NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	1 OF 0 5

TITLE (4) The Capacity Of The Engineered Safety Features Equipment Coolers Has Been Determined Inadequate For LOCA Conditions Due To HVAC Calculation Errors

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)
									Sequoyah, Unit 2	0 5 0 0 0 3 2 8
0 7 2 8	8 7	8 7	—	0 3 7	— 0 0	0 3	1 0	8 8		0 5 0 0 0

OPERATING MODE (9)	5
POWER LEVEL (10)	0 0 0

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

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	XX	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
	20.405(a)(1)(iv)	XX	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Don Siska K. E. Meade, Plant Operations Review Staff	AREA CODE: 6 1 5 — 8 7 0 - 6 2 5 0

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)	XX NO			

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

This LER is being revised in its entirety to (1) provide additional information relating to the corrective action TVA has taken to ensure that the Sequoyah Nuclear Plant (SQN) engineered safety feature (ESF) area/room coolers have sufficient cooling capacity and (2) document an investigation performed on the Auxiliary Building penetration room (elevation 714) backdraft damper.

With units 1 and 2 in mode 5 (cold shutdown), a review of SQN design calculations relating to the capacity of the units 1 and 2 ESF area/room coolers determined that Watts Bar Nuclear Plant (WBN) heat load data had been used as the basis for the SQN cooling calculations. Further investigation revealed that the capacity of three ESF area/room coolers (per train) was inadequate. During this investigation, it was also determined that the Auxiliary Building penetration room (elevation 714) backdraft dampers may not have been seismically qualified. However, further investigation determined the subject dampers were purchased to the correct quality assurance and seismic specifications.

The use of WBN data in the SQN calculations was the result of an inadequate design control process that was in place before SQN received an operating license. To increase the capacity of the subject ESF coolers, an engineering change notice (ECN) was implemented which increased the essential raw cooling water (ERCW) flow rate to these coolers and updated the appropriate SQN design documents. In addition, Surveillance Instruction (SI)-566, "ERCW Flow Verification Test," has been revised, and the most recent performance of this SI has verified adequate ERCW flow to the subject ESF coolers. The subject ESF area/room coolers now have sufficient cooling capacity as long as the ultimate heat sink temperature does not exceed 72 degrees F. To prevent recurrence, TVA has a new design process in place which provides the necessary control over TVA nuclear plant design requirements.

IE22

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	8 7	— 0 3 7	— 0 1	0 2 OF 0 5

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

This LER is being revised in its entirety to (1) provide additional information relating to the corrective actions TVA has taken to ensure that the Sequoyah Nuclear Plant (SQN) engineered safety feature (ESF) area/room coolers have adequate cooling capacity to dissipate the predicted postaccident heat load, and (2) document an investigation performed on the Auxiliary Building elevation 714 penetration room backdraft dampers.

DESCRIPTION OF EVENT

On February 20, 1987, with units 1 and 2 in mode 5 (cold shutdown), Sequoyah Nuclear Plant (SQN) personnel were notified of Significant Condition Report (SCR) SQNMEB8748, revision 0, which stated that the capability of the units 1 and 2 ESF area/room coolers (EIIS Code VF) was indeterminate, and that a review of mechanical calculations for technical adequacy was required. During this review, it was discovered that the capacity of the SQN ESF area/room coolers were based on the predicted postaccident heat load of the Watts Bar Nuclear Plant (WBN). As a result, a cooling load calculation verification program was initiated to determine what impact the predicted plant-specific SQN heat load would have on the operation of SQN ESF equipment.

Twenty-three essential heating, ventilation, and air conditioning (HVAC) calculations were regenerated using the most recent postaccident SQN heat load predictions. The postaccident heat loads are based on a loss of coolant accident (LOCA), all required ESF equipment in operation, and the HVAC system operating in the emergency mode. The program concluded that, based on the previous requirements for essential raw cooling water (ERCW) (EIIS Code BJ) flow to the ESF coolers, the capacity of three ESF area/room coolers (per train) was inadequate. The remaining 20 coolers had sufficient capacity to perform their design function. The three ESF area/room coolers with inadequate cooling capacity were: (1) units 1 and 2 common auxiliary feedwater (EIIS Code BA) and boric acid transfer pump (EIIS Code CB) area coolers (elevation 690), (2) units 1 and 2 common emergency gas treatment system (EGTS) (EIIS Code BH) room coolers (elevation 734), and (3) units 1 and 2 Auxiliary Building 714 elevation penetration room coolers.

The auxiliary feedwater (AFW) and boric acid transfer pump area coolers consist of a train A and B cooler to supply cooling air to the general area of the Auxiliary Building (elevation 690) where the unit 2 motor-driven AFW pumps and the units 1 and 2 boric acid transfer pumps are located. The EGTS room coolers consist of a train A and train B cooler that provides space cooling to the EGTS room where units 1 and 2 common EGTS filter trains are located. Both units 1 and 2 have a 714 elevation penetration room with a train A and train B cooler. The unit 1 coolers provide space cooling to the penetration room and the Auxiliary Building gas treatment system (ABGTS) (EIIS Code VF) filter train A room, and the unit 2 coolers provide space cooling to the penetration room and the ABGTS filter train B room.

