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ComEd

February 14, 1997

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Licensee Event Report #96-021-01, Docket #050-373 is being submitted to your office in accordance with 10 CFR 50.73(a)(2)(i) and (ii).

Respectfully,

F. R. Dacimo
Station Manager
LaSalle County Station

Enclosure

cc: A. B. Beach, NRC Region III Administrator
M. P. Huber, NRC Senior Resident Inspector - LaSalle
C. H. Mathews, IDNS Resident Inspector - LaSalle
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INPO - Records Center

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 05/31/95

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)

FACILITY NAME (1):	DOCKET NUMBER (2)	PAGE (3)
LaSalle County Station Unit One	05000373	1 of 9

TITLE (4)

Inadequate Review of Modification of Main Control Room Atmospheric Control System Radiation Monitoring Logic Results in an Unreviewed Safety Question

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 NAME	DOCKET NUMBER
									LaSalle County Station Unit Two	05000374
12	17	96	96	021	01	02	14	97	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	4
POWER LEVEL (10)	000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(iii)	☐ 73.71(b)
☐ 20.2203(a)(1)	☐ 20.2003(a)(3)(ii)	☐ 50.73(a)(2)(iv)	☐ 73.71(c)
☐ 20.2203(a)(2)(i)	☐ 20.2003(a)(4)	☐ 50.73(a)(2)(v)	☐ OTHER
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)	☐ 50.73(a)(2)(vii)	
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)
☐ 20.2203(a)(2)(iv)	☒ 50.73(a)(2)(i)	☐ 50.73(a)(2)(viii)(B)	
☐ 20.2003(a)(2)(v)	☒ 50.73(a)(2)(ii)	☐ 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
M. A. Whelan, Engineer	(815) 357-6761 Extension 3280

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)	☒ NO				

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

On December 17, 1996, an independent review of selected Technical Specification (TS) Clarifications, identified an apparent inconsistency between the TS Clarification related to the Main Control Room Atmospheric Control System (MCRACS) Radiation Monitoring System and TS 3.4.7.1. On January 13, 1997, the subsequent investigation determined that;

1. There was a functional inconsistency between the Design Basis as described in the FSAR text and the FSAR Logic Diagram for the MCRACS. The original installed design matched the logic diagram.

2. The modified design installed in 1993 was not consistent with either Design Basis as described in the FSAR text or as shown on the FSAR Logic Diagram.

3. SER Section 9.4.1 indicates that no single failure within the control circuit for the isolation dampers will result in a failed open Control Room Ventilation System. The modified design installed in 1993 does not meet this Single Failure Criteria and consequently introduced an Unreviewed Safety Question. A 4 hour Emergency Notification System (ENS) phone notification was made due to the plant being outside the design bases and in an unanalyzed condition.

Subsequent engineering review has determined that a postulated single failure in the modified circuitry combined with a Design Basis Accident could have resulted in a failure of the Control Room Ventilation System Isolation dampers to isolate resulting in a radiation exposure to Control Room Personnel in excess of 10 CFR 50 Appendix A General Design Criteria 19 limits.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

A. CONDITION PRIOR TO EVENT

Unit(s): 1/2 Event Date: 12/17/96 Event Time: 1350 Hours
Reactor Mode(s): 4/N Mode(s) Name: Cold Shutdown/ Defueled Power Level(s): 0%/0%

B. DESCRIPTION OF EVENT

On July 13, 1993, and July 26, 1993, modification of Unit 1 and Unit 2 Main Control Room Atmosphere Control System (MCRACS) Radiation Monitoring System (PR/VC) [IL] logic was made to prevent spurious Engineered Safety Features (ESF) actuations. Prior to installation of the modifications, the logic for initiation of the Emergency Makeup Mode due to High Radiation levels in the ventilation intakes consisted of four radiation monitors per intake divided into two channels to provide a one out of two taken once trip logic. See Attachment A. Due to this trip logic, a spurious trip of any one of the radiation monitors caused an ESF actuation. To eliminate spurious ESF actuations the modifications changed the trip logic for each Unit to require actuation of two monitors per channel to initiate the ESF actuation. See Attachment B.

