UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

November 12, 1992

NRC INFORMATION NOTICE 92-75: UNPLANNED INTAKES OF AIRBORNE RADIOACTIVE MATERIAL BY INDIVIDUALS AT NUCLEAR POWER PLANTS

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert licensees to unplanned personnel intakes of radioactive materials because of inadequate radiological, engineering, and procedural controls regarding radiologically contaminated materials. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

During two events in 1991 at nuclear reactor facilities, licensee employees received unplanned intakes of radioactive material while performing work in radiologically controlled areas. The following discussions of these events suggest inadequate licensee control in certain areas.

Fitzpatrick

On May 23, 1991, four workers signed a radiation work permit (RWP) to enter the torus room to remove insulation from a section of pipe. One was a health physics technician (HPT) who was to provide continuous job coverage. All were dressed in accordance with the RWP requirements, which included double protective clothing (PC) and a negative pressure (particulate) respirator. The HPT took an air sample just before removing the outer metal casing around the insulation. When the casing was removed, parts of the insulation crumbled into powder and formed a "cloud" of radioactive material in the air. The HPT then surveyed the insulation and obtained a survey meter reading that was much higher than expected, greater than 10 mSv/h (in the R/h range). The HPT promptly ordered the workers to stop work and leave the area. All four of the workers were contaminated, some in the chest area and some on the face. They all had inhaled small amounts of radioactive material. The licensee estimated that the intakes ranged between two and four maximum permissible

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hours (MPC-hrs). An air sample taken in the worker's breathing zone in the torus room while the insulation was being removed showed airborne radioactive concentrations of approximately 97 times MPC.

About 10 minutes after the four workers entered the torus room, two other workers signed the same RWP to erect scaffolding in a room adjoining the torus room. These workers did not wear respirators since the RWP did not require respirators for use in the adjoining room. Consequently, after exiting the area upon completing their work, both workers were found to be contaminated. One was contaminated on the face and the other on the chest. The workers were then decontaminated and sent to obtain a whole body count (WBC). The WBC results for these two workers indicated much higher intakes than any of the members of the first group (approximately 27 MPC-hrs). The airborne radioactive material from the torus room was the source of their intakes; this material entered the room through a gap in a sleeve around a pipe passing between the two rooms. Natural convection between these two areas caused the contaminated air to flow rapidly into the room where the two workers were erecting scaffolding.

During the as low as is reasonably achievable (ALARA) pre-job review meeting that was conducted to discuss the torus room scope of work, the licensee's ALARA group recommended using a high efficiency particulate air (HEPA) filtration system while removing insulation. However, the licensee did not use a HEPA filter system. Use of the HEPA system would have required removing a heavy concrete floor plug to gain access to the torus room. To remove the plug, the licensee needed to use a crane; maintenance personnel were requested to remove the plug, but could not support the job in a timely manner. Therefore, faced with a delay of several hours, the chief HPT and the radiological supervisor (RS) decided to disregard the recommendation from the ALARA group and deleted the HEPA system requirement from the RWP. However, the chief HPT and the RS had not attended the pre-job ALARA briefing, where workers stated that more insulation would need to be removed than originally indicated and that health physics (HP) personnel had not surveyed this additional larger area of insulation. As a result of missing the ALARA briefing, the chief HPT and RS used incomplete information and inadequate pre-job surveys in their decision to delete the HEPA system recommendation.

The decision to remove the insulation without using the HEPA system did not prompt the licensee to reevaluate the adequacy of the respiratory protection required by the RWP. For example, a negative pressure respirator has a maximum protection factor of 50, while a positive pressure (continuous flow) respirator has a maximum protection factor of 2000. Therefore, a positive pressure respirator would have better protected the workers.

The licensee evaluated this event and found inadequate communication between the insulation removers, the ALARA group, and HP personnel, and reached the following conclusions. The scope of work was not communicated adequately to radiation protection personnel. Also, the ALARA group did not adequately consider the information presented by insulation removers regarding the condition of the insulation and the amount of insulation to be removed.

Further, the change in job scope did not prompt the licensee to reevaluate the adequacy of the initial planning and job requirements.

