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SUBJECT: LER 90-008-00:on 900619,10CFR App R deficiencies resulting
 in potential for loss of auto start of svc water pumps.
 W/9 ltr.

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August 31, 1990

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Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73
entitled Licensee Event Reporting System, the following
report is being submitted:

90-008-00

Sincerely,

A.A. Blind
Plant Manager

AAB:clj

Attachment

cc: D.H. Williams, Jr.
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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) D.C. Cook Nuclear Plant, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 1 5				PAGE (3) 1 OF 0 6										
TITLE (4) 10 CFR Appendix R Deficiencies Resulting in Potential for Loss of Auto Start of Service Water Pumps Due to Incorrect Implementations of Design Change																								
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)											
0	6	0	1	9	0	9	0	0	0	8	0	0	0	8	3	1	9	0	D.C. Cook, Unit 2				0 5 0 0 0 3 1 6	
OPERATING MODE (9) 1			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																					
POWER LEVEL (10) 0 8 3			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)(vi)				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)(vii)(B)													
			20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)													
LICENSEE CONTACT FOR THIS LER (12)																								
NAME P.F. Carteaux - Safety and Assessment Superintendent												TELEPHONE NUMBER AREA CODE 6 1 1 6 4 6 5 1 - 1 5 9 0 1 1												
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																								
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS														
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR								
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)												<input checked="" type="checkbox"/> NO												

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

On June 19, 1990 with Unit One operating at 83 percent power and Unit Two operating at 90 percent power, it was discovered that the isolation relay circuitry for the low header pressure auto start switch for the Essential Service Water (ESW) pumps had been installed incorrectly. Because of a fuse coordination problem between the pressure switch and the remainder of the control circuit, it was possible for a pressure switch wiring short to disable the ESW pumps auto start circuit. On June 20, 1990, the same condition was found for the isolation relay circuit for the low header pressure auto start switch for the Component Cooling Water pumps.

Appendix R of 10 CFR 50 requires that when cables of redundant equipment necessary to achieve and maintain hot shutdown conditions are located in the same area, steps must be taken to ensure that one of the redundant trains is free of fire damage. The installed configuration for the pressure switch isolation circuitry did not meet this requirement. The immediate corrective action taken was to replace the isolation relay circuit fuses with smaller value fuses to provide proper fuse coordination. A plant modification packet has been initiated to modify the circuits to the correct configuration.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

Conditions Prior to Occurrence

Unit One in Mode One at 83 percent power.

Unit Two in Mode One at 90 percent power.

Description of Event

On June 19, 1990, it was discovered that the isolation relay circuitry for the low header pressure auto start switch (EIIS/BI-PIS) for the Essential Service Water (ESW) pumps (EIIS/BI-P) had not been correctly modified and might not meet the Appendix R separation criteria. Because of a fuse coordination problem between the pressure switch and the remainder of the control circuit, it was possible for a pressure switch wiring short to disable an ESW pump's auto start circuit. On June 20, 1990, the same condition was found for the Component Cooling Water (CCW) pump (EIIS/CC-P) low header pressure auto start switch (EIIS/CC-PIS). An engineering evaluation completed August 1, 1990 verified that this condition was reportable.

The breaker control circuits for the ESW and CCW pumps on both Unit 1 and 2 are not in compliance with our 10 CFR 50 Appendix R commitments as described in our submittal documented in the "Safe Shutdown Capability Assessment, Proposed Modifications and Evaluations," Section 5, Figure 5.14.2.

Our submittal stated that the pressure switches that provide the low header pressure auto start signal for each ESW and CCW pump will be isolated from the remainder of the pump's control circuit. This isolation was to be provided to prevent any common mode electrical open, short or ground fault, due to a fire, from disabling the control circuits of all four ESW pumps and all four CCW pumps. This common mode failure was considered possible because the pressure switches for all four ESW pumps (both units) are in the same fire zone and the pressure switches for all four CCW pumps (both units) are in the same fire zone. This determination was made during the Appendix R evaluation of Safe Shutdown components.

Isolation of the low header pressure switches was to be accomplished through the use of an isolation relay and by inserting fuses to isolate the relay coil and pressure switch contacts circuit from the rest of the pump's control circuit. The design drawings issued for the design changes (RFC-1-2668 and RFC-2-2685) that were to implement this isolation were incorrectly revised resulting in this isolation not being appropriately provided.