In anticipation of the above modification, on May 13, 1993, Technical Specification/License Clarification 03-93, Revision 0, was developed to provide guidance to plant reactor operators for compliance with Technical Specification 3.3.7.1 and Table 3.3.7.1-1. The clarification provided a definition of which radiation monitors constitute a trip channel and provided actions for the operator to take in the event a monitor became inoperable.

On August 30, 1996, all Technical Specifications/License Clarifications were reviewed by an Independent Review Group as part of an investigation under LER 374/96-010-00, Inadequate Standards for Technical Specification Clarifications resulted in violations of Technical Specifications and Design Basis. A total of 43 Clarifications were reviewed. Of the 43, seventeen could not be confirmed through engineering judgment that the interpretations met Design and Licensing Basis. Sixteen of the 17 were promptly deleted. One of the 17 was appropriately revised and approved August 30, 1996. Technical Specification Clarification 03-93 was reviewed and the determination made that the Clarification was acceptable as written.

On December 17, 1996, an independent review of Technical Specification/License Clarification 03-93, Revision 0, determined that there was an apparent inconsistency between the Technical Specification Clarification and Technical Specification 3.4.7.1.

Based on this, a Problem Identification Form (PIF) was initiated to investigate and resolve this issue. LaSalle Station took a conservative approach and declared the MCRACS Radiation Monitoring Systems INOPERABLE for LaSalle County Units 1 and 2 until this issue is resolved. The Control Room Ventilation (VC) and Auxiliary Electric Equipment Room Ventilation (VE) Systems were already INOPERABLE for other reasons. No additional actions were required because the MCRACS Radiation Monitoring Systems for LaSalle County Units 1 and 2 are not required to be OPERABLE with Unit 1 in Operational Condition 4, Cold Shutdown, and Unit 2 defueled.

Review of the Technical Specifications, FSAR, UFSAR and the Design Criteria for the MCRACS Radiation Monitoring System determined that there was an inconsistency between the Design Basis as described in the FSAR text and as shown on the FSAR Logic Diagram, and that the original installed design was consistent with the Design Basis as described in the FSAR Logic Diagram. However, there was an inconsistency between the original installed design and the Design Basis as described in the FSAR text. The FSAR Logic Diagram described a two channel system, either of which would initiate an ESF actuation, compared to the text which described a two channel system, which required both channels to concurrently actuate to initiate an ESF actuation. In addition, during the investigation, a question arose concerning the Safety Evaluation performed for the modifications. The question raised the possibility of an Unreviewed Safety Question related to the trip logic modifications. This issue was documented on PIF# 97-0167.

On January 13, 1997, at 16:00 CST, an engineering review determined that a condition existed in the MCRACS that resulted in the plant being in an unanalyzed condition. The engineering evaluation determined that the Modification to the MCRACS Radiation Monitoring logic installed in 1993 did not meet the single failure criteria required by the Safety Evaluation Report, and increased the number of monitors required to initiate the trip logic which may have increased the probability of failure of equipment important to safety. This was considered to constitute an Unreviewed Safety Question. This issue was documented in PIF# 97-0241. On January 13, 1997, at 17:55 CST, a four hour ENS phone notification was made to report the plant being in an unanalyzed condition per 10 CFR 50.72(b)(2)(i) and 10 CFR 50.72(b)(2)(iii).

This event is reportable per 10 CFR 50.73(a)(2)(ii) due to the plant being in an unanalyzed condition. This event is also reportable per 10 CFR 50.73(a)(2)(i) because this condition could have prevented the fulfillment of a safety system function needed to mitigate the consequences of an accident.

