Duke Power

RONALD A JONES
Vice President
Oconee Nuclear Site

Duke Power
ON01VP / 7800 Rochester Hwy.
Seneca, SC 29672

864 885 3158
864 885 3564 fax

September 29, 2005

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269,-270
Licensee Event Report 269/2004-04, Revision 1
Problem Investigation Process No.: O-04-7937,
O-05-2361

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 269/2004-04, Revision 1, regarding a Control Room Ventilation System Booster Fan discovered to have been inoperable longer than allowed by Technical Specifications. Revision 1 addresses discovery that a corrective action from the initial event was improperly implemented, such that the affected Fan remained inoperable for an additional period of time, also longer than allowed by Technical Specifications.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B) as operation in a condition prohibited by Technical Specifications. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

R. A. Jones

Attachment

IE22

cc: Mr. William D. Travers
Administrator, Region II
U.S. Nuclear Regulatory Commission
61 Forsyth Street, S. W., Suite 23T85
Atlanta, GA 30303

Mr. L. N. Olshan
Project Manager
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Mr. S. E. Peters
Project Manager
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Mr. M. C. Shannon
NRC Senior Resident Inspector
Oconee Nuclear Station

INPO (via E-mail)

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-2004)

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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| Oconee Nuclear Station, Unit 1 | 05000- 0269 | 1 OF 9 |

4. TITLE

Improper Overloads Installed on Control Room Ventilation Filter Train

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | Unit 2 | 05000 270 |
| 11 | 17 | 2004 | 2004 | - 04 - | 01 | 09 | 29 | 2005 | FACILITY NAME: None | DOCKET NUMBER: 05000 |

9. OPERATING MODE: 1

10. POWER LEVEL: 100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

| | | | |
|---|---|---|---|
| | 20.2201(b) | 20.2203(a)(3)(i) | 50.73(a)(2)(i)(C) | 50.73(a)(2)(vii) |
| | 20.2201(d) | 20.2203(a)(3)(ii) | 50.73(a)(2)(ii)(A) | 50.73(a)(2)(viii)(A) |
| | 20.2203(a)(1) | 20.2203(a)(4) | 50.73(a)(2)(ii)(B) | 50.73(a)(2)(viii)(B) |
| | 20.2203(a)(2)(i) | 50.36(c)(1)(i)(A) | 50.73(a)(2)(iii) | 50.73(a)(2)(ix)(A) |
| | 20.2203(a)(2)(ii) | 50.36(c)(1)(ii)(A) | 50.73(a)(2)(iv)(A) | 50.73(a)(2)(x) |
| | 20.2203(a)(2)(iii) | 50.36(c)(2) | 50.73(a)(2)(v)(A) | 73.71(a)(4) |
| | 20.2203(a)(2)(iv) | 50.46(a)(3)(ii) | 50.73(a)(2)(v)(B) | 73.71(a)(5) |
| | 20.2203(a)(2)(v) | 50.73(a)(2)(i)(A) | 50.73(a)(2)(v)(C) | OTHER |
| | 20.2203(a)(2)(vi) | X 50.73(a)(2)(i)(B) | 50.73(a)(2)(v)(D) | Specify in Abstract below or in NRC Form 366A |

12. LICENSEE CONTACT FOR THIS LER

| FACILITY NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| B.G. Davenport, Regulatory Compliance Manager | (864) 885-3044 |

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| 14. SUPPLEMENTAL REPORT EXPECTED | | | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | X | NO | | | | |

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


On 11-17-04, with Oconee Units 1 and 2 in Mode 1 at 100% Full Rated Power, the Control Room Ventilation System Train B Outside Air Booster Fan tripped unexpectedly at 1638 hours during a post maintenance test. This train supplies the shared Unit 1 and 2 control room with filtered air to reduce the impact on control room personnel due to any release of airborne contamination following a postulated accident. Investigation determined that the installed motor starter relay overload heater elements were improperly sized such that the train might trip following an accident. A modification was performed to install the proper size overload heaters, and the fan was declared operable on 11-19-04 at 1809 hours. The fan tripped again on 4-10-05.

