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

January 27, 1995

NRC INFORMATION NOTICE NO. 95-07: RADIOPHARMACEUTICAL VIAL BREAKAGE DURING PREPARATION

Addressees

All U.S. Nuclear Regulatory Commission medical licensees authorized to use byproduct material for diagnostic procedures.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a potential problem that can occur when heating radiopharmaceuticals.

Although the incidents we describe involve the preparation and subsequent cracking of Cardiolite® (Kit for the Preparation of Technetium-99m (Tc-99m) Sestamibi) vials, the potential for cracking and significant contamination exists whenever vials containing radioactive material are heated.

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

Description of Circumstances

NRC was recently notified of 20 separate incidents in which a Cardiolite® vial had cracked during the heating process. The events occurred between November 3 and January 11, 1995, and included vials from three lots: 3593M, 3594M, and 3595M. Eighteen of the vials that fractured came from lot No. 3594M (Kit lot 3594MK).

Contamination occurred when the contents of the cracked vial either leaked into the boiling water or came in contact with the hot heating block. In each case, the Tc-99m labeled Cardiolite® became airborne as steam. The level of radioactive contamination at each of the facilities varied depending on the activity in the vial, the preparation site, and emergency procedures employed.

®Trademark of The DuPont Merck Pharmaceutical Company,
331 Treble Cove Rd., N. Billerica, MA 01862,
Telephone: (508) 667-9531

Updated on 2/6/95 LOR11C

D103

The maximum personnel exposure reported, a total effective dose equivalent (TEDE) of 80 millirem, occurred at a facility that prepared the Cardiolite® on an open bench, rather than in a fume hood.

In a letter to Cardiolite® customers dated December 15, 1994, the Dupont Merck Pharmaceutical Company offered to replace any unused vials of Cardiolite® lot No. 3594M with vials from another lot.

Discussion

Two different methods were used to heat the Cardiolite® vials. The manufacturer's recommended method involved immersion of the vial in a boiling water bath for a specified time. The other method involved the use of a "heating block" (i.e., a block of heated lead containing wells into which the vial is placed and heated). Although the manufacturer has stated that it believes that the breakage may be related to the combined effects of low incidents of vial abrasion and a particularly stressful means of heating, it has not been unequivocally verified that these are the causes of the vials' cracking. Additionally, the volume of liquid within the 5 milliliter (ml) vials varied from less than the 3 ml maximum recommended by the manufacturer to 4.6 ml. However, it should be noted that each of the affected licensees had prepared many other Cardiolite® vials in the same way, using the same heating process and vial volume, with no problems. Therefore, the root cause for the vial breakage remains unknown. However, the manufacturer plans to continue its investigation which may lead to further information in the future.

In the cases described above, the licensees responded promptly, and thereby avoided overexposing personnel and spreading contamination. Licensees who prepare radiopharmaceuticals that may volatilize (e.g., such as by heating) should be aware of the possibility of vials cracking or breaking. Consequently, licensees are reminded of the importance of having emergency procedures to respond to unforeseen exposure events, and to ensure that all supervised individuals are trained in the procedures. Licensees may wish to review their procedures to ensure that they include controls and actions to address unexpected airborne activity when radiopharmaceuticals are heated.

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

Carl J. Paperiello

Carl J. Paperiello, Director
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards

Technical contact: Sally L. Merchant, NMSS
(301) 415-7874

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

Attachment filed in Jacket

LIST OF RECENTLY ISSUED NMSS INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
95-01	DOT Safety Advisory: High Pressure Aluminum Seamless and Aluminum Composite Hoop-Wrapped Cylinders	01/04/95	All U.S. Nuclear Regulatory Commission licensees.
94-89	Equipment Failures at Irradiator Facilities	12/28/94	All U.S. Nuclear Regulatory Commission irradiator licensees.
89-25, Rev. 1	Unauthorized Transfer of Ownership or Control of Licensed Activities	12/07/94	All fuel cycle and material licensees.
94-81	Accuracy of Bioassay and Environmental Sampling Results	11/25/94	All U.S. Nuclear Regulatory Commission licensees.
93-60, Supp. 1	Reporting Fuel Cycle and Materials Events to the NRC Operations Center	10/20/94	All 10 CFR Part 70 fuel cycle licensees.
94-74	Facility Management Responsibilities for Purchased or Contracted Services for Radiation Therapy Programs	10/13/94	All U.S. Nuclear Regulatory Commission Medical Licensees.
94-73	Clarification of Criticality Reporting Criteria	10/12/94	All fuel fabrication facilities.
94-70	Issues Associated with Use of Strontium-89 and Other Beta Emitting Radiopharmaceuticals	09/29/94	All U.S. Nuclear Regulatory Commission Medical Licensees.