C. CAUSE OF EVENT

The root cause of the inadequate safety evaluation for the modifications performed in 1993 was that LaSalle County Station failed to recognize that damper isolation for the control room ventilation air intakes is not functionally redundant. Hence, the modified design would have allowed a single failure to result in the failure to isolate one train.

Contributing to this event was a failure to conduct an adequate in-depth review of the documentation which comprise the licensing basis. The evaluation of the modification for conformance to single failure criteria, focused on single failure events described in the UFSAR and on the apparent functional redundancy of the two trains of ventilation. The safety evaluation determination that the change did not constitute an unreviewed safety question was based upon the text description in section 6.4.4 of the UFSAR. However, this description was in conflict with other design basis documentation as well as in conflict with the facility installed configuration. The root cause of this conflict is not known. The discrepancy existed at the time of licensing the facility. LaSalle County Station failed to review key documents other than the UFSAR which would have identified these discrepancies. At the time the safety evaluation was performed, LaSalle Safety Evaluation Procedures focused on reviews of the UFSAR and the Technical Specifications and did not specifically direct the reviewers to other license bases such as the FSAR and the SER. Reviews at that time were mainly limited to hard copy searches with limited electronic search capabilities.

In Updating the FSAR, numerous drawings had been removed for simplification of the UFSAR. The system logic diagram in the FSAR which depicted a different design had been incorrectly deleted from the UFSAR and review of the FSAR was not specifically called out in the Safety Evaluation Procedures at LaSalle County Station at the time.

HISTORICAL BACKGROUND

For the purpose of identifying the planned corrective actions, the following historical background is provided. The MCRACS consists of two 100% capacity redundant HVAC trains. Each train is supplied through its' own ventilation intake. Each ventilation intake is equipped with four radiation monitors installed and oriented approximately 90 degrees apart around the perimeter of each intake. Normal operating mode is for one of the two trains to be in operation. In the original design, a high radiation signal from any one of the four radiation monitors in an intake resulted in an automatic isolation of the normal outside air and actuation of the Emergency Makeup Filtration mode of the operating train.

Due to the one-out-of-four logic and the very low setpoint (2.5 mR/hr), the system was subject to spurious actuations. In 1989, LaSalle County Station investigated several modifications to the system to reduce the occurrence of spurious actuations. One proposal was to revise the actuation logic to require a signal from minimum of two radiation monitors in order to actuate the emergency mode.

In April, 1990, LaSalle County Station authorized its AE to proceed with design development of a modification to implement a two out of four actuation logic. The modification was to be implemented in conjunction with another modification deleting a trip feature from the air intake chlorine detectors.

In September, 1990, due to interface problems with the chlorine detector modification, further work on the modification was postponed by LaSalle County Station.

In January, 1992, LaSalle County Station again authorized the AE to resume development of the modification based on a two out of four logic.

In February, 1992, a draft plan for the modification was issued for review and comment. The design proposed incorporated two out of four logic with sufficient redundancy to satisfy the design basis for the system.

In March, 1992, the associated Engineering Change Notices (ECN) for the modifications were issued for review and comment.

In June, 1992, the AE was directed by LaSalle County Station to revise the design to incorporate a "limited two-out-of-four" logic. The reason given for the change was to allow the removal of two monitors at a time from service for ease of maintenance. The change also reduced the complexity and expense of the design change.

The AE incorporated the request and the revised design was issued in September, 1992. This design no longer met the channel redundancy requirements in the design basis. This was not recognized during the review and approval process as the new design appeared to be a basic simplification of the design change which had been proposed and reviewed numerous times since 1990.

The modification was installed in the facility in July, 1993.

