

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

December 31, 1997

**NRC INFORMATION NOTICE 97-91: RECENT FAILURES OF CONTROL CABLES USED ON  
AMERSHAM MODEL 660 POSILOCK RADIOGRAPHY  
SYSTEMS**

Addressees

All industrial radiography licensees.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to potential failures of control (drive) cables used on Amersham Model 660 Posilock radiography systems. It is expected that recipients will review this information for applicability to their radiographic equipment and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action nor written response is required.

Description of Circumstances

Recently, NRC became aware of several instances where the control cables used on Amersham Model 660 Posilock radiography systems became disconnected from the source assemblies. In each instance, the control cable broke at the male end of the control cable, and emergency procedures were implemented to return the source to the fully shielded and secured position. Three recent cases are described below:

Case 1: On November 16, 1997, a licensee was performing routine radiographic operations at a temporary job site. At the completion of the ninth radiographic exposure, the radiographer attempted to retract the source assembly into the radiography camera, using the remote drive assembly. The radiographer observed that his survey meter reading did not change as expected as the control cable was being retracted. Furthermore, the radiographer noted that the self-locking mechanism on the radiography camera had not actuated. The radiographer operated the remote drive assembly again, but did not succeed in returning the source assembly to the fully shielded and secured position. The radiographer and his assistant then implemented emergency procedures, maintained control of the area, and contacted their radiation safety officer (RSO). The RSO responded to the temporary job site and successfully recovered the source assembly, placing it into an Amersham 650L source changer. The licensee then reported the source disconnect to the NRC Operations Center. The licensee also submitted a 30-day report to the NRC.

9712310254

updated on  
1/27/98

PDR I+E NOTICE 97-091 971231

DFD 1/1



ID#R - 1/c

Case 2: On December 8, 1997, this same licensee reported another source disconnect, also at a temporary job site, where the control cable failed in the same manner. In this instance, an Amersham representative retrieved the disconnected source assembly. The licensee reported the source assembly disconnect on the same day of the event. In addition to these two source disconnects, this licensee reported to NRC that it had two previous source assembly disconnects on Amersham Model 660 Posilock radiography systems, both having similar failures of the control cable. These disconnects occurred in 1995 and 1996.

Case 3: On November 21, 1997, another licensee was performing routine radiographic operations at a temporary job site. The radiographers noted that the source assembly had not retracted to the fully shielded and secured position, implemented emergency procedures, and notified their RSO. The RSO and a former RSO responded to the temporary job site and successfully recovered the source assembly, returning it to the radiography camera. The control cable failed in a similar manner to the previous two cases. Normal operations were resumed using another control cable. The licensee did not report the source disconnect to the NRC Operations Center within the 24-hour timeframe, as required by 10 CFR 30.50(b)(2), but did submit a 30-day report.

#### Discussion

In all the cited cases, the control cable failed at a point approximately 0.33 - 1.25 centimeter (0.125 - 0.5 inch) behind the male connector. The failed equipment from each instance has been returned to the manufacturer for failure analysis. A metallurgical analysis has been completed on two of the control cables with the results indicating failure from fatigue and failure due to corrosion and/or fatigue. The cause of the remaining failures is still under investigation by the manufacturer. Due to these failures, it is recommended that the control cable be carefully checked before each day's use and during the quarterly maintenance checks, as required by 10 CFR 34.31(a) and (b), for indications of corrosion, metal fatigue, or other early indications of cable failure. It is important to note that these control cables can be purchased off-the-shelf and may be used on radiography systems manufactured by various companies, and, therefore, these failures may not be limited to control cables used on Amersham Model 660 Posilock radiography systems.

Each of the source disconnects discussed above required the radiographers to implement emergency procedures to return the source assembly to the fully shielded and secured position. Implementation of emergency procedures is crucial to successful source assembly retrieval as well as to ensuring that exposure of radiographers and members of the public remain as low as is reasonably achievable. In all three cases, after identifying that the source assembly had become disconnected from the control cable, the radiographers adequately secured and controlled the area surrounding the disconnected source assemblies. In addition, the exposures to the individuals involved in the source assembly retrievals were well within regulatory limits. Therefore, it is important to implement and adhere to emergency procedures when source assembly disconnects are identified.

A source assembly disconnect on the Amersham Model 660 radiography system can be identified by two methods. First, upon completion of retracting the control cable, the self-locking mechanism should engage, revealing a green dot. This can be identified by observing the indicator (lock slide) on the locking mechanism. Failure of the self-locking mechanism to engage would cause the red dot to remain visible on the lock slide, thus indicating the source was not secured in the fully shielded position, although not necessarily indicating a source assembly disconnect. Second, when the survey to verify that the source assembly has been returned to its shielded position is performed after each radiographic exposure, as required by 10 CFR 34.49(b), typical dose rates around the radiography camera and the guide tube should be observed. However, if the dose rates observed are not typical for a fully shielded source assembly (e.g., the dose rates may be lower if the source assembly remained in the collimator or the dose rates may be higher if the source assembly is located within the guide tube), then the situation should be further investigated. Therefore, it is important to use the survey meter and to pay careful attention to its readings and the self-locking mechanism indicator to identify circumstances that are not normal.