Limerick

On March 25, 1991, a group of maintenance workers entered the reactor cavity to perform general inspections and housekeeping activities in preparation for flooding of the cavity. Access to the transfer canal was roped off and posted with a sign stating "Caution: Do Not Enter." [The transfer canal is a narrow passageway that connects the reactor cavity to the spent fuel pool (SFP) and is used to transfer fuel between the two areas.] The RWP specified "Entry Into The Transfer Canal Prohibited Under This RWP." The reactor cavity had been decontaminated, but the transfer canal had not; personnel conducting the last transfer canal survey had found loose contamination levels of 0.24 mGy/h (24 mrad/h), smearable.

The licensee job leader (JL) and his crew entered the cavity after signing the RWP. They inspected the reactor vessel flange and started general housekeeping activities, including vacuum cleaning of the cavity area. During these activities, the crew found indications of a surface defect in the vessel flange. As a result, the JL summoned assistance from Reactor Services Section (RSS) personnel. The RSS superintendent and another RSS engineer entered the cavity to inspect the flange. After the engineers inspected the flange, the crew removed the service platform and completed its housekeeping. The JL then removed the rope and the "Caution: Do Not Enter" sign at the entrance to the transfer canal. The work crew then removed a "stop log gate," (a large gate installed between the transfer canal and the SFP), at the end of the transfer canal near the SFP. While the gate was being lifted, the JL noted that some sealant material had broken off and fallen on the floor of the transfer canal. Since the vacuum cleaner had been removed from the cavity, the JL asked that a brush and dustpan be sent down.

The JL then entered the transfer canal. Even though he had just removed the rope barrier and sign, the RWP prohibiting such entry was still in effect. Therefore, he was in violation of the RWP. While cleaning the transfer canal, he noticed some damage to the stop log gate guides, and exited the canal to summon the RSS engineers to inspect the guides. The JL then escorted the two engineers into the transfer canal to perform the inspection, again in violation of the RWP.

On leaving the cavity, the JL removed his protective clothing and went to the whole body contamination monitor on the refueling floor to check for contamination. The monitor alarmed, and a later survey indicated contamination around his neck and upper torso. HP personnel escorted the JL to a decontamination facility where extensive decontamination efforts were performed. However, no change in count rate was noted, indicating a possible intake of radioactive material. The licensee final estimate of the intake was less than 50 MPC-hr.

The region held an enforcement conference with the licensee to discuss NRC staff concerns with programmatic weaknesses, including procedure violations, inadequate HP controls, poor communication between the JL and HP, and an inadequate understanding of the hazards that can result from using a dustpan and brush in a highly contaminated area.

Discussion

Section 20.103(b) of Title 10 of the Code of Federal Regulations (10 CFR 20.103), "Exposure of individuals to concentrations of radioactive materials in air in restricted areas," requires the use of process or other engineering controls, to the extent practicable, to limit concentrations of airborne radioactive material. In the Fitzpatrick case, the HEPA filtration system was an available engineering control. When the use of these controls is not practicable, the licensee is required to use other precautionary procedures, such as increased surveillance, limitation of working times, or provision of respiratory protective equipment to limit personnel intakes of radioactive material to as low as is reasonably achievable.

Worker intakes of radioactive material at nuclear power plants are generally far below the limits of 10 CFR Part 20. During normal plant operation, airborne radioactive material is of little concern. However, the events discussed herein demonstrate the need for vigilance in conducting maintenance activities that could significantly increase airborne radioactive material. These examples indicate that some licensees have not adequately implemented certain radiological control requirements. In both of these events, process or other engineering controls, (e.g., HEPA filtration systems, roped-off areas and pre-work ALARA briefings) were available to help control the intake of airborne radioactive material, but were not effectively used.

This information notice requires no specific action or written response. If you have any questions about this matter, please call the technical contact listed below or the appropriate Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contacts: Jack M. Bell, NRR
(301) 504-1083

