10 CFR 50.73

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION
P. O. BOX A
SANATOGA, PENNSYLVANIA 19464

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M. J. McCORMICK, JR., P.E.
PLANT MANAGER
LIMERICK GENERATING STATION

February 26, 1990
Docket Nos. 50-352
50-353
License Nos. NPF-39
NPF-85

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

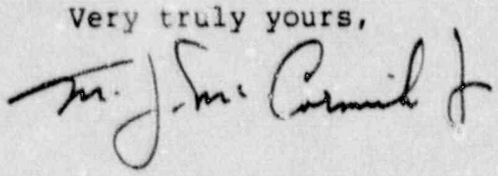
SUBJECT: Licensee Event Report
Limerick Generating Station - Units 1 and 2

This LER reports aspects of the Main Control Room (MCR) Ventilation, and Air Conditioning system which are outside of the design basis of the plant as described in the Limerick Generating Station Final Safety Analysis Report. This condition resulted from a failure to consider the MCR ventilation isolation to isolation modes of operation.

Reference:	Docket Nos. 50-352 50-353
Report Number:	1-90-002
Revision Number:	00
Event Date:	January 25, 1990
Report Date:	February 26, 1990
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(ii)(B).

Very truly yours,



VAW/JKP/nlk
cc: W. T. Russell, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

IE22
1/1

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

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TITLE (4) The Main Control Room Ventilation System is outside of the design basis due to misapplication of the design basis assumptions.

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)
2 1 2 5 9 0			9 0	— 0 0 2	— 0 0	0 2 2 6 9 0			Limerick Unit 2	0 5 0 0 0 3 5 3
										0 5 0 0 0

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)	1 0 0	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
Gil J. Madsen, Regulatory Engineer	AREA CODE 2 1 5 3 2 7 - 1 2 1 0

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
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 8	0 1	9 0

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

On January 25, 1990, a condition outside the design basis was identified in that, if the Main Control Room (MCR) ventilation system is in the radiation isolation mode and an automatic chlorine isolation is required, a single failure could prevent the full chlorine mode isolation. Also, the Final Safety Analysis Report does not state any exceptions to the automatic entry of the MCR ventilation system into the radiation isolation mode. When the MCR ventilation system is in the chlorine isolation mode and a high radiation signal is received, the MCR ventilation system will not enter the radiation isolation mode. An analysis shows that there is adequate protection in any MCR ventilation operating mode to prevent a habitability concern. The finding that the chlorine isolation mode of the MCR ventilation does not meet the single failure criterion when the MCR ventilation is in the radiation isolation mode is due to the failure to consider that the radiation isolation mode may be entered under non-accident conditions. The failure to provide automatic entry into the radiation isolation mode from a chlorine isolation mode is due to the failure to consider the transition of the system from one mode of isolation to another mode. When the design bases are clarified with the NRC, the appropriate corrective actions will be taken.

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

Unit Conditions Prior to the Event:

	Unit 1	Unit 2
Operating Condition:	1 (Power Operation)	1
Power Level:	100%	100%

BACKGROUND

The Limerick Generating Station (LGS), Units 1 and 2, Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) system (EIIS:VI) has several modes of operation (see Figure 1). There is a normal mode where outside air is circulated through the MCR and maintains it at a slight positive pressure. In the normal mode, the normal outside air intake isolation dampers are open and the Control Room Emergency Fresh Air Supply (CREFAS) System outside air intake dampers are closed. In the event of the presence of radiation in the normal outside air intake plenum, the normal MCR HVAC supply and exhaust flow paths are isolated from outside air and the CREFAS System is operated in the radiation isolation mode. The radiation isolation mode is a partial recirculation mode with the normal outside air intake isolation dampers closed and a maximum of 525 scfm of filtered outside air that enters the MCR through the CREFAS outside air intake dampers to maintain the positive pressure. In the event of the presence of chlorine or other toxic gases in the normal outside air intake plenum, the normal MCR HVAC system supply and exhaust flow paths are isolated from outside air and the CREFAS system is operated in the chlorine isolation mode. The chlorine isolation mode is a full recirculation mode with no outside air entering the MCR. In this mode, the positive pressure in the MCR decays to atmospheric pressure due to exfiltration. In both isolation modes, the recirculated or outside air flows through charcoal and High Efficiency Particulate Air (HEPA) filters.

