

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)

Oconee Nuclear Station, Unit Three

DOCKET NUMBER (2)

05000 287

PAGE (3)

1 OF 6

TITLE (4) Reactor Building Cooling Units Technically Inoperable Due To A Manufacturing Deficiency

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(S)
04	02	97	97	02	01	06	02	97		05000

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

OPERATING MODE (9)	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER	20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)(D)	73.71(c)
LEVEL (10)	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)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	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

R. T. Bond, Safety Review Manager

TELEPHONE NUMBER

AREA CODE

(864)

885-3043

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 (f yes, complete EXPECTED SUBMISSION DATE)

X

NO

EXPECTED
SUBMISSION
DATE (15)

MONTH

DAY

YEAR

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

On April 1, 1997, while reviewing previously identified problems on Unit 3's Reactor Building Cooling Units (RBCU) fan motor circuits, it was recognized that a potential past operability concern existed. Potentially underrated fuses had been replaced with fuses of a higher rating on June 21, 1995. On May 1, 1997, with Unit 3 operating at 100 % full power, an Engineering evaluation concluded that the Unit 3 RBCUs were technically past inoperable, prior to June 1995, because the fuses in the primary circuit of Unit 3's RBCUs control power transformer were underrated. This might have prevented the RBCUs from re-starting during a LOCA/LOOP upon receipt of an Engineered Safeguard signal. The root cause is Manufacturing Deficiency, functional design deficiency, electrical. Corrective actions included replacing all three units' RBCU fuses.

9706110117 970602
PDR ADOCK 05000287
S PDR

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit Three	287	97	02	01	2 OF 6

BACKGROUND:

The Reactor Building Cooling Units (RBCU) [EIIS:BK] are one of two independent Engineered Safeguards Systems (ES) provided to remove heat from the Reactor Building (RB) atmosphere following an accident. The other system is the Reactor Building Spray (RBS) [EIIS:BE] System. The capacity of each of these systems is designed to remove sufficient heat from the RB to reduce pressure following a Loss Of Coolant Accident.

During normal plant operation, RBCUs "A" and "C" operate in the high speed mode to help cool the RB in conjunction with the Reactor Building Auxiliary Coolers. RBCU "B" is not typically operated during normal operation.

During an emergency, the RBCU System mode of operation changes automatically. The ES System is activated when the RB pressure reaches 3 psig. Upon actuation, the fan motors associated with RBCUs "A" and "C" change from high to low speed and the fan motor associated with RBCU "B" is started at low speed. All three RBCUs then operate continuously to circulate the RB steam-air mixture past the cooling coils to transfer heat from the RB atmosphere to the Low Pressure Service Water System. Each fan motor has a control power transformer associated with it and Units 1, 2, and 3 were supplied by different manufacturers.

EVENT DESCRIPTION:

In February of 1995, a Component Failure Analysis Report was generated which identified four previous occasions (between January 1990 and December 1994) where the primary fuses for the control transformer had blown on Unit 3's Reactor Building Cooling Units (RBCU) following maintenance. Engineering reviewed this report and generated a Problem Investigation Process (PIP) report. The PIP was screened as a Less Significant Event (LSE) which required a problem evaluation, but not an operability evaluation. The problem evaluation concluded that the blown fuses were underrated for this application. The original design by the motor starter manufacturer specified and supplied a fast acting type fuse with an inrush rating of 80 amps for .01 seconds. On June 21,

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				PAGE (3)
		YEAR	SEQUENTIAL NUMBER		REVISION NUMBER	
Oconee Nuclear Station, Unit Three	287	97	02		01	3 OF 6

1995, these fuses were replaced by an available fast acting fuse with an inrush rating of 200 amps for .01 seconds. This was recognized as being overrated and was intended as an interim replacement until a more appropriate fuse could be selected. Unit 3's RBCUs were tested with acceptable results.

A decision was made to replace the RBCU fuses on all three Oconee units with a slow blow type fuse that fully enveloped the original fuse characteristics and provided additional time to withstand the expected inrush current, based on manufacturers information at the time. In July 1996, Unit 1's fuses were replaced and the RBCUs started with no problems. On December 5, 1996, Unit 2's fuses were replaced and the RBCUs started with no problems. On December 23, 1996, Unit 3's fuses were replaced and during post maintenance testing the fuses blew after power was restored to the control power transformer. As a result, the slow blow fuses were replaced with the fast acting fuse with an inrush rating of 200 amps. Testing was initiated to directly measure the control power transformer inrush current. Measurements indicated that Unit 3's RBCUs fuses were exposed to inrush currents that ranged from 6 to 160 amps during approximately 15 tests. Unit's RBCUs were successfully tested. Unit 1 and 2's RBCUs control power transformer inrush current was measured and 80 amps was the highest recorded during approximately 10 tests. Subsequent contact with control power transformer manufacturers confirmed that the possibility of inrush currents up to 171 amps could be expected. As a result, a decision was made to replace the fuses on Units 1 and 2 even though past operating experience indicated no previous problems. Unit 2's RBCU fuses were replaced with fuses having an inrush rating of 200 amps on January 22, 1997 and Unit 1's RBCU fuses were replaced with fuses having an inrush rating of 200 amps on January 29, 1997. Both Units were successfully tested following fuse replacement.

