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FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana & 05000315
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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-008-01:on 900619,discovered that isolation relay circuitry for low header pressure auto start switch for essential svc water pumps installed incorrectly.Caused by design errors.Plant mod packet initiated.W/910104 ltr.

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January 4, 1991

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Docket No. 50-315

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

90-008-01

Sincerely,

A. Adam Blind

A.A. Blind
Plant Manager

AAB:sb

Attachment

c: D.H. Williams, Jr.
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NRC FORM 366 (6-89) | U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH 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)	DOCKET NUMBER (2)	PAGE (3)
D. C. Cook Nuclear Plant, Unit 1	0 5 0 0 0 3 1 5	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 1	0 1	0 4	9 1	D. C. Cook, Unit 2	0 5 0 0 0 3 1 6
										0 5 0 0 0

OPERATING MODE (9): [ ]
POWER LEVEL (10): 0 8 3

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)	[ ] 50.73(a)(2)(i)	[ ] 50.73(a)(2)(viii)(A)	
[ ] 20.405(a)(1)(iv)	[X] 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
P. F. Carteaux - Safety and Assessment Superintendent	AREA CODE 6 1 6 — 4 6 5 - 5 9 0 1

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 *(If 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 June 19, 1990, 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. However, it was determined that this condition would not render the CCW pumps inoperable.

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.

Condition 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. An engineering evaluation completed August 1, 1990 verified that this condition was reportable.

The breaker control circuits for the ESW pumps on both Unit One and Two 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 pump will be isolated from the remainder of the pump's control circuit. This isolation was to be provided to prevent any common mode elctrical open, short or ground fault, due to a fire, from disabling the control circuits of all four ESW 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. 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 properly implemented on the design drawing. The Design Department's check of the 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 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 closed circuit would become inoperable. If the pump was already running, it would continue to run, but if it was not running or was subsequently shut down, 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 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 properly implemented on the design drawings. 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 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)(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 requirement. All four ESW pressure switches for low header pressure are 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 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.

The fire zones where the ESW and CCW pumps are located are equipped with fire protection systems, as required by Appendix R III G. Fire Zones 29 A, B, C and D, which include the ESW pump area, have an ionization smoke detection system. An exemption has been granted for these zones waiving the requirement for a suppression system. Dry pilot preaction sprinklers are provided throughout the normally accessible portions of Fire Zone 44S which includes the CCW pumps and a closed space perimeter of the open stairway to form a water curtain between fire areas, above and below. In addition, to increase sprinkler density over the CCW pumps, directional water spray sprinklers are provided for the pump bearings.

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 amp fuses to provide proper fuse coordination with the 10 amp control circuit fuse. This action was completed in both units on June 22, 1990.

The breaker control circuits for Unit Two ESW pumps will be modified during the current Unit Two refueling outage (Plant Modification Number 12-MM-110). The breaker control circuits for Unit One ESW 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. RFC's 01-2668 and 02-32685 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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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)