Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247 402/636-2000

May 18, 1992 LIC-92-135L

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

Reference: Docket No. 50-285

Gentlemen:

Subject: Licensee Event Report 92-016 for the Fort Calhoun Station

Please find attached Licensee Event Report 92-016 dated May 18, 1992. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii). If you should have any questions, please contact me.

Sincerely,

RL. 21 Thates

W. G. Gates Division Manager Nuclear Operations

WGG/dle

Attachment

c: R. D. Martin. NRC Regional Administrator, Region IV D. L. Wigginton, NRC Senior Project Manager S. D. Bloom, NRC Project Engineer R. P. Mullikin, NRC Senior Resident Inspector INPO Records Center

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Yes & yes concerve SUPPECTED SUBMISSION DATE:         No           During Omaha Public Power District's Design Basis Reconstitution of the containment spray (CS) system, it was discovered that an as-built hydraulic analysis of the CS system was not available. As part of the resolution of this Design Basis Document open item, a hydraulic analysis of the CS system was performed. The analysis revealed that the CS pumps would not have adequate suction head during the recirculation phase of operation per the requirements of AEC Safety Guide 1 (Regulatory Guide 1.1). This condition is outside the Fort Calhoun Station design basis, thus, a four-hour report was made to the NRC pursuant to 10 CFR 50.72(b)(2)(i) on April 17, 1992. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii).           The containment pressure analysis that reflects as-built containment design and the emergency core cooling system detailed system model show that actual NPSH for the CS pumps will significantly exceed required NPSH due to the presence of subcooling in the containment sump water. Therefore, the safety significance of this event is minimal.           The root cause of this event is attributed to analytical deficiencies of the original CS system design by the plant Architect/Engineer.           Corrective actions include the preparation of Safety Analysis for Operability (SAO) 92-02, a revision to USAR Section 6.2.1, and required review of this LER and its associated Root Cause Analysis by the Design Engineers - Mechanical.	BUPPLEMENTAL REPORT EXPECTED (14)	EXPE	OTED MONTH DAY YEAR
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The function of the containment spray (CS) system is to limit the containment structure pressure rise thereby reducing the leakage of airborne radioactivity from the containment by providing a means for cooling the containment atmosphere after the occurrence of a loss-of-coolant accident (LOCA).

Pressure reduction is accomplished by spraying cool borated water into the containment atmosphere. Heat removal is accomplished by recirculating and cooling the water through the shutdown cooling heat exchangers. The CS system is independent of the containment air recirculation and cooling system.

The CS system consists of the Safety Injection and Refueling Water Tank (SIRWT), three containment sprar pumps, two heat exchangers (shutdown cooling heat exchangers) and all necessary piping, valves, instruments and accessories. The CS pumps discharge the borated water through the two heat exchangers, during recirculation, to a dual set of spray headers and spray nozzles in the containment. These spray headers are supported from the containment roof and the spray nozzles are arranged in the headers to give essentially complete spray coverage of the containment horizontal cross sectional area. One pump meets the capacity requirements in the event of a Design Basis Accident.

Initially, the pumps take suction from the SIRWT. Upon reaching low tank level, the recirculation actuation signal (RAS) is initiated, automatically transferring the pump suction to the containment recirculation line inlet. The recirculated effluent is cooled by component cooling water in the shutdown cooling heat exchangers prior to discharge into the containment atmosphere. During the recirculation phase, a portion of the cooled effluent from the shutdown heat exchangers may be directed to the high-pressure safety injection pumps.

During the Omaha Public Power District (OPPD) Design Basis Reconstitution of the CS system, it was discovered that an as-built hydraulic analysis of the CS pumps was not available. Thus, as part of the resolution of this Design Basis Document open item, a hydraulic analysis of the CS system was performed. This analysis shows that the CS pumps will provide significantly greater flow to containment than originally analyzed. While this is conservative for the containment pressure analysis, it is non-conservative for the CS pump flow increases, the required net positive suction head (NPSH) also increases. The original design of the pumps calculated the NPSH requirements at 1700/2000 gpm (Pre-RAS/Post-RAS) per pump. The current analysis shows that approximately 3000 gpm (Post-RAS) per pump will be delivered in the event of a single failure.

Containment spray pump flow concerns were previously raised and reported to the NRC in December, 1990 in LER 90-025, Revision 1, due to high motor horsepower requirements. A modification was initiated to reduce flow to an acceptable level (approximately 3000 gpm) by closing one of the spray headers if two of the three CS pumps failed to start. This reduced the horsepower requirements to an acceptable level. At that time, an analysis (OPPD Calculation FC05508) was performed, which indicated that the NPSH available to the pumps was adequate. This analysis credited the subcooling of the spray water in the sump. The subcooling was based on data from the containment pressure analysis, which calculates containment peak pressures and peak temperatures.

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While this method of calculating NPS the Updated Safety Analysis Report (1 (Regulatory Guide 1.1) and this Safe temperature in calculating NPSH. The sump water be assumed to be at boili pressure, thus only elevation head bo NPSH calculations.	H is realistic and va USAR) Section 6.2.1 re ty Guide does not allo e AEC Safety Guide cor ng temperature for the etween sump level and	lid, the design requirements of eference AEC Safety Guide 1 bw the use of actual sump inservatively requires that the e associated containment pump inlet can be credited in				
The NPSH calculation that was perform accordance with AEC Safety Guide 1, or containment pressure effects in the calculated NPSH differs from the require condition was determined to be outsi on April 17, 1992, a four-hour report 10 CFR 50.72(b)(2)(i). This report 10 CFR 50.73(a)(2)(ii).	med for this design ba which requires that no analysis and consequer uired NPSH by approxim de the Fort Calhoun St t was made to the NRC is being submitted pur	asis issue has been performed in o credit be taken for htly shows inadequate NPSH. The mately four feet. This tation design basis. Therefore, pursuant to the requirements of rsuant to the requirements of				
The containment pressure analysis the core cooling system detailed system is significantly exceed required NPSH di sump water. Therefore, the safety s of the acceptability of the current Operability (SAO) No. 92-02, which we April 25, 1992.	at reflects as-built o model show that actual ue to the presence of ignificance of this ev configuration is conta as approved by the Pla	containment design and emergency I NPSH for the CS pumps () subcooling in the containment vert is minimal. Documentation ained in Safety Analysis for ant Review Committee on				
The root cause of this event is attr Containment Spray system design by this this event is the lack of awareness recirculation phase CS pump available FC05508 in 1990. This is considered missed opportunity to discover this	ibuted to analytical on the plant Architect/Eng of the USAR section 6. e NPSH by the preparer to be a contributing condition at an earlie	deficiencies of the original gineer. A contributing cause of .2.1 Method for calculating r and reviewer of Calculation cause because it resulted in a er time.				
The following corrective actions wil	1 be taken:					
<ol> <li>The Design Engineers - Mechan associated Root Cause Analysi assumptions when performing c</li> </ol>	ical will review this s to emphasize the imp alculations. This wi	Licensee Event Report and its portance of confirming USAR 11 be completed by June 4, 1992.				
<ol> <li>An analysis is being complete revised to credit liquid subc calculation. This will be co</li> </ol>	d and the affected US/ ooling in the recircu mpleted by August 15,	AR Section 6.2.1 will be lation phase available NPSH 1992.				
There have been no previous events in	nvolving the lack of (	CS net positive suction head.				