Additionally, on May 22, 1987, the seismic qualification of the backdraft dampers installed in the Auxiliary Building elevation 714 penetration room coolers was questioned due to the use of spare parts. The purpose of backdraft dampers is to prevent air flow through a nonoperating cooler. An investigation was undertaken to identify the unqualified parts of the backdraft dampers, and on July 28, 1987, a potential reportable occurrence (PRO) was issued for a reportability determination. Further investigation of this event determined the subject dampers had been purchased to the correct quality assurance and seismic qualification specifications. A review of the purchase contract determined the rest of the dampers purchased under that contract were also bought to the proper specifications. Thus, this condition was not reportable.

No immediate operator actions were required following the discovery of these conditions since both SQN units were in mode 5, and the subject ESF coolers had sufficient capacity to dissipate the predicted heat load that could result from any postulated accident initiated from cold shutdown conditions.

CAUSE OF EVENT

The most probable cause of the WBN heat load data being used in the SQN cooling calculations was an inadequate design control process. During the time the original HVAC calculations were prepared (before receipt of the SQN operating license), the SQN and WBN design projects were under the direction of a single project manager due to their design proposal as identical units. In addition, there was only one HVAC design section that was assigned the responsibility of preparing a detailed HVAC design for both nuclear plants. As a result, it is likely that a WBN motor list, which is used as input to HVAC heat load calculations, was assumed to be representative of both the WBN and SQN plants.

ANALYSIS OF EVENT

These conditions, as described above, are being reported in accordance with 10 CFR 50.73, paragraphs a.2.i.b and a.2.ii.a.

The purpose of the subject ESF area/room coolers is to provide cooling air to ESF equipment when (1) the area ESF pump starts, (2) an Auxiliary Building isolation actuation (EIIS Code JE) occurs which isolates the normal HVAC, or (3) when room/area temperature reaches a predetermined setpoint. In addition, the ERCW system, which is attendant equipment to the ESF coolers, is designed to supply cooling water to various heat loads in both the primary and secondary systems of each unit. The ERCW system is designed to ensure a continuous flow of cooling water to those systems and components necessary for plant safety during normal or accident conditions. The ERCW heat loads are based on a maximum heat sink temperature (i.e., the temperature of the Tennessee River water at the suction of the ERCW pumps) of 83 degrees F. However, because of the deficiencies described herein, the ERCW system can dissipate the predicted postaccident heat loads only if the river temperature remains below 72 degrees F.

Surveillance Instruction (SI)-566, "ERCW Flow Verification Test," is performed once every year to measure the amount of ERCW flow received by each cooler with the ERCW system aligned for the most demanding plant operational mode, i.e., unit 1 in LOCA recirculation and unit 2 in hot standby. Based on the most recent performance of the subject SI, TVA has determined that the ESF area/room coolers have sufficient cooling capacity for all modes of power operation provided that the temperature of the ultimate heat sink (i.e., river temperature) does not exceed 72 degrees F.

Although ERCW flow rates to the subject ESF coolers have been increased, the area/room temperatures assumed in the original environmental qualification of the ESF equipment has increased. TVA has analyzed this increase in ambient air temperature and determined that there was no impact on the environmental qualification of the ESF equipment in those areas.

COkRECTIVE ACTION

TVA has implemented an engineering change notice (ECN) to increase the ERCW flow rate to the subject ESF coolers, and updated the appropriate environmental qualification data and the HVAC drawings to reflect the most recent SQN heat load calculations. In addition, SI-566 has been revised to reflect the increased ERCW flow to the three ESF area/room coolers, and the most recent performance of this SI has verified adequate ERCW flows to these coolers. Thus, adequate ESF cooling capacity exists as long as the ultimate heat sink temperature remains below 72 degrees. Additional ECNs and/or design change notices (DCNs) are currently being written to provide additional cooling capacity for the subject ESF coolers. These changes will ensure that the subject ESF coolers provide adequate cooling as long as the ultimate heat sink temperature remains below its 83 degrees F.

To prevent recurrence of this event, TVA has completely reorganized its design and engineering groups since the original SQN design was approved, and the SQN and WBN plants now have separate design organizations. In addition, Nuclear Engineering Procedures (NEP)-5.1, "Design Output" (issued July 1, 1986); NEP-5.1, "Review" (issued July 1, 1986); and NEP-5.5, "Engineering Requirements Specifications" (issued December 31, 1986), provide the necessary control over TVA nuclear plant design requirements that did not exist before SQN was licensed.

New seismically qualified dampers have been installed in the unit 1 and unit 2 Auxiliary Building penetration room coolers (elevation 714). The installation of the new dampers was not required to meet seismic qualification specifications, rather, the dampers were installed for maintenance purposes only. The new dampers are a heavy-duty type damper whose sturdiness will enable better system performance.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	8 7	— 0 3 7	— 0 1	0 5 OF 0 5

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

ADDITIONAL INFORMATION

Dampers: Manufacturer - American Foundary and Furnace Company - Model - SHC series.

Coolers: Manufacturer - H. K. Porter Company - Custom Built Nos.:

- AB Penetration Room Coolers: F1M-8.93.
- AFW and Boric Acid Transfer Pump Area Coolers: F2P-22.25.
- EGTS Room Coolers: F1J-4.34.

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