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FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
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SUBJECT: LER 94-006-00:on 941215,TS limit exceeded due to vendor design deficiency.Increased calibr frequencies & replaced or repaired pressure switches.W/950112 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 2
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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PRIORITY 1 DOCUMENT

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**DUKE POWER**

January 12, 1995

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 269/94-06

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/94-06, concerning a Technical Specification limit exceeded due to a vendor design deficiency.

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

Very truly yours,

J. W. Hampton
Vice President

/ftr

Attachment

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JE22

NRC FORM 366 (5-92)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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)

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

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Oconee Nuclear Station, Unit One | 05000 269 | 1 OF 6 |

TITLE (4)
TECHNICAL SPECIFICATION LIMIT EXCEEDED DUE TO VENDOR DESIGN DEFICIENCY

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT NUMBER (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 12 | 15 | 94 | 94 | -- 06 -- | 00 | 01 | 12 | 95 | Oconee, Unit Three | 05000 287 |
| | | | | | | | | | FACILITY NAME | DOCKET NUMBER 05000 |

| OPERATING MODE (9) | N |
|---|---|
| POWER LEVEL (10) | 100 |

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (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 |
| | 20.405(a)(1)(iii) | X | 50.73(a)(2)(i)(B) | 50.73(a)(2)(viii)(A) | (Specify in Abstract below and in Text, NRC Form 366A) |
| | 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 | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Lanny V. Wilkie, Safety Review Manager | 803-885-3518 |

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) | X | NO | | | | |

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

On December 7, 1994, Unit 1, and 3 were at 100% full power. Unit 2 was at Hot Shutdown conditions following a unit trip. Instrument and Electrical technicians were performing routine calibration of Unit 1 Reactor Protective System loss of Feedwater pressure switches. Switch setpoint drift was identified during the calibration. On December 12, 1994, the setpoint drift for some switches was determined by engineering evaluation, to be excessive. The vendor is testing and evaluating the pressure switch to determine the cause of the excessive setpoint drift. The root cause of the event is Vendor Design Configuration and Analysis; Design Analysis; Component functional design deficiency. Corrective actions include increasing calibration frequencies and replacing or repairing the pressure switches.

BACKGROUND

The Reactor Protective System (RPS) [EIIS:JC] monitors several important system parameters and will trip the reactor when any trip setpoint is reached using two-of-four channel logic. One trip parameter is loss of Main Feedwater [EIIS:SJ], which is indicated when both Main Feedwater Pumps (MFDWP) have either low hydraulic oil pressure or low discharge pressure. Each MFDWP has four discharge pressure switches providing input to the RPS (one per channel).

The Emergency Feedwater (EFDW) system [EIIS:BA] is designed to start automatically upon loss of Main Feedwater [EIIS:SJ] or low level in either Steam Generator (SG). The EFDW system consists of two motor driven pumps and one turbine driven pump. The Turbine Driven Emergency Feedwater Pump utilizes the same logic as the RPS. The Motor Driven Emergency Feedwater Pumps have initiation circuitry which will start the pumps automatically when both Main Feedwater Pumps (MFDWP) have low hydraulic oil pressure or both MFDWP's have low discharge pressure. Each MFDWP has three discharge pressure switches providing input to start each of the EFDW pumps.

ATWS Mitigation System Actuation Circuit (AMSAC) is an additional system intended to mitigate the consequences of an anticipated transient without scram event. It functions by initiating EFDW and tripping the Main Turbine [EIIS:TA] when both MFDWPs have low discharge pressure or low hydraulic oil pressure. This function is accomplished using additional switches of a different model than the switches used to perform the safety actuation.

Technical Specification (TS) 3.4 addresses the EFDW system and the bases which require automatic EFDW initiation circuitry in the event of loss of both MFDWP's. TS 3.5 Table 3.5.1-1 lists the requirements for operability of the RPS.

