ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9205180175 DOC.DATE: 92/05/15 NOTARIZED: NO DOCKET #
FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana M 05000315
50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana M 05000316
AUTH.NAME AUTHOR AFFILIATION
FITZPATRICK,E. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
RECIP.NAME RECIPIENT AFFILIATION
MURLEY,T.E. Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to NRC request for addl info re dose limits applied at facilities for control room operators & analyses submitted per NUREG-0737,Item III.D.3.4.

DISTRIBUTION CODE: A003D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
TITLE: OR/Licensing Submittal: Suppl 1 to NUREG-0737(Generic Ltr 82-33)

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD3-1 LA	1	1	PD3-1 PD	1	1
	STANG,J	2	2			
INTERNAL:	NRR/DLPQ/LHFB11	1	1	OC/LFMB	1	0
	REG FILE 01	1	1	RES/DSIR/EIB	1	1
EXTERNAL:	NRC PDR	1	1	NSIC	1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 10 ENCL 9

RIDS/ADDS

RIDS/ADDS

Indiana Michigan
Power Company
P.O. Box 16631
Columbus, OH 43216

AEP
INDIANA
MICHIGAN
POWER

AEP:NRC:0398W

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
DOSE LIMITS FOR CONTROL ROOM OPERATORS

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

May 15, 1992

Dear Dr. Murley:

The attachment to this letter provides the information requested by your staff regarding dose limits applied at the Donald C. Cook Nuclear Plant for control room operators. The information concerns the analyses submitted pursuant to NUREG-0737 Item III.D.3.4.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,

E. E. Fitzpatrick

E. E. Fitzpatrick
Vice President

dag

Attachment

180006

A003

cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
J. R. Padgett
G. Charnoff
NFEM Section Chief
A. B. Davis - Region III
NRC Resident Inspector - Bridgman

ATTACHMENT 1 TO AEP:NRC:0398W

DOSE LIMITS FOR CONTROL ROOM OPERATORS

AT DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2

1. Background

General Design Criteria (GDC) 19 from 10 CFR 50 Appendix A, which is referenced in the basis for our control room habitability Technical Specification (T/S) 3/4.7.5, requires a control room design such that the whole body dose to control room operators is limited to five rem whole body, or the equivalent to any part of the body, for the duration of an accident. NUREG 0737, Item III.D.3.4, required licensees to submit analyses demonstrating the adequacy of their control room ventilation systems in limiting operator doses to acceptable limits following an accident.

The original Cook Nuclear Plant analyses were submitted in our letter AEP:NRC:0398C, dated February 9, 1981. The analyses demonstrated compliance with the five rem whole body requirement from GDC 19, as well as the 30 rem thyroid and skin dose values determined to be equivalent to five rem whole body in the Standard Review Plan, Chapter 6.4. In 1985 it was discovered that the analyses submitted in the 1981 letter were in error in that they underestimated the amount of filtered air intake required to achieve pressurization, and did not account adequately for sources of unfiltered air in-leakage into the control room. Licensee Event Report 85-007 was submitted in March of 1985 to document the discrepancies. The LER included revised dose calculations that demonstrated compliance with the same limits as the original III.D.3.4 submittal.

In response to NRC concerns with those dose calculations, the analyses were again revised to account for the effects of postulated single failures of non-redundant dampers, and to incorporate a more conservative meteorological model. The most recent Cook Nuclear Plant analyses were submitted in our letter AEP:NRC:03980 (October 11, 1988) with error correction in letter AEP:NRC:0914E (December 29, 1988). The analyses did not determine single values for whole body, skin, and thyroid doses. Rather, a range of doses were calculated as a function of filtered intake and unfiltered in-leakage into the control room ventilation system. The analyses discussed above demonstrated compliance with the five rem whole body limit of GDC 19 over the expected range of filtered intake and unfiltered in-leakage flow rates, including appropriate consideration of single failures. The thyroid and skin doses for the expected range of flows and with consideration of single failures were well within the 50 rem limit for non-stochastic dose taken from the International Commission on Radiological Protection's Publication No. 30. In our letter AEP:NRC:03980, we interpreted 50 rem to the thyroid and skin as satisfying the meaning of "equivalent" to a 5 rem whole body dose from GDC 19.

We have recently been informed by your staff that the NRC believes that we should apply more conservative limits to the thyroid and skin dose. The staff has suggested that both thyroid and skin doses comply with the 30 rem limit of the Standard Review Plan, and has requested that we supply information on how this more conservative interpretation will be implemented for the Cook Nuclear Plant. This information is provided below.

2. Description of Control Room Ventilation System and Discussion of Analyses

Figure 1 is a simplified flow diagram of the control room ventilation system. Figure 1 also shows the layout of the various rooms that are served by the control room ventilation system. These rooms include the control room itself, the HVAC machine room (which houses the various ventilation equipment), and the computer room.

Normal Operation

During normal operation of the control room HVAC system, outdoor air is drawn into the system through the normal intake damper (HV-ACRDA-1). The HVAC system supplies air to the computer room and to the control room. Air from the computer room flows to the machine room through a transfer grill. Air returns to the HVAC system from the control room and the machine room. The emergency intake damper (HV-ACRDA-2) is maintained partially open, in a preset position that limits the intake under radiological conditions to a level consistent with the accident analysis assumptions and the T/S limit on flow through the filter train. The toilet exhaust damper (HV-ACRDA-4) may be open or closed.