On April 1, 1997, while reviewing previously identified problems on Unit 3's RBCU, it was recognized that a potential past operability concern existed. As a result, another PIP was generated to address possible past operability concerns.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Oconee Nuclear Station, Unit Three	287	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 6
		97	02	01	

On April 2, 1997, prior to the completion of the operability evaluation, this event was conservatively reported to the NRC via the Emergency Notification System.

On May 1, 1997, the past operability evaluation concluded that, prior to June 1995, magnetizing inrush currents to Unit 3's RBCUs control power transformers could cause the RBCU fuses to randomly blow. This may have prevented the RBCUs from re-starting during a LOCA/LOOP upon receipt of an ES signal. Therefore, Unit 3's RBCUs were considered to be past inoperable, prior to June 1995. The evaluation concluded that Unit's 1 and 2 RBCUs were past operable due to the fact that they had no history of similar failures (from 1978 until present) and currents measured during testing of Unit's 1 and 2 RBCUs were never more than 80 amps.

CONCLUSIONS:

The root cause of this event is determined to be a Manufacturing Deficiency, functional design deficiency, electrical. During the original design of Unit 3's Reactor Building Cooling Units (RBCU), it was not recognized that the control power fuse could be subjected to an inrush current greater than its capability. It is concluded that, if the proper type fuses had been designated and installed this event could have been prevented.

This problem applies to size five motor starters and the RBCUs are the only application at Oconee that utilizes this size.

A review of past Component Failure Analysis Reports associated with blown fuses did not indicate any other similar problems.

A search of the Operating Experience Data Base and Problem Investigation Process reports over the past two years indicated that the failure of the fuses was recurring. However, there were no other significant events involving the RBCUs with the same root cause. Therefore, this event is considered non-recurring.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Oconee Nuclear Station, Unit Three

287

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

97

02

01

5 OF 6

This event did not involve an equipment failure and is not NPRDS reportable. There were no radiological overexposures, radioactive releases, or personnel injuries associated with this event.

CORRECTIVE ACTIONS:**Immediate**

1. Replaced fuses on Unit 3's Reactor Building Cooling Units.

Subsequent

1. Replaced fuses on Units 1 a 2's Reactor Building Cooling Units.

Planned

None

SAFETY ANALYSIS:

During a Loss of Coolant Accident (LOCA) concurrent with Loss of Offsite Power (LOOP) event, the Reactor Building Cooling Units (RBCU) are required to restart and provide Reactor Building (RB) heat removal. During a LOCA/LOOP, power is initially lost to the RBCUs until an emergency power source can be aligned to the affected unit. Upon restoration of power to the affected unit, the RBCUs are restarted by an Engineered Safeguards (ES) signal. During this restart, a signal from the RBCU's control circuit closes contacts in the main power supply path to the RBCU motors to supply power to the motors. The RBCU control circuit receives power from a control power transformer that has fuses on the primary (power) and secondary (control) sides. It has been conservatively determined that these primary control fuses were potentially underrated, prior to June 1995. This might have prevented the RBCUs from re-starting during a LOCA/LOOP upon receipt of an ES signal.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Oconee Nuclear Station, Unit Three

287

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

97

02

01

6 OF 6

In the event that the RBCUs failed to start upon receipt of an ES signal, operators would have recognized this by control room indications. Troubleshooting efforts would have been initiated by the Technical Support Center/Operational Support Center to determine the cause of the failure. The fuses are located outside the RB in the Equipment Room, an accessible area. Also, post-LOCA RB heatup and pressurization would be reduced by the Reactor Building Spray System (RBS), Low Pressure Injection (LPI) coolers, and the passive structural heat sinks.

The potential exists that a complete failure of the RBCUs to start might allow the long term RB response to exceed the Environmental Qualification (EQ) envelope. However, the probability of actually exceeding the EQ envelope is considered to be low due to the substantial period of time that exists for damage control measures and the low likelihood of LOCA/LOOP accident.

During the period of inoperability, no event occurred which required the accident mitigation functions of the RBCUs. Therefore, the health and safety of the public was not affected by this event.