitution program has been initiated to address deficiencies in accuracy, control and availability of design basis information. The program is scheduled to be closed out in 1999. (NTS 2371219601607,607A,608)

8. The procedure for Operability Evaluations has been revised to provide specific guidance on documentation of potential operability concerns, initiation of compensatory actions, and closeout of corrective actions. (Complete)

9. An Engineering Assurance Group (EAG) consisting of senior engineering personnel was established. The EAG will function to provide oversight of key engineering activities until normal engineering functions have improved to the point where reviews are no longer necessary. (Complete)

10. The procedures governing commitments and corrective actions have been revised to more rigorously control adherence to established schedules and documentation for closure of commitments. (Complete)

11. A new surveillance, Containment Cooling Water Loop Flow Verification, DOS 1500-12, was created to verify minimum CCSW Flows. (Complete)

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.

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.