EVENT DESCRIPTION

On December 29, 1993, a problem was recognized with pressure switch components allowing water intrusion to render the switch inoperable. This problem affected pressure switches that monitor low Main Feedwater Pump discharge pressure and provide inputs to the Reactor Protective System (RPS) trip signal and Emergency Feedwater (EFDW) initiation. It was reported as LER 270/94-01, "Technical Specification Limit Exceeded Due to Equipment Failure." Replacement switches were installed and calibrated on Oconee Units 1, 2, and 3 between February and November, 1994. The switches are manufactured by Static-O-Ring and are model number 9N6-W5-U8-C1A-JJTTNQ.

On December 7, 1994 the initial periodic instrument re-calibration of the Unit 1 RPS pressure switches was completed. Four of the eight Main Feedwater Pump (MFDWP) discharge pressure switches that provide input to the RPS exhibited setpoint deviations requiring engineering evaluation.

The manufacturer was advised of the situation. The manufacturer stated that some setpoint drift would be expected after initial installation and that the magnitude of the drift would be significantly less on subsequent calibrations. Previously, Oconee Engineering was not aware of this condition.

On December 12, 1994, Oconee Engineering concluded that setpoint drifts of four of the switches were excessive. A Problem Investigation Process report was initiated, an evaluation of the operability of the switches was begun, and the remaining switches on Unit 1 were calibrated. Also, the switches on unit 2 and 3 were scheduled for immediate calibration. On December 14, 1994, calibration of the switches was completed with setpoint drifts identified on all of them. In addition to the four Unit 1 switches, excessive setpoint drift was noted on nine of the fourteen Unit 3 switches. All of the switches were successfully re-calibrated within tolerance. Replacements were installed for several switches which were removed and sent to the manufacturer for evaluation.

On December 16, 1994, Oconee Engineering completed the operability evaluation and concluded that the switches were conditionally operable contingent upon calibration every fourteen days for the Unit 1 and 2 switches and every seven days for the Unit 3 switches. This was based on evaluation of the current calibration data, discussions with the manufacturer, and the minimum allowable setpoint value for each Unit. Due to system differences, Unit 3 has the least amount of margin for setpoint drift. It is conservatively assumed that the setpoint drift occurred shortly after initial pressurization, based on vendor information.

Based on a review of the as-found data for the Unit 1 switches, three switches were found to be below the minimum allowable setpoint. The function of two of these switches rendered the auto initiate circuit of the Motor Driven Emergency Feedwater Pump (MDEFDWP) B and the Turbine Driven Emergency Feedwater Pump (TDEFDWP) inoperable on low MFDWP discharge pressure since late June 1994. The third switch was associated with the input to the RPS. The other seven RPS switches were acceptable, therefore the function of the anticipatory trip on low MFDWP discharge pressure would be operable in the past.

No Unit 2 switches were found to be below the minimum allowable setpoint; therefore, their RPS and EFDW safety related functions were operable.

Unit 3 had nine switches found to be below the minimum allowable setpoint. Based on the conservative assumption, the auto initiate circuit for the MDEFDWP A, the TDEFDWP, and the RPS anticipatory trip on low discharge pressure were inoperable since February 1994.

The present calibration results indicate the increased frequencies are adequately maintaining the pressure switches within the specified setpoints.

CONCLUSIONS

The root cause of this event is Vendor Design Configuration and Analysis; Design Analysis; Component functional design deficiency. Based on information from the vendor, the cause of the setpoint drift is possibly the design of the non-wetted diaphragm.

A review of previous events for the last two years, revealed that LER 270/94-01, "Technical Specification Limit Exceeded Due To Equipment Failure", was reported due to failure of a pressure switch in this same application. A diaphragm failure allowed water to contact electrical components in the pressure switch resulting in the failure of the switch to perform the automatic initiation function. The corrective actions were to replace all the pressure switches with these new switches which would not exhibit the diaphragm failure. However, these replacement switches corrected the problem with the diaphragm deterioration but exhibited unexpected setpoint drift. The setpoint drift was not recognized because the switches are scheduled for their periodic calibration annually. This frequency was in accordance with manufacturer recommendations. When informed of the setpoint drift encountered, the manufacturer indicated that this was not an acceptable amount to be expected.