The A train on Unit 1 and 2 and both trains on Unit 3 were verified to have proper overloads installed. The apparent cause of the initial trip was that the B train was not included in the scope of a 1987 modification which revised the overload heaters on the A train. The cause of the 4-10-05 trip was improper installation of the new overload heaters during replacement on 11-18-04. This event is considered to have no significance with respect to the health and safety of the public.

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

EVALUATION:

BACKGROUND

This event is reportable per 10CFR 50.73(a)(2)(i)(B) as operation in a condition prohibited by Technical Specifications (TS).

The Oconee Nuclear Station control rooms are located in the Auxiliary Building. Oconee 1 and 2 share a common control room zone, which is comprised of the Control Room, Cable Rooms and Electrical Equipment Rooms, while Oconee 3 has a separate control room zone. Unit 3 was not affected by this event.

The Control Room Ventilation and Air Conditioning System (CRVS) [EIIS:VF]is designed to maintain the environment in the control area within acceptable limits for the operation of unit controls as necessary for equipment and operating personnel. The CRVS includes two 50% capacity outside air filter/booster fan (OABF) trains per control room. This sub-system is normally in stand-by and must be manually started. It is designed to filter particulate matter from the outside air and to maintain a positive pressure to minimize uncontrolled infiltration of potentially contaminated air following an accident. This provides adequate radiation protection to the control room zone, even under accident conditions, to maintain radiation exposures of assigned personnel within 10CFR20 limits.

The OABF sub-system was not designed or licensed to maintain a positive pressure in the Control Room assuming a single failure. The Basis of TS 3.7.9 credits that one OABF train can maintain a slight positive pressure in the Control Room zone, and thus can reduce infiltration of contaminants.

TS 3.7.9, Condition B, allows one OABF train to be inoperable for 72 hours. Condition C allows both OABF trains to be inoperable for 24 hours. If either of those completion times is not met, Condition D requires the affected units to be in Mode 3 within 12 hours and in Mode 6 within 36 hours.

Selected Licensee Commitment (SLC) 16.9.8 requires the OABF trains to be operable in Modes 5 and 6 during movement of recently irradiated fuel.

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Prior to this event Units 1 and 2 were operating at 100% power with no safety systems or components out of service that would have contributed to this event.

EVENT DESCRIPTION

On 11-17-04 at 0423 hours, Operations (OPS) personnel removed the B outside air booster fan from service for a planned filter replacement and routine Preventative Maintenance of the fan. As a result, Units 1 and 2 entered TS 3.7.9, condition B, for one OABF train out of service.

Following completion of the planned maintenance, and prior to declaring the OABF OPERABLE, Operations performed PT/1&2/A/0110/ 005A as part of the post-maintenance testing. All testing had been completed successfully and the OPS test person was preparing to have the fan stopped per the procedure. At that time the B OABF had been in operation for approximately 2.5 hours. However, the B OABF tripped at 1638 hours, prior to any operator action.

The procedure was stopped. The Control Room SRO notified the Operations Shift Manager.

An investigation was initiated which found that the fan motor had tripped due to actuation of the motor starter overload relays. Troubleshooting determined that the installed motor starter overload relay heaters were size S4.0 and that the measured motor current was approximately 4 amps, which matched the full load current given on the motor nameplate.

A review of past Maintenance activities found that the adjustable pulley on the fan drive had been adjusted or replaced on at least two occasions, which would affect the operating current. Maintenance instructions included guidance to verify the measured current was below the motor nameplate rating, but did not verify the current remained within the operating range of the installed overloads.

The investigation reviewed the motor overload heater response curves (current versus time) for the installed size S4.0 overload heater and confirmed that the overload relay would be expected to

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

operate at the observed current for approximately 2.5 hours prior to initiating a breaker trip. The investigation also reviewed prior tests and concluded that none of the tests performed in recent years resulted in an operating duration long enough to challenge the overloads.

Further investigation found that the applicable design documents specified size S3.3 heaters. Vendor catalog data on the heaters indicated that a 4.0 amp load would require size S4.4 heaters.