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
95-06	Potential Blockage of Safety-Related Strainers by Material Brought Inside Containment	01/25/95	All holders of OLs or CPs for nuclear power reactors.
95-05	Undervoltage Protection Relay Settings Out of Tolerance Due to Test Equipment Harmonics	01/20/95	All holders of Construction Permits for nuclear power reactors.
95-04	Excessive Cooldown and Depressurization of the Reactor Coolant System Following a Loss of Offsite Power	01/19/95	All holders of OLs or CPs for nuclear power reactors.
95-03	Loss of Reactor Coolant Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition	01/18/95	All holders of Ols or CPs for nuclear power reactors.
95-02	Problems with General Electric CR2940 Contact Blocks in Medium-Voltage Circuit Breakers	01/17/95	All holders of OLs or CPs for nuclear power reactors.
95-01	DOT Safety Advisory: High Pressure Aluminum Seamless and Aluminum Composite Hoop-Wrapped Cylinders	01/04/95	All U.S. Nuclear Regulatory Commission licensees.
94-90	Transient Resulting in a Reactor Trip and Multiple Safety Injection System Actuations at Salem	12/30/94	All holders of OLs or CPs for nuclear power reactors.
94-89	Equipment Failures at Irradiator Facilities	12/28/94	All U.S. Nuclear Regulatory Commission irradiator licensees.

OL = Operating License
CP = Construction Permit

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OFC	IMAB	IMAB*	IMAB*	Tech Ed*	IMOB *
NAME	SLMerchant	LWCamper	MVFederline	EKraus	FCCombs
DATE	01/13/95	01/ /95	01/13/95	12/28/94	01/05/95

OFC	DD/IMNS	D/IMNS	OGC
NAME	WBrach	CPaperiello	STreby
DATE	01/09/95	01/24/95	01/17/95

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Contamination occurred when the contents of the cracked vial either leaked into the boiling water or came in contact with the hot heating block. In each case, the Tc-99m labeled Cardiolite® became airborne as steam. The level of radioactive contamination, at each of the facilities, varied depending on the activity in the vial, the preparation site, and emergency procedures employed. The maximum personnel exposure reported, a total effective dose equivalent (TEDE) of 80 millirem, occurred at a facility that prepared the Cardiolite® on an open bench, rather than in a fume hood.

Discussion:

In the cases described above, the licensees responded promptly, and thereby avoided overexposing personnel and spreading contamination. Licensees who prepare radiopharmaceuticals that may volatilize (e.g., such as by heating) should be aware of the possibility of vials cracking or breaking. Consequently, licensees are reminded of the importance of developing an adequate emergency plan to respond to unforeseen exposure events and to ensure that all supervised individuals have received instruction in the plan.

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OFC	IMAB	E	IMAB	E	IMAB		Tech Ed		IMOB	
NAME	SLMerchant		LWCamper		MVFederline		EKraus		FCCombs	
DATE	12/3/94		12/3/94		12/3/94		12/28/94		/ /94	

OFC	DD/IMNS		D/IMNS					
NAME	WBrach		CPaperiello					
DATE	/ /		/ /					

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this level of filling of the vials because each of the affected licensees had prepared many other Cardiolite® vials in the same way and the vials have a 5 ml capacity. Therefore, the root cause for the vial breakage remains unknown. However, the manufacturer plans to continue their investigation which may lead to further information in the future.

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DATE	01/9/95	12/13/94	01/03/94	12/28/94	01/05/95

OFC	DD/IMNS	D/IMNS			
NAME	WBeach	CPaperiello			
DATE	01/11/95	01/9/95			

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NAME	SLMerchant slm		LWCamper		MVFederline		EKraus		FCCombs	
DATE	01/5/95		12/13/94		01/03/94		12/28/94		01/5/95	

OFC	DD/IMNS		D/IMNS					
NAME	WBrach		CPaperiello					
DATE	01/ /95		01/ /95					

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