The chlorine isolation logic for the normal outside air intake isolation dampers is shown on Figure 2. Two chlorine detectors must detect chlorine to actuate the isolation logic resulting in closure of one of the two series normal outside air intake isolation valves.

The major functional difference between the two isolation modes is the operation of the CREFAS system filtered outside air intake

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dampers. These isolation dampers only open in the radiation isolation mode and are closed in the normal and chlorine isolation modes. Following a modification on this system, the new chlorine isolation logic for the CREFAS system outside air intake dampers is shown as on Figure 3. Presently, all four chlorine detectors must detect chlorine to actuate the isolation logic to close the CREFAS outside air intake dampers in both filter train supply lines.

The configuration of the CREFAS system filtered outside air intake dampers and the associated chlorine logic was originally designed to conform with single failure proof criteria when the system is in the radiation isolation mode.

Description of the Event:

On January 25, 1990, it was determined that, if the MCR HVAC system is in the radiation isolation mode and an automatic chlorine mode isolation is required due to the presence of chlorine, a single failure in the chlorine isolation logic could prevent the CREFAS outside air intake isolation dampers from closing and completing the chlorine mode isolation. The possible single failures that could occur are a chlorine detector probe failure or a relay failure in the isolation logic. This is contrary to the description in the Final Safety Analysis Report (FSAR) sections 6.4.1.j and 7.3.2.10, which describe the MCR habitability system and indicate that the chlorine isolation design meets the single failure criteria.

In addition, during the review of the above system, station personnel discovered that the FSAR Section 6.4 did not state any exceptions to the automatic entry into the radiation isolation mode on receipt of a high radiation signal. However, by the original design, if the CREFAS system is in the chlorine isolation mode and a high radiation signal is received, then the CREFAS system will not automatically switch to the radiation isolation mode but will remain in the chlorine isolation mode.

The FSAR describes the MCR HVAC system operation from the normal mode of operation to an isolation mode (chlorine, or radiation) of operation. The FSAR states that the MCR HVAC system is in conformance with Regulatory Guide (RG) 1.78, "Assumptions for Evaluating the Habitability of Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," and RG 1.95, "Protection of Nuclear Power Plant Control Room Operators Against

an Accidental Chlorine Release." However, the FSAR and the RGs are unclear regarding the necessity of the MCR HVAC system to automatically switch from one mode of isolation to another mode(e.g. chlorine isolation during testing to a radiation isolation). As a result of the ambiguities in the FSAR and the RGs, the requirement of automatic transition between isolation modes was not considered be necessary.

The above conditions are considered to constitute operation outside the design basis of the plant as currently described in the FSAR and a one hour notification was made to the NRC at 1044 hours on January 25, 1990, in accordance with 10CFR 50.72(b)(1)(ii)(B). Accordingly, this report is being submitted in accordance with 10CFR 50.73(a)(2)(ii)(B).

Consequences of the Event:

The consequences of these conditions are minimal, as shown by analysis. Sufficient time exists while in any of the operating modes of the MCR HVAC and CREFAS system (normal, radiation isolation, or chlorine isolation) for the appropriate protective actions to be taken in response to a high chlorine condition to prevent a habitability concern. Sufficient radiation protection is provided when the CREFAS system is in the chlorine isolation mode since the MCR ventilation is completely isolated in this mode and the MCR atmosphere is filtered through the CREFAS system charcoal filters. The MCR operators' actions of donning Self-Contained Breathing Apparatus (SCBA) and inserting a manual isolation signal to reinforce the expected automatic actions are covered in plant procedures and licensed operator training. The probability of having to go from one isolation mode to the other isolation mode is low since operation in any one isolation mode for prolonged periods of time is low.

