



December 11, 1996
LIC-96-0179

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

References: 1. Docket No. 50-285
2. Generic Letter 96-06

Subject: Licensee Event Report 96-012 Revision 0 for the Fort Calhoun
Station

Please find attached Licensee Event Report 96-012 Revision 0 dated
December 11, 1996. This report is being submitted pursuant to
10 CFR 50.73(a)(2)(ii). If you should have any questions, please contact me.

Sincerely,

S. K. Gambhir
Division Manager
Production Engineering

EPM/epm

Attachment

c: Winston and Strawn
L. J. Callan, NRC Regional Administrator, Region IV
L. R. Wharton, NRC Project Manager
W. C. Walker, NRC Senior Resident Inspector
INPO Records Center

9612170197 961211
PDR ADOCK 05000285
S PDR

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 THE
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)

Fort Calhoun Station Unit No. 1

DOCKET NUMBER (2)

05000285

PAGE (3)

1 OF 4

TITLE (4)

Potential for Vaporizing Cooling Water in Containment Fan Cooling Units

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
11	11	96	96	-- 012	-- 00	12	11	96	FACILITY NAME	DOCKET NUMBER
										05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§ (Check one or more) (11)			
POWER LEVEL (10)	0	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	X 50.73(a)(2)(ii)	50.73(a)(2)(x)
		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)	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

Bernard J. Van Sant, Supervisor Design Engineering
Nuclear, Mechanical

TELEPHONE NUMBER (Include Area Code)

(402) 533-6509

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)

YES

(If yes, complete EXPECTED SUBMISSION DATE)

X

NO

EXPECTED
SUBMISSION
DATE (15)

MONTH DAY YEAR

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

In response to NRC Generic Letter (GL) 96-06, the Omaha Public Power District (OPPD) evaluated the plant response to either a Loss of Offsite Power (LOOP) coincident with a Loss of Coolant Accident (LOCA) or a LOOP coincident with a Main Steam Line Break (MSLB) inside containment. The results of the analysis show that some vaporization of the Component Cooling Water (CCW) in the containment air cooling and filtering units can occur, thereby creating the potential for waterhammer upon restart of the CCW pumps.

Analyses have been performed for both the design basis LOCA containment temperature response for the coincident Loss Of Offsite Power (LOOP) scenario and the design basis MSLB containment temperature response for the coincident LOOP scenario. The results of these analyses have been incorporated into Safety Analysis for Operability (SAO) 96-02. Compensatory actions implemented by SAO 96-02 have eliminated the potential for waterhammer and allow continued plant operation until a permanent resolution is developed and implemented. The permanent resolution will be implemented prior to startup from the 1998 refueling outage.

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

BACKGROUND

At the Fort Calhoun Station (FCS) the containment is cooled by two containment air cooling and filtering units and two containment air cooling units. The cooling unit cooling coils are supplied by a closed loop cooling water system called the Component Cooling Water (CCW) system. These cooling units are used to control the containment atmospheric temperature during normal plant operation, and to help in maintaining containment pressure and temperature during accident conditions.

EVENT DESCRIPTION

On August 12, 1996, the NRC issued Information Notice (IN) 96-45 titled, "Potential Common-Mode Post-Accident Failure of Containment Coolers." Subsequently, on September 30, 1996, the NRC issued Generic Letter (GL) 96-06 titled, "Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions." The concern in GL 96-06 is that cooling water systems serving the containment air coolers may be exposed to the hydrodynamic effects of waterhammer during either a Loss Of Coolant Accident (LOCA) or a Main Steam Line Break (MSLB). The potential for this condition is created upon a Loss Of Offsite Power (LOOP) coincident with a LOCA or MSLB that causes the CCW pumps and the containment air cooler fans to stop operating until they are automatically restarted with power from the emergency diesel generators. The concern is that the water in the containment air cooling coils may boil and create a substantial steam volume in the CCW system. When the CCW pumps restart, the water may rapidly condense this steam volume and produce a waterhammer. The hydrodynamic loads introduced by such waterhammer may challenge the integrity and function of the containment air coolers and the CCW system.