This condition was the result of design errors implemented under RFC-1-2668 and RFC-2-2685. It was found that while the engineering documents for the design changes had been properly prepared, the changes were not implemented on the design drawing properly. The design department's check of the

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		

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

Description of Event cont.

drawings did not find the error nor did the engineering review. The drawings were then issued and the changes implemented at the plant. RFC-1-2668 was completed on November 13, 1985. RFC-2-2685 was completed on June 23, 1984.

To get a better understanding of the problem, please refer to the attached sketch. This sketch is typical for all ESW and CCW pumps. The circuit labeled "Proposed CKT" shows how the isolation was supposed to be provided. In the "Proposed Circuit," the pressure switch contact and the isolation relay would be isolated from the rest of the control circuit by 10 amp fuses. A fault at pressure switch WPS-701 would result in one of the isolation relay fuses being blown. The 10 amp control circuit fuse would be left unaffected.

The circuit labeled "Actual CKT" shows what was actually installed. As shown on the sketch, the 10 amp isolation relay fuses were placed in series with the 10 amp control circuit fuse.

Since the fuses have the same rating and characteristics, there is a chance that the control circuit fuse would blow before the isolation relay fuse in the event of a fault at WPS-701. If this happened, the pump's close circuit would become inoperable. If the pump was already running, it would continue to run, but if it was not running or was subsequently shutdown, the pump could not be restarted without manual action by the operators at the pump's electrical breaker.

Appendix R requires that the cables be separated or an alternate shutdown capability be provided. However, the procedures that the operator would have used had a fire occurred that affected all four ESW or all four CCW pumps coincident with a loss of offsite power would have instructed the operator to replace the fuses. Replacing fuses is considered a repair in Appendix R and is not allowed to reach hot shutdown. Therefore, it has been determined that this condition is outside our Appendix R design basis.

Cause of Event

This condition was the result of design errors implemented under RFC-1-2668 and RFC-2-2685. It was found that, while the engineering documents for the design changes had been properly prepared, the changes were not implemented on the design drawings properly. The design department's check of the drawings did not find the error nor did the engineering review. At this time, no reason can be found as to why this mistake was made nor why it was

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

Cause of Event cont.

not detected during the engineering and design checks.

Analysis of Event

This event is considered reportable per the requirements of 10 CFR 50.73 (a) (2) (ii) (B) for Units One and Two and 10 CFR 50.72 (b) (1) (ii) (B) for Unit One as a condition that was outside the design basis of the plant.

Appendix R of 10 CFR 50 requires that when cables of redundant equipment necessary to achieve and maintain hot shutdown conditions are located in the same area, steps must be taken to ensure that one of the redundant trains is free of fire damage. The installed configuration of the pressure switches did not meet this requirements. All four ESW pressure switches for low header pressure are located in the same fire area. All four CCW pressure switches are also located in the same fire area. Because of the lack of fuse coordination in the pump control circuitry, a short in the pressure switch wiring of a pump had the potential for disabling the auto start feature of that pump. this created a potential for a fire in the area causing a short in all ESW or CCW pressure switch cables and disabling the auto start capability. This would not have affected any operating pumps but, following a loss of offsite power as stipulated in Appendix R for assessing fire consequences, the pumps could not have been restarted electrically. Restarting the pumps would have required identifying and repairing the faulted circuit.

During the period that this condition existed, no fire occurred in this fire area. Had a fire occurred, it is highly unlikely that all pumps would have been disabled. For this to happen, a short would have to occur in a specific location in the cables of all pumps, and a loss of offsite power would have to occur concurrent with the fire.

Based on the above, this event is not considered to have created a significant safety concern nor did it create a significant hazard to the health and safety of the general public.

Corrective Actions

The immediate corrective action was to replace the 10 amp isolation relay fuses with 5 amps fuses to provide proper fuse coordination with the 10 amp control circuit fuse. This action was completed in both units on June 22, 1990.

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Corrective Action cont.

The breaker control circuits for Unit 2 ESW and CCW pumps will be modified during the current Unit 2 refueling outage (Plant Modification number 12-MM-110). The breaker control circuits for Unit One ESW and CCW pumps will be modified during the next Unit One refueling outage (Plant Modification number 12-MM-110).

The Electrical Plant Section Procedure II-5 Design Verification was revised and issued in January 1985 to include the Electric Plant Section Checklist. This checklist is used by the design checker to verify the correct completion of a design change. This checklist has given the checker an invaluable tool in assuring design completeness. RFCs 01-2668 and 02-2685 were completed in 1984 before the checklist became part of the design check procedure. The checking procedure is such today that this mistake would have been caught and corrected before any drawings had been issued.

Failed Component Identification

None.

Previous Similar Events

None.

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