Daniel R. Carter, NRR
(301) 504-1848

Ronald L. Nimitz, RI
(215) 337-5267

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-74	Power Oscillations at Washington Nuclear Power Unit 2	11/10/92	All holders of OLs or CPs for nuclear power reactors.
92-61, Supp. 1	Loss of High Head Safety Injection	11/06/92	All holders of OLs or CPs for nuclear power reactors.
92-73	Removal of A Fuel Element from A Research Reactor Core While Critical	11-04/92	All holders of OLs or CPs for nuclear power reactors.
92-59, Rev. 1	Horizontally-Installed Motor-Operated Gate Valves	11/04/92	All holders of OLs or CPs for nuclear power reactors.
92-72	Employee Training and Shipper Registration Requirements for Transporting Radioactive Materials	10/28/92	All U.S. Nuclear Regulatory Commission Licensees.
91-64, Supp. 1	Site Area Emergency Resulting from A Loss of Non-Class 1E Uninterruptible Power Supplies	10/07/92	All holders of OLs or CPs for nuclear power reactors.
92-71	Partial Plugging of Suppression Pool Strainers At A Foreign BWR	09/30/92	All holders of OLs or CPs for nuclear power reactors.
92-70	Westinghouse Motor-Operated Valve Performance Data Supplied to Nuclear Power Plant Licensees	09/25/92	All holders of OLs or CPs for nuclear power reactors.
92-69	Water Leakage from Yard Area Through Conduits Into Buildings	09/22/92	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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Discussion

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Original signed by
Brian K. Grimes

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Office of Nuclear Reactor Regulation

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Attachment: List of Recently Issued NRC Information Notices
DOCUMENT NAME: 92-75.IN

*SEE PREVIOUS CONCURRENCE.

OFC	PRPB:DREP	SC:PREP:DREP	TECHED	BC:PRPB:DREP	D:DREP/NRR
NAME	DCarter	JWigginton	JMain	LCunningham	FCongel
DATE	8/25/92*	8/25/92*	8/30/92*	8/25/92*	8/27/92*

OFC	BC:OGCB:DORS	D:DORS	OGCB:DORS
NAME	GHMarcus	BKGrimes	JPetrosino
	10/16/92*	11/6/92	10/14/92*

92-99

Discussion

Section 20.103(b) of Title 10 of the Code of Federal Regulations (10 CFR 20.103), "Exposure of individuals to concentrations of radioactive materials in air in restricted areas," requires the use of process or other engineering controls, to the extent practicable, to limit concentrations of airborne radioactive material. In the Fitzpatrick case, the HEPA filtration system was an available engineering control. When the use of these controls is not practicable, the licensee is required to use other precautionary procedures, such as increased surveillance, limitation of working times, or provision of respiratory protective equipment to limit personnel intakes of radioactive material to as low as is reasonably achievable.

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DOCUMENT NAME: AIRRADIO.IN

*SEE PREVIOUS CONCURRENCE.

OFC	PRPB:DREP	SC:PREP:DREP	TECHED	BC:PRPB:DREP	D:DREP/NRR
NAME	DCarter	JWigginton	JMain	LCunningham	FCongel
DATE	8/25/92*	8/25/92*	9/30/92*	8/25/92*	8/27/92*

OFC	BC:OGCB:DORS	DIR:DORS	OGCB:DORS
NAME	GHMarcus	BKGrimes	JPetrosino
DATE	10/16/92*	10/ /92	10/14/92*

Discussion

Section 20.103(b)(1) of Title 10 of the Code of Federal Regulations (10 CFR 20.103), "Exposure of individuals to concentrations of radioactive materials in air in restricted areas," requires, the use of process or other engineering controls to the extent practicable,to limit airborne radioactivity. When the use of these controls is not practicable, the licensee is required to use other precautionary procedures, such as increased surveillance, limitation of working times, or provision of respiratory protective equipment to limit personnel intakes of radioactive material to as low as is reasonably achievable.

Worker intakes of radioactive material at nuclear power plants are generally below the limits of 10 CFR Part 20 by several orders of magnitude. During normal plant operation, occupational airborne hazards are normally of little concern. However, the events discussed above demonstrate the need for increased vigilance in conducting maintenance activities that could significantly increase the amount of airborne radioactive material. These examples suggest that some licensees are not adequately implementing their own radiological control requirements. In both of these events, process or other engineering controls, (e.g., HEPA filtration systems, roped-off areas and pre-work ALARA briefings) were available or in place to help control the intake of airborne radioactive material, but were not adequately utilized.