The Unit 1 A OABF train and Unit 3 A and B OABF trains were inspected to verify the installed motor sizes, motor heater overloads, and operating currents against design documentation. No discrepancies were found.

A modification was performed to revise the B OABF overload heaters to size S4.4. Following installation of the new heaters, the B OABF was operated for 4 hours without incident. The B OABF was declared Operable at 1809 hours on 11-19-04.

Oconee personnel believed that this action was sufficient to terminate the event. Revision 0 of this LER was submitted to the NRC on 1-17-05.

Subsequently, on 4-08-05 Oconee Unit 1 initiated a refueling outage. On 4-09-05 at 2110 power was lost to motor control center (MCC) 1XR. MCC 1XR supplies A OABF and the B OABF Suction Damper. Neither OABF was actually operating at the time, but both were required to be operable by TS 3.7.9 and SLC 16.9.8. The loss of power to these components placed Unit 1 in SLC 16.9.8 Conditions B and C and placed Unit 2 in TS 3.7.9 Conditions B and C due to the loss of both OABFs.

Per the procedure for response to loss of 1XR, Maintenance (MNT) technicians failed the B OABF suction damper open (powered from 1XR) and, as a compensatory measure, OPS started the B OABF (powered from 2XR). TS 3.7.9 Condition C (Unit 2) and SLC 16.9.8 Conditions C (Unit 1) were exited 4-10-05 at 0747.

At 1500 on 4-10-05 the B OABF was found off with the thermal overload relays tripped. Due to this Unit 1 re-entered SLC 16.9.8 Condition C and Unit 2 re-entered TS 3.7.9 Condition C.

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A Technical Issues Resolution (TIR) team was assembled to further investigate these events.

Investigation by MNT technicians revealed the 'Y' phase overload relay of the B OABF had actuated, stopping the fan. As part of the troubleshooting activities, MNT inspected the overload heaters and found the 'Y' phase overload heater to be slightly off center. They re-centered the heater. The heaters for the other phases were found centered and did not require adjustment. The B OABF subsequently successfully ran 13 hours before being secured.

However, the TIR team was initially not certain that the overload heater alignment was the primary cause of the B OABF trip. To eliminate several potential causes, another design change was implemented on 4-12-05 to replace the A and B OABF overload relays and to install higher capacity thermal overloads. This increased the design margin between the motor operating current and the overload trip point. Both fans passed the Post-modification testing and the B OABF was declared operable at 1750 on 4-12-05.

A root cause investigation was conducted. The investigation included additional testing into the effects of installation of this model thermal overload heater off-center with respect to the overload relay thermal mechanism. Based on those results, the investigation team concluded that the B OABF tripped on 4-10-05 because the 'Y' phase thermal overload heater had been improperly installed during replacement on 11-18-04. Revision 0 of the Root Cause report was approved on 8-14-05.

Upon review of the root cause report, it was recognized that the B OABF had been incapable of performing its specified safety function following the improper installation of the overload heater. Installation of that heater had been credited with terminating the initial event reported in Revision 0 of this LER and discussed above. Therefore Oconee concluded that this additional condition was appropriately an extension of the previous event rather than a separate event, and should be reported as such via this revision to the original LER.

CAUSAL FACTORS

Due to the apparent age of the initial discrepancy, an apparent cause investigation was performed rather than a root cause. It was determined that a modification (ONOE-1274) was performed in August, 1987 to install size S4.4 overload heaters on the Unit 1 A OABF. There was no equivalent change made to address the B OABF at that time. The apparent cause is therefore an oversight in the change management process in effect in 1987 in that the need to revise the B OABF fan overload heaters was not recognized.

There is an additional apparent cause due to the fact that the overload heaters actually installed on the B fan were not in conformance with the design documents. It was not the S3.3 designated for the B fan, nor was it the S4.4 designated for the A fan. Therefore the additional apparent cause is a lack of configuration control. A search of Work Orders contained in the current database did not indicate that the overloads on the B fan were replaced in recent years. The current database contains Work Orders as far back as 1990. Therefore it cannot be determined when the overloads found during this event were installed or the personnel or process involved.