D. ASSESSMENT OF SAFETY CONSEQUENCES

General Design Criteria 19 of 10 CFR 50, Appendix A, requires a maximum allowable calculated control room dose of 5 rem to the whole body or its equivalent to any organ as a result of a Design Basis Accident. Equivalents to the 5 rem whole body dose are 30 rem to the skin and 30 rem to the thyroid. MCRACS is designed to limit the exposure of the Control Room Personnel to less than these allowable exposure limits. Upon detection of high radiation at the outside air intake, the System is designed to automatically isolate the MCR from the normal outside air, starting the Emergency Makeup Filtration, and initiate a high radiation alarm in the MCR. The modifications introduced an electrical cross connection between radiation monitoring channels that could have resulted in the loss of the automatic isolation feature by a single fault in one radiation monitor. This would have resulted in the operating train continuing to introduce contaminated outside air into the control room during a Design Basis Event prior to manual action by the MCR operator. The alarm function of the radiation monitors was not affected.

In the event of a design basis accident requiring the isolation of the MCR HVAC system combined with a single failure which disabled the automatic isolation of the operating MRACS train, the Control Room Personnel would still have received a high radiation alarm from the operating radiation monitors. The alarm response for a high radiation alarm is for the operator to confirm that the Emergency Makeup Train has actuated as required. If the single failure had prevented the automatic actuation, the control room operator would have manually activated the isolation mode as required by alarm response procedures.

However, in accordance with the accident analyses, no manual operator action can be assumed for the first 10 minutes of the accident. In 1993, an analysis was performed of the effect of a delay in MCR isolation due to an increase in the response time of the radiation monitors as a result of a modification. The analysis determined that during normal outside makeup air operation, the maximum increase in delay of isolation without exceeding GDC 19 dose limits is 30 seconds. Based on this analysis, the single failure of the MCRACS isolation combined with a minimum 10 minute operator response time could have resulted in exposure of the MCR personnel exceeding the GDC 19 limits.

E. CORRECTIVE ACTIONS

The Safety Evaluation for the modification was performed in September, 1992. The procedures and culture of the Facility at that time was such that sufficient rigor was not always exercised in the Safety Evaluation process. Numerous programmatic weaknesses were subsequently identified with LaSalle County Station's Safety Evaluation process. Corrective actions were taken which included increased training and programmatic changes resulting in greater rigor and thoroughness in the Safety Evaluation and modification review and approval process. The Safety Evaluation Procedures were revised to specifically require reviews of the additional documentation which make up the license basis other than the UFSAR and Tech Specs. The documents comprising the license bases are now available for electronic searches which assist in a more thorough review and evaluation process.

1. The potential extent of condition for this type problem will be evaluated as part of the System Functional Performance Review Program. This program is being conducted for all systems important to safe and reliable operation and includes 1) determining the required system functions derived from the design bases, 2) identifying materiel condition problems that affect achieving these functions and 3) ensuring the periodic testing requirements adequately confirm system functions. Corrective actions including design changes and maintenance activities will be implemented when required to ensure the system functions are achieved. If substantive functional problems are encountered, a detailed design review will be performed to confirm whether supporting detailed analyses are available and identify necessary design changes.

2. Additionally, LaSalle County Station is implementing a long-term plan for preparation of a major scope of design bases documents, verification of these design bases documents with other documentation, and plant system verification. This effort will include reconstitution of selected analyses and calculations, improvements in calculation control and UFSAR validation.

All the following corrective actions will be taken prior to restart of either Unit 1 or 2.

1. A modification will be developed to correct the installed design. The original channel separation and redundancy will be restored. The revised design will meet the single failure criterion of the design basis.

2. The Technical Specifications will be revised to conform to the design and to eliminate confusion in the wording of the action statement.

3. An ongoing detailed system design review of the MCRACS is already in progress as a result of previous concerns as identified in LER 96017.

4. A review of other modifications to the MCR Ventilation System which could affect the single failure criteria as it applies to the MCR Isolation Dampers and Control Circuitry will be conducted.

5. A review of the changes which removed FSAR drawings from the UFSAR to ensure that the information contained on the drawings is adequately referenced in the UFSAR for subsequent Safety Reviews.