Cause of the Event:

The cause of the lack of protection from a single failure in the transfer of the MCR ventilation system from the radiation isolation mode to the chlorine isolation mode is the failure to consider that the radiation isolation mode may be entered under

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non-accident conditions. In addition, the FSAR and the applicable RGs did not discuss operations between isolation modes. This failure occurred during the development of a Temporary Circuit Alteration (TCA) and a subsequent permanent modification to the chlorine isolation logic. When the TCA and later the modification were developed the fact that the final design did not satisfy the single failure criterion while CREFAS system is in the radiation isolation mode was identified. However, this issue was evaluated from the point of view that entry into the radiation isolation mode was one accident and the chlorine isolation would be a second accident and requiring the single failure criteria between modes would be beyond the design requirements. However, there is a possibility of the CREFAS being in the radiation isolation mode because of maintenance, testing or Technical Specifications (TS) requirements and then having an automatic chlorine isolation signal which would require the single failure criterion to be met. The TCA was installed from 1985 to 1989 and the modification was installed on September 7, 1989. Therefore the design did not meet the single failure criteria from 1985 until present.

The cause of the failure to provide automatic entry into the radiation isolation mode from a chlorine isolation mode is that only entrance from the normal mode of operation to a single isolation mode of operation was considered when the FSAR was written. In addition, the applicable RGs did not discuss operation between isolation modes. Isolation to a single isolation mode of operation was not considered and as a result was not described in the FSAR.

Corrective Actions:

No immediate actions were taken as the existing procedures provide sufficient guidance to the MCR operators to take protective actions within the time frame specified in the results of the analysis discussed in the Consequences Section.

A conference call was held between PECo personnel and the NRC Technical Reviewers on February 15, 1990. These conditions were discussed and arrangements were made for a subsequent meeting between PECo personnel and the NRC reviewers to further discuss this issue and to decide on appropriate steps that should be taken to clarify the design basis. A supplement to this LER will

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be issued by August 1, 1990, once the corrective actions are determined.

Actions Taken to Prevent Recurrence:

A revision to the FSAR will be developed to further explain the design when the ambiguities of the design basis for the various isolation modes are resolved. The FSAR revision will provide sufficient information of the system design basis to prevent misinterpretation in the future.

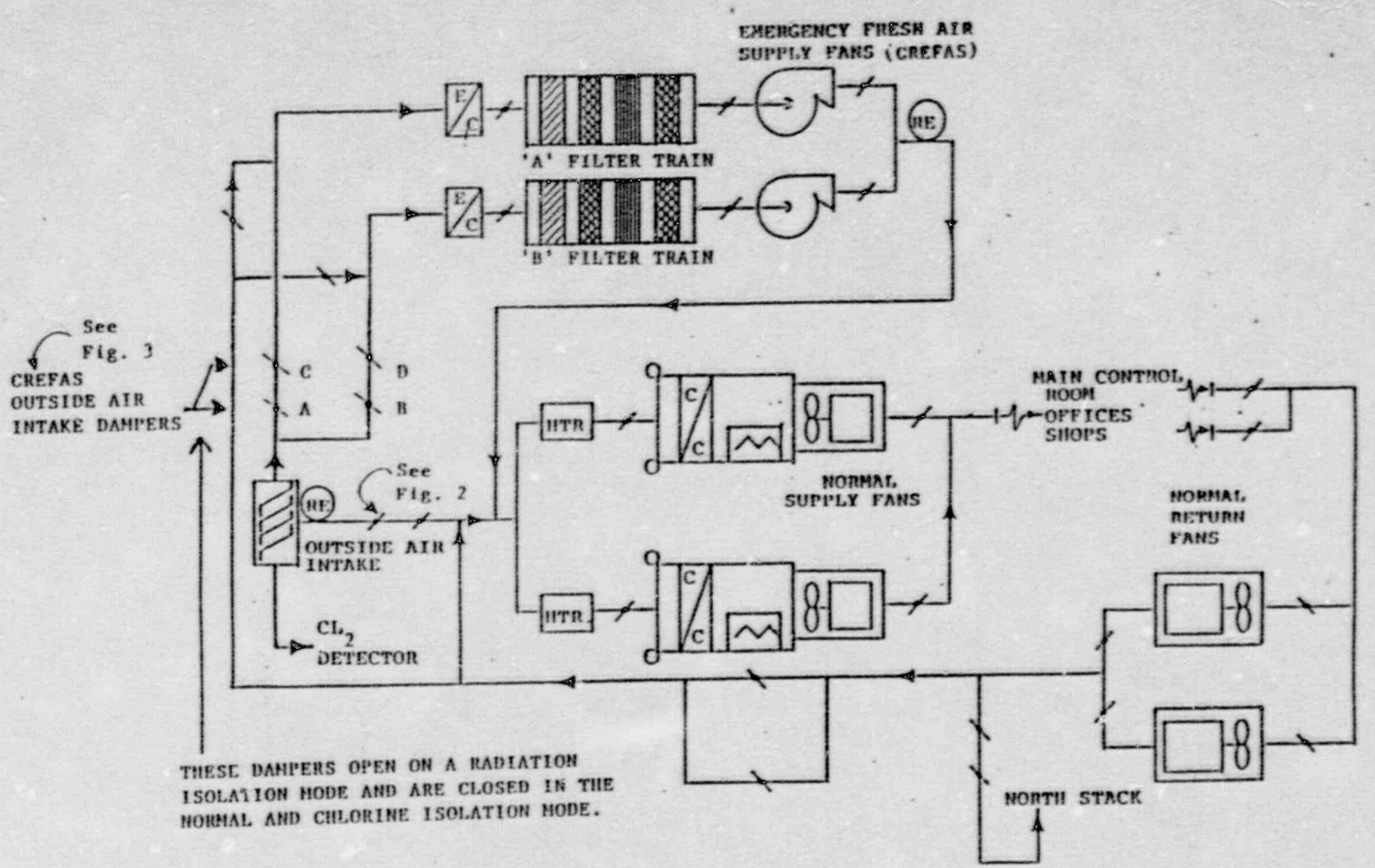
Previous Similar Occurrences:

None

Tracking Codes:

A99 - other personnel error

D2 - Inadequate procedure, did not cover situation



MAIN CONTROL ROOM VENTILATION DIAGRAM

FIGURE 1

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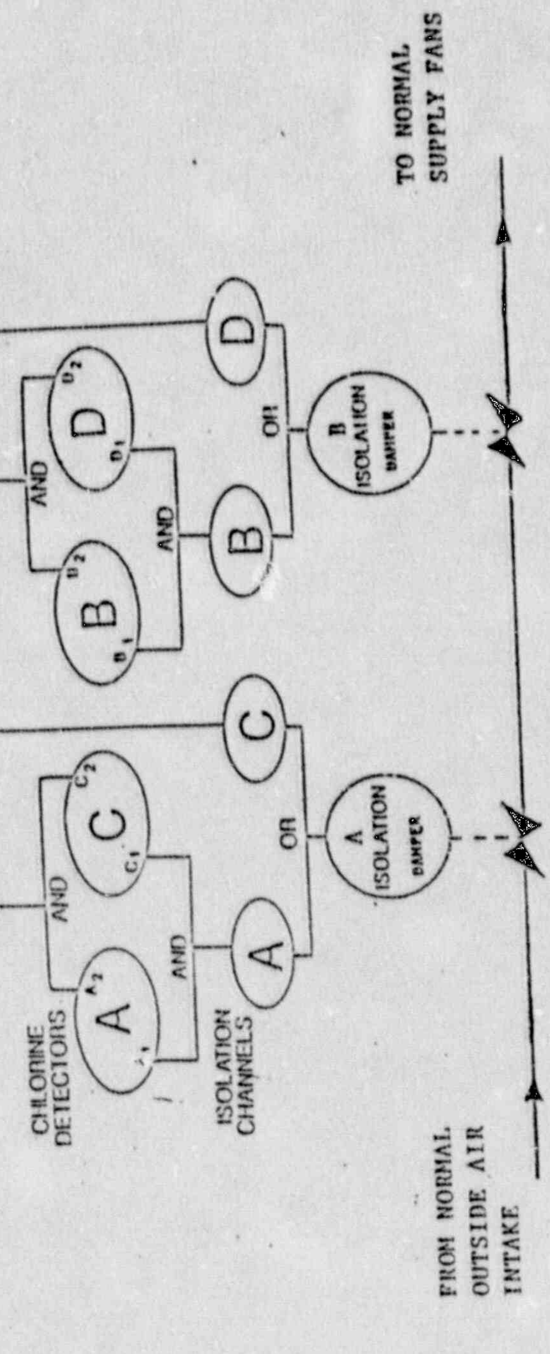