Radiological Mode

In the event of a safety injection signal from either unit, the system would automatically be realigned in the recirculation/cleanup mode. In this mode, the normal intake damper and the toilet exhaust damper would automatically close to prevent unfiltered air from being drawn into the system. The emergency recirculation damper (HV-ACRDA-3) is administratively maintained in a preset position that provides a recirculation flow rate consistent with the accident analysis assumptions and the T/S limit on flow through the filter train. If, for some reason, the recirculation damper would be closed, the damper would automatically open to provide recirculation capability. Both of the pressurization fans would automatically start, drawing air through the filter unit. The operator would then turn off one of the redundant fans to ensure that air velocity through the filter unit will provide minimum iodine residence times of approximately

1/4 second. The filter unit includes roughing filters, high efficiency particulate air (HEPA) filters, and charcoal adsorbers enclosed in a filter housing.

In the radiological mode, the system is designed to provide a flow rate through the filter unit of 6000 cfm ± 10% with a single fan running, consistent with the T/S 3/4.7.5.1 requirements. This flow rate is a combination of air recirculated through the recirculation damper and air drawn from the outside through the emergency intake damper. Pressurization of the control room envelope is provided by air drawn by the pressurization fans from outside. The design of the system is such that a minimum 1/16 inch water gauge pressure would be maintained in the control room.

Control Room Dose Analyses

The dose analyses summarized in the letters discussed above do not provide a single dose for the whole body, thyroid, and skin doses. Rather, doses are calculated as a function of filtered intake and unfiltered in-leakage. Filtered intake is that amount drawn by a pressurization fan through the emergency intake damper. Unfiltered in-leakage is a combination of a flow rate penalty that accounts for fluctuations in pressure due to such effects as opening and closing doors, and the leakage past the normal intake damper. The latter of these two values is determined by surveillance testing with the normal intake damper in the closed (post-accident) position. The thyroid dose is due to radioiodines, which are removable by the control room filter unit. The whole body and skin doses are due to noble gases that are not removable by the filter train. Thus, there is no distinction for these doses between filtered and unfiltered flows.

The current calculations are available for audit at the AEPSC offices in Columbus, OH and at the Cook Nuclear Plant.

Single Failure Considerations

The Cook Nuclear Plant control room ventilation system was not designed to meet the single failure criterion. Nevertheless, the impact of postulated single failures on the capability of the system to mitigate doses to control room operators was evaluated. The single failures of concern were those involving the emergency recirculation damper, the toilet damper, and the normal intake damper.

Failure of the recirculation damper in the closed position would limit the flow of air through the filter housing to that provided via the emergency air intake and would limit air cleanup to a single pass. This would significantly reduce the system effectiveness and significantly increase control room doses. To

compensate for this possibility, the recirculation damper is administratively controlled to a preset open position such that it does not have to change position in the event of a radiological accident.

Failure of the toilet damper in the open position would represent a breach in the control room pressure envelope, and have the effect of reducing the positive pressure developed by the pressurization fan. Since the control room would remain at a positive pressure with this damper open, this failure would have a negligible impact on control room dose.

Failure of the normal intake damper to close would result in unfiltered air being drawn into the control room. The flow through the normal intake damper is administratively limited such that it is less than 200 cfm. Thus, failure of this damper to isolate would result in an additional 200 cfm of unfiltered in-leakage being admitted to the control room until such time as the damper can be isolated.

The analyses submitted in the letters discussed above considered both a base case and a case that assumed that isolation of the damper was accomplished within 2 hours after the accident. (The two-hour time frame is consistent with the guidance of Chapter 6.4 of the Standard Review Plan.) Compliance with the GDC 19 limit of 5 rem whole body and our interpretation of a 50 rem thyroid and skin dose limit was satisfied in the analyses even with consideration of the single failure of the normal intake damper.

3. Corrective Measures

The GDC 19 limit of 5 rem whole body is satisfied, per the current analyses, even with consideration of failure of the normal intake damper. However, in order to lower the skin and thyroid doses the operators would receive, we are planning to administratively maintain closed the normal intake damper. This will eliminate the concern for failure of the normal intake damper that was postulated in the analyses as described above. The combination of filtered intake and unfiltered in-leakage will be administratively limited (in plant procedure EHP 4030 STP 229) such that thyroid dose will be limited to 30 rem while still ensuring that the control room is pressurized to the T/S 3/4.7.5.1 requirement of 1/16 inch water gauge. (The impact on skin dose is discussed below.)

4. Evaluation of Safety Significance

With the measures outlined above, the thyroid dose will be limited to 30 rem. With these measures in effect, the corresponding skin dose is approximately 32 rem. Although this is slightly above the Standard Review Plan 30 rem limit, we believe it meets the intent of the NRC's position concerning GDC 19. The amount by which 30 rem is exceeded (7%) is so small that we do not believe further actions are warranted.

With the normal intake damper closed, fresh air will still enter the control room via the normally open emergency intake damper. This air is drawn into the control room due to the normally negative pressure of the auxiliary building drawing air through the control room. Although closing of the normal intake damper will result in a reduction of fresh air brought into the control room through the normal HVAC system, an essentially equivalent amount of air is expected to be drawn through the emergency intake. We note that in conjunction with previous work on the control room ventilation system, the normal intake damper was closed for approximately six months in 1985. Our experience at that time was that the control room remained satisfactory for operator habitation.

5. Date by Which Corrective Measures will be in Effect

Based on data from the current surveillances on the control room ventilation systems for both units, adherence to the 30 rem thyroid dose limit is achieved with the normal intake dampers shut. The normal intake dampers will be shut by May 15. Procedural changes to limit flow acceptance criteria for future surveillances to ensure adherence to the 30 rem thyroid dose limit will be made by August 31, 1992. (As discussed above, this will limit skin dose to approximately 32 rem.)

We are currently in the process of evaluating alternate solutions to the issues raised by your staff. We will contact your staff by August 15, 1992 regarding this matter.

Figure 1 **CONTROL ROOM VENTILATION SYSTEM**