F. PREVIOUS OCCURRENCES

LER NUMBER	TITLE

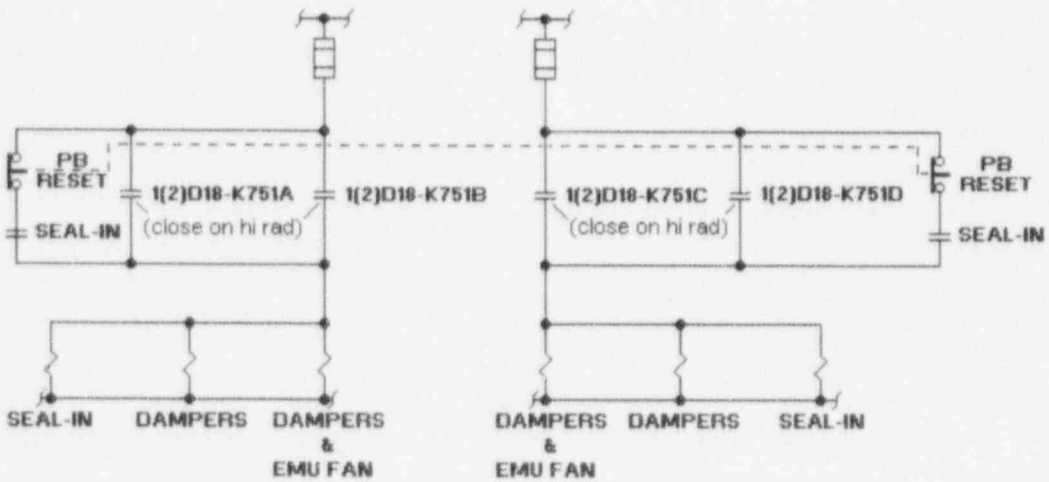
None.

G. COMPONENT FAILURE DATA

Since no component failure occurred, this section is not applicable.

ATTACHMENT A

UNIT 1(2) MCRACS RADIATION MONITOR TRIP LOGIC PRIOR TO INSTALLATION OF MODIFICATION M01-88-003A(B)

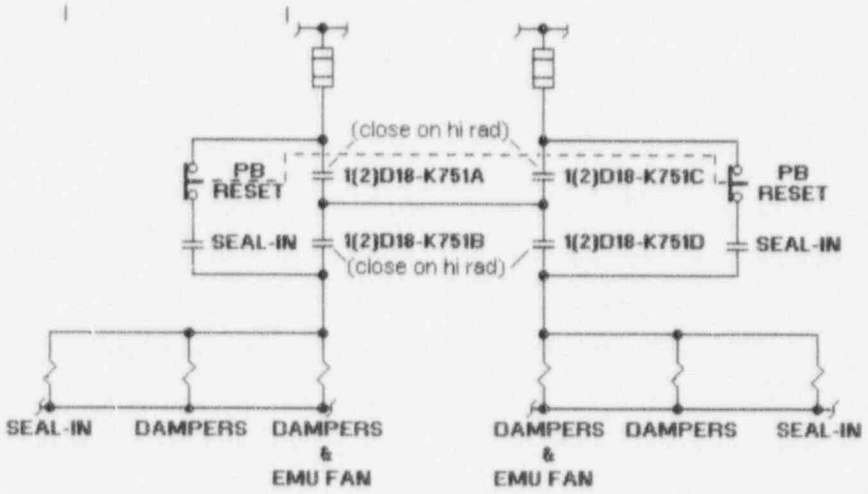


CHANNEL 1 CHANNEL 2

(Representative Configuration for Illustration Only)

ATTACHMENT B

UNIT 1(2) MCRACS RADIATION MONITOR TRIP LOGIC AFTER INSTALLATION OF MODIFICATION M01-0-88-003A(B)



(Representative Configuration for Illustration Only)