MAIN CONTROL ROOM VENTILATION
NORMAL OUTSIDE AIR INTAKE
ISOLATION DAMPERS

FIGURE 2

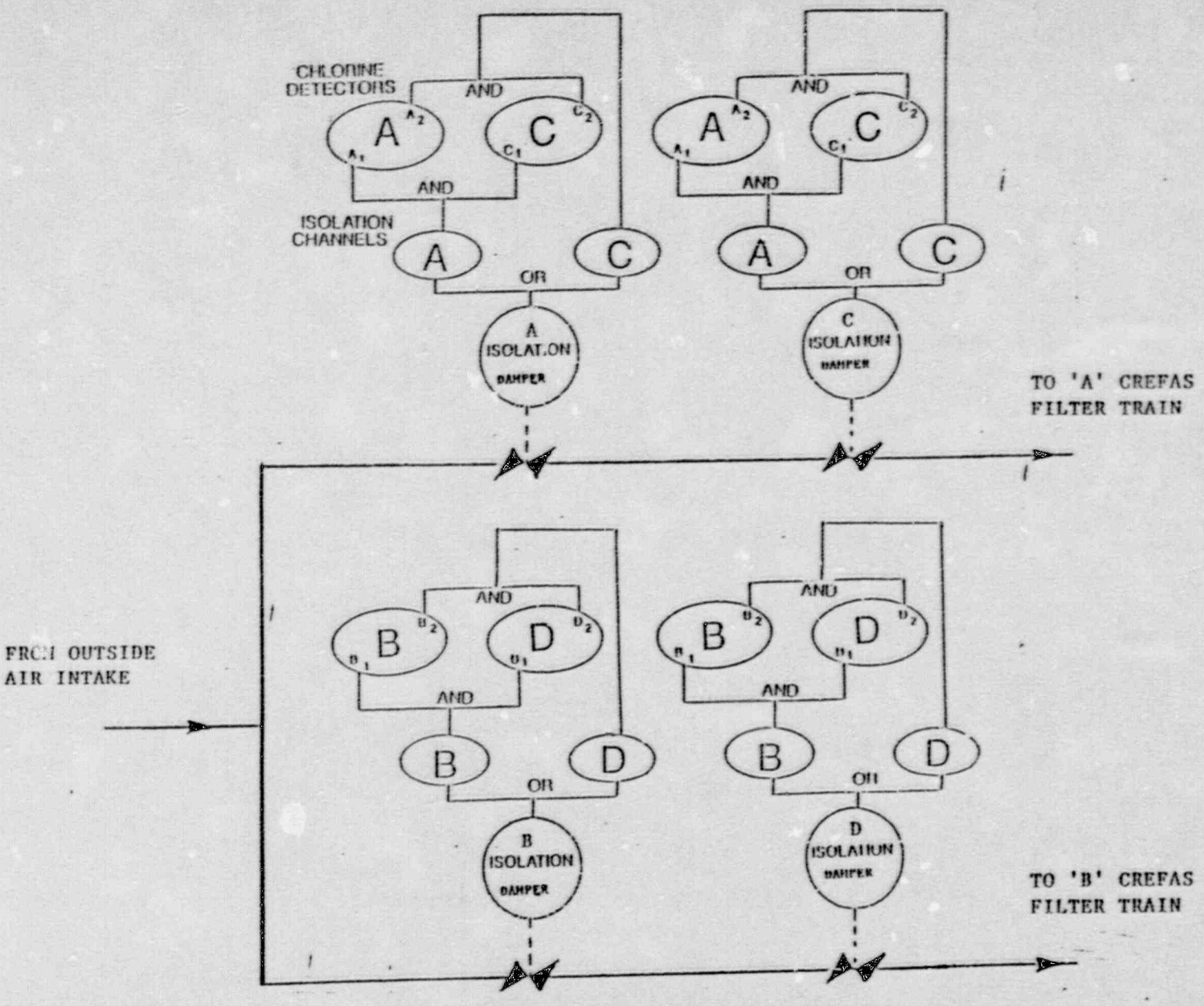
CHLORINE DETECTORS
AND
A
C
ISOLATION CHANNELS
OR
A ISOLATION DAMPER
C ISOLATION DAMPER
TO 'A' CREFAS FILTER TRAIN
FROM OUTSIDE AIR INTAKE
B
D
B ISOLATION DAMPER
D ISOLATION DAMPER
TO 'B' CREFAS FILTER TRAIN
CREFAS OUTSIDE AIR INTAKE DAMPERS

FIGURE 3