The root cause investigation for the subsequent (4-10-05) trip of the B OABF found two root causes.

The first root cause was improper installation of the thermal overload device when it was replaced 11-19-04. The heater was installed slightly off center such that the overload did not actuate (trip) within the 4 hour post-maintenance test, but did actuate after approximately 7 hours of operation on 4-10-05.

Proper installation of this type overload heater has been considered "skill of the craft." The applicable procedure contains a note requiring the overload heater to be "properly centered on the solder element" and includes a documented sign off by a Quality Assurance inspector but does not provide any specific criteria as to what constitutes "properly centered."

The second root cause for this event was that the motor running current was at the upper range for the specified overload relay heater element. This resulted in less margin between the motor

running current and the overload relay trip point than if the motor current was closer to the minimum heater element range. While the heater element was properly selected for its application, this condition made the overload relay more susceptible to tripping if the heater element was not properly centered.

In order to ensure the fan's operation in an event, additional margin was provided by selecting overloads to provide cable protection versus motor protection. Cable protection will allow continued fan operation with slight variations of heater element position associated with visual verification after installation.

CORRECTIVE ACTIONS

Immediate:

1. A modification was performed to revise the motor overload heaters for the B OABF, which was expected to restore the system to an Operable status. Following the subsequent trip in April, 2005, a second similar modification was performed on both the A and B fans to provide additional margin. The overloads are now sized for cable protection rather than motor protection.

Subsequent:

1. The motor overloads on the other booster fan motors (Unit 1 A, Unit 3 A and B) were inspected and found to be the proper size.

Planned:

1. Site Engineering will review applicable Maintenance procedures to assure that appropriate procedural controls exist so that whenever overload heaters are replaced, the proper size is verified prior to installation. (Revision 1 update: This is complete.)

2. Site Engineering will review applicable Maintenance procedures and Operations Test procedures to assure that when OABF flow rates are changed by adjusting variable pulleys, the resulting motor currents are verified against overload ratings rather than (or in addition to) motor nameplate full load amps. (Revision 1 update: This is complete.)

3. Revise IP/0/A/3011/015 (the procedure for installing these overloads) to provide a diagram or sketch to clarify guidance on centering of this type of overload heater.

4. Review this event during Maintenance continuing training to focus on the importance of centering this type overload heater during installation. Cover specific procedure steps and required expectations.

These corrective actions are not considered NRC Commitment items. There are no NRC Commitment items contained in this LER.

SAFETY ANALYSIS

The CRVS has been screened from inclusion in the Oconee PRA based on low risk significance. The function of the OABFs is to maintain positive pressure in the control room for accident conditions using filtered outside air. The OABF sub-system was not designed or licensed to maintain a positive pressure in the Control Room assuming a single failure. However, the Bases of TS 3.7.9 credits that one OABF train can maintain a slight positive pressure in the Control Room zone.

These fans do not provide any core cooling function or support any other core cooling systems, and they do not serve to prevent or directly reduce dose consequences to the public. Maintaining a positive pressure in the control room reduces the inleakage of radioactive effluents or toxic gases from adjacent buildings or the outside atmosphere, and thus protects control room personnel. Considering the timing of radioactive releases from a core damage event, the OABFs serve only to protect control room personnel after core damage has occurred. Thus, this event would have no impact on the reliability of human actions involved in the prevention of core damage or immediate actions related to prevention of releases to the public thereafter. However, the possibility exists that, due to the potential trip of the B OABF, control room doses might exceed Part 20 limits following some severe accident scenarios. An adjacent unit would only be affected following failure of the remaining OABF and failure to otherwise maintain the control room habitable, forcing use of alternate shutdown locations. This would

represent a very small change in core damage frequency (CDF) for these units.

These factors support the conclusion that the unavailability of a single OABF would have no significant impact on CDF or large early release frequency (LERF).

Therefore, there was no actual impact on the health and safety of the public due to this event.

ADDITIONAL INFORMATION

A data base search was performed for similar events with similar root causes within the previous two years. None were found; therefore this is not a recurring event.

There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.

This event is considered reportable under the Equipment Performance and Information Exchange (EPIX) program.