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50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana M 05000316
AUTH.NAME AUTHOR AFFILIATION
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BLIND,A.A. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 94-013-00:on 941216,discovered that certain cables associated w/Units 1 & 2 ESW sys not encl in 1-hour rated fire barrier in fire zone 29G.Caused by errors in original safe shutdown analysis.Fire watch established.W/950116 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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PRIORITY 1 DOCUMENT

Indiana Michigan
Power Company
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
616 465 5901

INDIANA MICHIGAN POWER

January 16, 1995

United States Nuclear Regulatory Commission
Document Control Desk
Rockville, Maryland 20852

Operating Licenses DPR-58
Docket No. 50-315

Document Control Manager:

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

94-013-00

Sincerely,

A. A. Blind
Plant Manager

/sb

Attachment

c: J. B. Martin, Region III
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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)
D. C. Cook Nuclear Plant - Unit 1	05000 315	1 OF 5

TITLE (4)
Fire Protection in Zone 29G Found Outside Design Basis

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	16	94	94	-- 013 --	00	01	16	95	D. C. Cook - Unit 2	05000 316
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1
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)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
	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 (Include Area Code)
P. C. Mangan, Project Manager	614/223-1918

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)

This is a follow-up report pursuant to the one-hour telephone notification made in accordance with 10CFR50.72(b)(ii)(B) on December 21, 1994. Certain cables associated with the Unit 1 and Unit 2 Essential Service Water (ESW) systems were found to not be enclosed in a 1 hour rated fire barrier in Fire Zone (FZ) 29G. An unsealed penetration was also discovered between zones 29G and 29A. This is contrary to the configuration submitted in an exemption request to 10CFR50 Appendix R, Section III.G.2, which was subsequently granted by the NRC for FZ 29G. A postulated fire in FZ 29G could have resulted in the loss of both Unit 1 ESW pumps and the loss of the nonoperating Unit 2 ESW pump.

Upon discovery, fire watches were immediately established in Fire Zone 29G in accordance with Technical Specification 3.7.10.

This condition was determined to have little safety significance due to the availability of fire detection systems in the area, the low combustible loading in the zones affected and the minimal effect on the calculated Core Damage Frequency (CDF). At no time was the health or safety of the public in jeopardy due to this event.

Conditions Prior to Occurrence

Unit 1 was in Mode 1 at 100 percent Rated Thermal Power; Unit 2 was in Mode 1 at 48 percent Rated Thermal Power.

Description of Event

On December 16, 1994, while performing a revalidation of the Appendix R Safe Shutdown Analysis, it was discovered that certain cables associated with the Units 1 and 2 Essential Service Water (ESW) system were not enclosed in a 1-hour rated fire barrier in Fire Zone (FZ) 29G, and an unsealed penetration existed between Fire Zones 29G and 29A. This is contrary to conditions outlined in an exemption request for 10CFR50 Appendix R, Section III.G.2, which had been submitted in early 1983. Based on the statements made in the request, the exemption was granted by the NRC for FZ 29G in December 23, 1983. With the discovery of the unenclosed cables, it was determined that a postulated fire in FZ 29G could result in the loss of both Unit 1 ESW pumps and the loss of the non-operating Unit 2 ESW pump.

Revision 0 of the Safe Shutdown Capability Assessment (SSCA), which included the subject exemption request, was submitted to the NRC on March 31, 1983 (AEP:NRC:0692E). The SSCA provided an overall description of how Cook Nuclear Plant complied with the requirements of 10CFR50, Appendix R and included a number of exemption requests. The SSCA and the exemption requests were written by a consultant, Engineering Planning and Management (EPM), contracted by AEPSC to perform the Safe Shutdown Analysis under an approved Appendix B QA program.

A detailed revalidation of the Safe Shutdown Analysis is currently being performed in fulfillment of a commitment established in LER 93-005. As a part of this revalidation, the ability to safely shutdown while experiencing a potential fire in Analysis Area 32 was being evaluated. Analysis Area 32 contains Fire Zones 29A, 29B, 29E, and 29G, and the following equipment:

FZ	Identification
29A	ESW Pump PP 1-E - El 591 ft - Unit 1
29B	ESW Pump PP 1-W - El 591 ft - Unit 1
29A	MCC for ESW Pumps - El 591 ft - Unit 1
29G	Screen House Auxiliary MCC Rm - El 575 ft - Unit 1&2

While performing this evaluation, the safe shutdown raceways in this area were independently identified, then compared to the existing safe shutdown analysis for this area, and any applicable exemption requests were reviewed.

This review identified multiple discrepancies. Four cables and associated pull boxes which were identified as being located in FZ 29G in the new analysis were not in the existing analysis. These cables are 600V AC power supply cables to Motor Control Centers (MCCs) 1-PS-A, 1-PS-D, 2-PS-A and 2-PS-D, which provide power to the ESW pump discharge valves and to HVAC supply fans for ventilation in each of the four ESW pump cubicles.

Description of Event (cont'd)

The Unit 1 and 2 ESW pump discharge valves were assumed to be open in the original analysis, when in reality, they are only open when the associated pump is running. Because of this error, the original analysis did not evaluate the availability of the discharge valves' power supplies during a potential fire.

The exemption request written for FZ 29G stated that the east and west trains of ESW for both units would be protected from the effects of fires in FZ 29G. Contrary to this statement, the power feeds to MCCs PS-A and PS-D for both units were not protected.

The same exemption request provided an argument as to why hot gases and other products of combustion from a fire in FZ 29G would not flow up an open stairway and disable the Unit 1 ESW pump motors. This argument assumed the ESW pump cubicle supply fans would prevent the ESW pump motors from being damaged. This assumption was incorrect as a fire in FZ 29G could disable the power supplies to the supply fans since the power feed cables associated with MCCs PS-A and PS-D were not protected.

