UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D.C. 20555-0001

October 5, 2000

NRC INFORMATION NOTICE 2000-16: POTENTIAL HAZARDS DUE TO VOLATILIZATION OF RADIONUCLIDES

Addressees:

All U.S. Nuclear Regulatory Commission (NRC) licensees that process unsealed byproduct material.

Purpose:

NRC is issuing this information notice (IN) to alert addressees to the potential hazards associated with the volatilization of radiochemicals and/or radiopharmaceuticals if containment is breached during chemical or physical processing.

The incident described below involves the volatilization of technetium-99m (Tc-99m) during the manufacture of a cardiac imaging agent in a radiopharmacy. However, licensees should be aware of the potential hazards posed by the volatilization of other radionuclides under similar conditions and ensure that their emergency procedures adequately address those hazards.

It is expected that recipients will review this information for applicability to their operations and consider actions, as appropriate. However, suggestions contained in this information notice are not new NRC requirements; therefore, no specific action nor written response is required.

Background:

IN 95-07, issued on January 27, 1995, described the potential for cracking vials and significant contamination when medical and radiopharmacy licensees heat vials of Cardiolite, a cardiac imaging agent, as part of the process to label the pharmaceutical with Tc-99m. The IN described incidents in which vials cracked during the heating phase of the tagging process of Cardiolite, and the subsequent volatilization of the Tc-99m which resulted in significant facility contamination.

Description of Circumstances:

In August of 1999, NRC conducted a special inspection to review the circumstances of a similar accident at a radiopharmacy. The incident occurred while the licensee was using a heating block to process 35 gigabecquerels (950 millicuries) of Tc-99m in 1.3 milliliters of Cardiolite solution. The vial ruptured, and the heat from the block caused the liquid to volatilize, spreading contamination in the laboratory as well as to unrestricted areas throughout the pharmacy.

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The licensee's employees did not immediately recognize the volatilization induced spread of the contamination, and continued to work in the laboratory. They did not follow their emergency procedure, which required evacuation of the laboratory in case of a major spill [defined as a spill involving more than 3.7 gigabecquerels (100 millicuries) of Tc-99m]. In addition, the ventilation system was not shut down, causing circulation of Tc-99m throughout the pharmacy.

The incident resulted in the contamination of pharmacy staff, as well as packages prepared for shipment to pharmacy customers. Some of the packages were shipped to customers with levels of removable contamination that exceeded regulatory limits. The incident did not result in significant external or internal dose to pharmacy staff.

Discussion:

Volatilization of radiochemicals or radiopharmaceuticals can create an airborne hazard, potentially resulting in internal doses to workers and spread of contamination to unrestricted areas through ventilation systems.

Licensees should review their procedures for handling radioactive materials to identify processes that could cause volatilization. In addition to direct heating, as in the example above, exothermic chemical reactions and changes in pH can result in volatilization of some materials. Some organic compounds may volatilize at room temperature if stored in open containers.

Licensees should ensure that their emergency procedures adequately address this scenario if they handle or process radioactive materials in a manner that could cause volatilization. The emergency procedures should include, at a minimum, instructions to immediately evacuate and secure the affected areas. Licensees should also assess their ventilation systems and determine whether emergency procedures are appropriate to prevent circulation of radioactive contamination to other areas within the facility. Licensees may also consider performing heating procedures or potential volatile processes in a laboratory hood with independent ventilation.

This information notice requires no specific action nor written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate regional office.

/RA/
Donald A. Cool, Director
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards

Technical Contact: Kevin G. Null, Region III
630-829-9854
E-mail: kgn@nrc.gov

Attachments:
1. List of Recently issued NMSS Information Notices
2. List of Recently Issued NRC Information Notices

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OFFICE	RIII		RIII		NMSS	
NAME	Null:mb*		Pederson*		Cool:jh for cool*	
DATE	09/27/2000		09/ 27 /2000		10/ 02 /2000	

LIST OF RECENTLY ISSUED
NMSS INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2000-15	Recent Events Resulting in Whole Body Exposures Exceeding Regulatory Limits	9/29/2000	All radiography licensees
2000-12	Potential Degradation of Firefighter Primary Protective Garments	9/21/2000	All holders of licenses for nuclear power, research, and test reactors and fuel cycle facilities
2000-11	Licensee Responsibility for Quality Assurance Oversight of Contractor Activities Regarding Fabrication and Use of Spent Fuel Storage Cask Systems	8/7/2000	All U.S. NRC 10 CFR Part 50 and Part 72 licensees, and Part 72 Certificate of Compliance holders
2000-10	Recent Events Resulting in Extremity Exposures Exceeding Regulatory Limits	7/18/2000	All material licensees who prepare or use unsealed radioactive materials, radio-pharmaceuticals, or sealed sources for medical use or for research and development
2000-07	National Institute for Occupational Safety and Health Respirator User Notice: Special Precautions for Using Certain Self-Contained Breathing Apparatus Air Cylinders	4/10/2000	All holders of operating licenses for nuclear power reactors, non-power reactors, and all fuel cycle and material licensees required to have an NRC approved emergency plan
2000-05	Recent Medical Misadministrations Resulting from Inattention to Detail	3/06/2000	All medical licensees
2000-04	1999 Enforcement Sanctions for Deliberate Violations of NRC Employee Protection Requirements	2/25/2000	All U.S. Nuclear Regulatory Commission licensees
2000-03	High-Efficiency Particulate Air Filter Exceeds Mass Limit Before Reaching Expected Differential Pressure	2/22/2000	All NRC licensed fuel-cycled conversion, enrichment, and fabrication facilities

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2000-15	Recent Events Resulting in Whole Body Exposures Exceeding Regulatory Limits	9/29/2000	All radiography licensees
2000-14	Non-Vital Bus Fault Leads to Fire and Loss of Offsite Power	9/27/2000	All holders of OL for nuclear power reactors
2000-13	Review of Refueling Outage Risk	9/27/2000	All holders of OL for nuclear power reactors
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95-03, Supp 2	Loss of Reactor Coolant Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition	7/03/2000	All holders of OL for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the reactor vessel
2000-09	Steam Generator Tube Failure at Indian Point Unit 2	6/28/2000	All holders of OL for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently

OL = Operating License
CP = Construction Permit

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