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NAME	DCarter	JWigginton	JMain	LCunningham	FCongel
DATE	8/25/92*	8/25/92*	9/30/92*	8/25/92*	8/27/92*

OFC	BC:OGCB:DORS	DIR:DORS	OGCB:DORS
NAME	GHMarcus GHM	BKGrimes	JPetrosino
DATE	10/16/92	10/ /92	10/14/92*

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OFC	PRPB:DREP	SC:PREP:DREP	TECHED	BC:PRPB:DREP	D:DREP/NRR
NAME	DCarter	JWigginton	JMain	LCunningham	FCongel
DATE	8/25/92*	8/25/92*	9/30/92*	8/25/92*	8/27/92*

OFC	BC:OGCB:DORS	DIR:DORS	OGCB:DORS
NAME	GHMarcus	BKGrimes	JPetrosino
DATE	10/ /92	10/ /92	10/07/92*

Discussion

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Office of Nuclear Reactor Regulation

Technical contacts: Jack M. Bell, NRR
(301) 504-1083

Daniel R. Carter, NRR
(301) 504-1848

Ronald L. Nimitz, RI
(215) 337-5267

DOCUMENT NAME: AIRRADIO.IN

*SEE PREVIOUS CONCURRENCE.

OFC	PRPB:DREP	SC:PREB:DREP	TECHED	BC:PRPB:DREP	D:DREP/NRR
NAME	DCarter	JWigginton	JMain	LCunningham	FCongel
DATE	~~8/25/92*~~ 10/7/92	~~8/25/92*~~ 10/7/92	9/30/92*	8/25/92*	8/27/92*

OFC	BC:OGCB:DORS	DIR:DORS	OGCB:DORS
NAME	GHMarcus	BKGrimes	JPetrosino
DATE	10/ /92	10/ /92	10/7/92

interim

This information notice requires no specific action or written response. If you have any questions about this matter, please contact the technical contact listed below, one of the Board representatives listed on the attachments, or the appropriate Nuclear Reactor Regulation (NRR) project manager.

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical contact: Daniel R. Carter, NRR
(301) 504-1848

Jack M. Bell, NRR
(301) 504-1083

Ronald L. Nimitz, RI
(215) 337-5267

Attachment: List of Recently Issued NRC Information Notices

DOCUMENT NAME: 92-68.IN

*SEE PREVIOUS CONCURRENCE.

OFC	PRPB:DREP	SC:PREP:DREP	TECHED	BC:PRPB:DREP	D:DREP/NRR
NAME	DCarter	JWigginton	Jmain	LCunningham	FCongel
DATE	8/ /92*	8/ /92*	8/30/92*	8/25/92*	8/27/92*

OFC	BC:OGCB:DOEA	DIR:DOEA	OGCB
NAME	GHMarcus	CERossi	JPetrosino
DATE	9/ /92	9/ /92	9/ /92

AUG 27 1992

MEMORANDUM FOR: Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

FROM: Frank J. Congel, Director
Division of Radiation Protection
and Emergency Preparedness
Office of Nuclear Reactor Regulation

SUBJECT: REQUEST FOR ISSUANCE OF INFORMATION NOTICE 92-XX, "UNPLANNED INTAKES OF AIRBORNE RADIOACTIVE MATERIAL AT NUCLEAR POWER PLANTS"

Enclosed is the subject draft information notice (IN), describing personnel intakes of radioactive materials as a result of inadequate radiological controls associated with working with contaminated materials. This draft IN has benefitted from the review, comment, and support of all Regions.

Please issue this IN to emphasize the importance of using proper radiological, engineering, and procedural controls. To obtain additional information, please contact Dan Carter at 504-1848.

Original signed by Frank J. Congel

Frank J. Congel, Director
Division of Radiation Protection
and Emergency Preparedness
Office of Nuclear Reactor Regulation

Enclosure: Draft Information Notice
Disk containing draft IN

DISTRIBUTION:

GMarcus, 8D22	FCongel	JCunningham
JWigginton	DCarter	JBell
RNimitz, RI	PRPB R/F	Central File
TEssig		

OFC	PRPB:NRR	PRPB:NRR:SC	ADM	PRPB:NRR:BC	DREP:NRR:D
NAME	*DCARTER	*JWIGGINTON	*JMAIN	LCUNNINGHAM	FCONGEL
DATE	08/ /92	08/ /92	08/ /92	08/25/92	08/27/92

*See Previous Concurrence
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