Since the equipment which failed was performing the same function as in the previous event, the event is considered recurring. However, the mode of failure, manufacturer, and design of the switch is different.

The pressure switch identified in this event is not NPRDS reportable.

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

CORRECTIVE ACTIONS

Immediate

1. The manufacturer of the pressure switches was notified of the calibration findings.

2. All pressure switches of this type were calibrated and the results reported to engineering for evaluation.

Subsequent

1. An increased calibration frequency was established to maintain the Reactor Protective System and Emergency Feedwater safety function of these switches.

2. The manufacturer observed the calibration of the switches by Oconee Instrument and Electrical technicians and determined that equipment and methods used are acceptable.

3. The manufacturer is conducting drift testing on this switch model as well as alternate designs to attempt to identify the exact problem causing the excessive drift.

Planned

1. Replace or repair the pressure switches as necessary to allow normal calibration frequencies to be resumed.

SAFETY ANALYSIS

The Motor Driven Emergency Feedwater Pump (MDEFDWP) B and the Turbine Driven Emergency Feedwater Pump (TDEFDWP) for Unit 1 would not have automatically started at the required Main Feedwater Pump (MFDWP) low discharge pressure. MDEFDWP A and the TDEFDWP for Unit 3 would not have automatically started at the required MFDWP low discharge pressure. However, the second MDEFWP remained operable on both Units.

If Main Feedwater had been lost while the low discharge pressure switches were not within tolerance, the Emergency Feedwater (EFDW) system would still have been automatically initiated by this or other signals. Specifically, for scenarios where the MFDWPs trip off, if the pump discharge pressure switches did not initiate, the low hydraulic oil pressure signals would have initiated EFDW.

If the MFDWPs do not trip off, the switches to start one MDEFDWP on low discharge pressure remained operable on each affected unit. The Final Safety Analysis Report (FSAR) Chapter 10 discusses the fact that one EFDWP would meet system needs. Since FSAR Chapter 10 states that one EFDWP is adequate for decay heat removal, the EFDW system could still function. If there is an additional single failure affecting that pump and/or its flow path, the low Steam Generator (SG) dry out protection signal would automatically initiate the EFDWP in the other train.

Also, other means of actuating the pumps were available during the time period of this inoperability.

ATWS Mitigation System Actuation Circuit (AMSAC) was available to automatically initiate the EFDW system, including the emergency feedwater pumps identified in this report, since this is a separate and independent circuit.

In addition, the low SG level (SG dry out protection) signal would automatically initiate both MDEFDW pumps, when the SG level dropped low enough.

Furthermore, during a loss of MFDW event, the Operators are directed by the Emergency Operating Procedure (EOP) and Abnormal Procedures (AP) to verify that all Emergency Feedwater Pumps (EFDWP) have started. The operators would have manually started the EFDWP's from the affected Unit's control room.

If all of these efforts failed, the EOP and AP's provide for use of High Pressure Injection [EIIS:BG] forced cooling and/or use of the Standby Shutdown Facility Auxiliary Service Water Pump [EIIS:BA]. Analyses have been performed to verify that sufficient time is available for an Operator to line up these systems before any core damage would occur.

If the Unit 3 Reactor Protective System anticipatory reactor trip signal had not functioned to trip the reactor, the AMSAC actuation using redundant switches would have produced a turbine trip, which would provide a redundant path for the anticipatory reactor trip. Also, if this redundant trip did not function, the loss of MFDW would result in high Reactor Coolant System (RCS) [EIIS:AB] temperature/pressure, resulting in a high RCS pressure trip of the reactor. Therefore, with the MFDW pump discharge pressure input to the RPS anticipatory reactor trip out of calibration, the reactor trip would have occurred by other methods.

Therefore, sufficient redundancy exists to assure that, even with the MFDW discharge pressure switches out of calibration, the health and safety of the public was not compromised by this event.