In the exemption request it was also stated that all ceiling and wall penetrations were sealed with three-hour-rated fire seals. A visual inspection of FZ 29G found an unsealed penetration in the ceiling of FZ 29G which leads to FZ 29A above.

As a result of these errors, the analysis did not recognize that a fire in FZ 29G could result in loss of both Unit 1 ESW pumps due to hot gases rising up from FZ 29G below, and the loss of the nonoperating Unit 2 ESW pump since its discharge valve would fail in its closed position. The net result of these losses would be a single Unit 2 ESW pump left to supply both units.

Cause of Event

The root cause for the errors in the original safe shutdown analysis could not be conclusively determined as the analysis was performed over twelve years ago and detailed documentation of the analysis methodology is no longer available. This lack of documentation is a primary reason that the analysis is being revalidated. Discussions with utility personnel involved with the original analysis indicated that spot checks of EPM's work were done but 100 percent verification was not performed.

Electrical physical drawings were provided to EPM, including Drawing 12-1384 which shows the raceway contained within FZ 29G. The revision of this drawing in effect at the time of the original analysis clearly shows the conduits and pull boxes associated with the power feeds for MCCs PS-A and PS-D.

A possible reason for EPM failing to recognize that the power feed cables for the MCCs were located in from FZ 29G is that 600v power feed cables are typically embedded in concrete floor slabs to the point where they terminate in an MCC.

Cause of Event (cont'd)

This fact is discussed in the SSCA and may have led EPM not to look for the subject cables in fire zones other than where the MCCs were located. The cables in question run in FZ 29G for approximately six inches before entering the pull boxes, then exit the back of the pull boxes and immediately enter the concrete wall. This is the only case noted in the revalidation project where power cables were routed in this manner.

It is not known why EPM assumed the ESW pump discharge valves were normally open valves. The circuit analysis should have clearly shown that these valves receive an open signal upon pump start. A review of correspondence with EPM indicates discussion on subjects such as normal system lineups, but there is no record indicating that the valve positions used by EPM were verified. It also could not be determined why the open penetration between the fire zones was missed or to what extent EPM's field walkdowns were verified.

Analysis of Event

This event is being reported in accordance with 10CFR50.73(a)(2)(ii)(B) and 10CFR50.73(a)(2)(ii)(C) in that the condition was outside the design basis and not covered by the plant's operating and emergency procedures.

Fire Zone 29G has a very low combustible loading of less than 12,000 BTUs per square foot for an equivalent fire severity of under ten minutes and is provided with ionization smoke detectors. Analysis by fire protection engineers of a potential fire starting in FZ 29G concluded that the fire would be quickly detected by the ionization smoke detection system and annunciated in the Control Room. On receipt of the annunciator, the Control Room operators would initiate fire brigade response. Upon arrival, the fire brigade would be able to suppress the fire using manual hose stations or portable fire extinguishers. Due to the general lack of combustibles within these zones and the existence of fire detection, the fire brigade would be expected to arrive at the scene of the fire before significant fire spread occurred along the cable trays through the open penetration between FZs 29G and 29A.

A Fire Probabilistic Risk Assessment (PRA) evaluation of this condition was performed using Fire-Induced Vulnerability Evaluation (FIVE) Methodology techniques to examine the safety significance of this condition. The FIVE screening assessment showed that for the worst case fire in FZ 29G, only the cable pull boxes associated with the Unit 1 ESW system would possibly be damaged. Such a fire would result in the loss of the standby Unit 1 ESW train. Assuming the loss of the Unit 1 standby ESW train, the increase in core damage frequency (CDF) was calculated to be 1.94E-10/year, which is well below the NRC's Individual Plant Examination for External Events (IPEEE) reporting criteria of 1.0E-07/year.

Under Appendix R requirements, the worst case scenario would result in one operable ESW pump. A calculation was performed for this scenario to show that one ESW pump could provide sufficient flow to safely shutdown both units without

Analysis of Event (cont'd)

exceeding runout conditions. The calculated required flow of 11,240 gpm is beyond the pump's design capacity of 10,000 gpm and outside of the ESW system design basis. It was determined, however, that a single pump is capable of providing the required flow without exceeding runout conditions.

Alignment of a single pump to support both units is not covered by the emergency procedures. However, general operator knowledge of ESW cross-tie capabilities is considered sufficient such that this alignment could be performed if necessary.

In summary, this condition was determined to have little safety significance due to the availability of fire detection and low combustible loading in the fire zones. This conclusion is supported by the thermal/hydraulic analysis of the service water system which indicates that one operable ESW pump could deliver the required flow to support safe shutdown functions. Finally, the resulting increase in CDF confirms that the condition did not significantly jeopardize the fire safety of the plant.

Corrective Action

Fire watches were immediately established for FZ 29G as required for an inoperable fire barrier per Technical Specification 3.7.10.

A penetration seal for the opening between FZs 29G and 29A has been installed.

A 1-hour barrier for the pull boxes and the six-inch lengths of exposed cable associated with MCCs 1-PS-A, 1-PS-D, 2-PS-A and 2-PS-D will be installed. Due to the ongoing Thermo-lag issue, it is unclear at this time when the installation will be completed. Until then, compensatory measures will remain in place.

The Appendix R revalidation project is scheduled to be completed by the end of 1995. Comprehensive procedures which include independent verification have been developed for the performance of the revalidation. These procedures will reduce the probability of similar errors occurring in the revised analysis as well as help identify errors in the existing analysis.

Failed Component Identification

NONE

Previous Similar Events

316/93-005

315/90-010