In the event of a LOOP coincident with a LOCA or MSLB, the CCW pumps and containment air cooler fans will lose power and coast down. Approximately twelve seconds after the LOOP, the emergency diesel generators are operating, DG breakers are closed, and the automatic Engineered Safety Feature (ESF) load sequence begins. CCW pumps AC-3A and AC-3B are automatically started on their respective diesel generators in the first ESF load group, which occurs 2.0-3.5 seconds after the automatic ESF load sequence begins. The maximum time between the LOOP and CCW pump restart is 15.5 seconds. (The containment air cooler fans are started after the CCW pumps.) During the brief period when the CCW pumps are not operating, the containment air cooling coils are exposed to the air/steam mixture inside containment from either the LOCA or MSLB.

This issue was evaluated by OPPD in October and November 1996, using the services of consulting engineers (Sargent & Lundy) to do a heat transfer analysis for the LOOP/LOCA and LOOP/MSLB scenarios in question. Results of the heat transfer analysis show that for the design basis LOCA containment temperature response, a coincident LOOP will result in vaporization of CCW in the containment air cooling coils before restart of the CCW pumps with the CCW surge tank at the lower end of its normal operating range (20 psig). Results of the heat transfer analysis show that for the design basis MSLB containment temperature response, a coincident LOOP will not result in vaporization of CCW in the containment air cooling coils with a CCW surge tank pressure of 20 psig.

On November 11, 1996, with the unit in cold shutdown, the FCS Plant Review Committee

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(PRC) was briefed on the findings of the investigation and results of the analysis by Design Engineering. At 1540 Central Standard Time (CST) the PRC concluded that the containment air coolers would not have functioned as required for the FCS Updated Safety Analysis Report (USAR) Chapter 14 Design Basis Accidents (DBAs). At 1718 Eastern Standard Time (EST), a four-hour non-emergency notification was made to the NRC Operations Center pursuant to 10 CFR 50.72(b)(2)(i). This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii). The CCW system operability was evaluated for the cold shutdown condition that existed at the time of the notification and the system was determined to be operable for the existing plant conditions (plant in mode 5).

SAFETY SIGNIFICANCE

Heat removal by the containment air coolers is not required to keep containment peak pressure below the containment design pressure of 60 pounds per square inch gage (psig) for the design basis LOCA if containment spray is available. A LOCA with coincident LOOP will not result in containment peak pressure exceeding its design value regardless of containment air cooler performance. However, containment air coolers are credited for long-term containment heat removal post-LOCA with respect to the containment hydrogen generation analysis (i.e., containment spray is stopped and containment coolers maintain containment atmospheric temperature).

The containment pressure analysis for a design basis MSLB inside containment credits heat removal by the containment air coolers in keeping containment peak pressure below 60 psig. However, the scenario for which the containment air coolers are credited involves a single failure in the feedwater system and conservatively requires offsite power to be available. If offsite power is lost, heat removal from the containment air coolers does not need to be credited to keep containment peak pressure below 60 psig for a design basis MSLB. A MSLB with coincident LOOP will therefore not result in containment peak pressure exceeding its design value regardless of containment air cooler performance.

Prior to the corrective actions initiated because of this investigation, had either a design basis MSLB or LOCA, with coincident LOOP, occurred a waterhammer event in the CCW system was likely. A waterhammer event could have ruptured the CCW system boundary inside containment. A rupture of the CCW system inside containment would have resulted in an unanalyzed breach of containment integrity. These accidents have an extremely low probability of occurrence. In addition, the calculations that were performed to demonstrate the possibility of this type of waterhammer event are conservative.

CORRECTIVE ACTIONS

Analyses have been performed for both the design basis LOCA with coincident LOOP containment temperature response scenario and the design basis MSLB with coincident LOOP containment temperature response scenario. The results of these analyses have been considered in Safety Analysis for Operability (SAO) 96-02 which was approved on November 22, 1996. Compensatory actions, raising the pressure of the CCW surge tank and attendant temporary modifications to the CCW system to allow the higher system pressures, have been implemented in SAO 96-02 to allow plant operation at full power until permanent corrective actions are completed.

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

The interim actions identified in SA0 96-02 will remain in effect until a permanent resolution is developed and implemented to address the containment air cooler CCW vaporization and waterhammer issue. The permanent resolution will be implemented prior to startup from the 1998 refueling outage. The 1998 refueling outage is currently scheduled to begin in the spring of 1998.

PREVIOUS SIMILAR EVENTS

LER 90-014 previously reported CCW containment isolation valves outside the plant design basis.