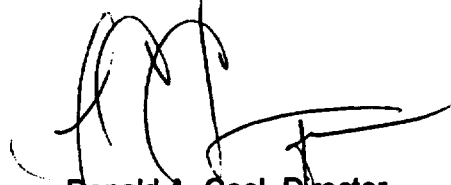
In cases of unintentional disconnection of the source assembly from the control cable or the inability to retract the source assembly to its fully shielded and secured position, licensees must notify NRC within 24 hours, pursuant to the regulations in 10 CFR 30.50(b)(2). The notification must be made to the NRC Operations Center. In addition to making a notification within 24 hours, the licensee must also submit a written report to NRC within 30 days, as required by 10 CFR 30.50(c)(2) and 10 CFR 34.101(a). One report can satisfy both of these requirements, but it must include: (1) a description of the equipment problem; (2) cause of each incident, if known; (3) manufacturer and model number of equipment involved in the incident; (4) place, time, and date of the incident; (5) actions taken to establish normal operations; (6) corrective actions taken or planned to prevent recurrence; and (7) qualifications of personnel involved in the incident [10 CFR 34.101(b)]. Additional information on reporting requirements for industrial radiography licensees can be found in Information Notice 96-04, "Incident Reporting Requirements for Radiography Licensees."

Reporting such problems to NRC is important because it provides the opportunity for NRC to verify that the material has been properly secured and has not been released into the public domain. If notified early, NRC can help ensure that all necessary regulatory actions are completed. In addition, NRC reviews this information to determine if trends or generic safety issues exist that have the potential to cause a significant safety hazard. If a generic safety issue is identified, those licensees that may be affected will be notified and informed of the proper actions to reduce or eliminate similar incidents in the future and to protect the health and safety of both the occupational workers and the public. It is important to point out that these failures have not been identified as a generic safety issue at this point in time, but that the recommendations provided in this information notice should be considered by those licensees who use Amersham Model 660 Posilock radiography systems.

The Commonwealth of Massachusetts (hereafter, Commonwealth) has been informed of all the cases discussed above and is working with Amersham on the determination of whether these

failed control cables represent a generic safety issue. NRC will coordinate with the Commonwealth to determine if any actions are necessary, based on the findings from the failure analyses being performed by Amersham.

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.



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

Technical contact: Larry W. Camper, NMSS  
301-415-7231  
E-mail: [lwc@nrc.gov](mailto:lwc@nrc.gov)

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
97-89	Distribution of Sources and Devices Without Authorization	12/29/97	All sealed source and device manufacturers and distributors
97-87	Second Retrofit to Industrial Nuclear Company IR100 Radiography Camera, to Correct Inconsistency in 10 CFR Part 34 Compatibility	12/12/97	All industrial radiography licensees
97-86	Additional Controls for Transport of the Amersham Model No. 660 Series Radiographic Exposure Devices	12/12/97	Registered users of the Model No. 660 series packages, and Nuclear Regulatory Commission industrial radiography licensees
97-75	Enforcement Sanctions Issued as a Result of Deliberate Violations of NRC Requirements	09/24/97	All U.S. Nuclear Regulatory Commission licensees
97-72	Potential for Failure of the Omega Series Sprinkler Heads	09/22/97	All holders of OLs or CPs for nuclear power reactors and fuel cycle facilities
97-65	Failures of High-Dose-Rate Remote Afterloading Device Source Guide Tubes, Catheters, and Applicators	08/15/97	All high-dose-rate remote afterloader licensees
97-64	Potential Problems Associated with Loss of Electrical Power in Certain Teletherapy Units	08/13/97	All U.S. Nuclear Regulatory Commission medical teletherapy licensees
97-61	U.S. Department of Health and Human Services Letter, to Medical Device Manufacturers, on the Year 2000 Problem	08/06/97	All U.S. Nuclear Regulatory Commission medical licensees, veterinarians, and manufacturers/distributors of medical devices

**LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES**

<b>Information Notice No.</b>	<b>Subject</b>	<b>Date of Issuance</b>	<b>Issued to</b>
97-90	Use of Nonconservative Acceptance Criteria in Safety-Related Pump Surveillance Tests	12/30/97	All holders of OLs for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the vessel
97-89	Distribution of Sources and Devices Without Authorization	12/29/97	All sealed source and device manufacturers and distributors
97-88	Experiences During Recent Steam Generator Inspections	12/16/97	All holders of OLs for pressurized- water reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor
97-87	Second Retrofit to Industrial Nuclear Company IR 100 Radiography Camera, to Correct Inconsistency in 10 CFR Part 34 Compatibility	12/12/97	All industrial radiography licensees
97-86	Additional Controls for Transport of the Amersham Model No. 660 Series Radiographic Exposure Devices	12/12/97	Registered users of the Model No. 660 series packages, and Nuclear Regulatory Commission industrial radiography licensees
97-85	Effects of Crud Buildup and Boron Deposition on Power Distribution and Shutdown Margin	12/11/97	All holders of OLs for pressurized- water reactors, except those licensees who have permanently ceased operations and have certified that the fuel has been permanently removed from the reactor vessel

Commonwealth to determine if any actions are necessary, based on the findings from the failure analyses being performed by Amersham.

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.

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

Technical contact: Larry W. Camper, NMSS  
301-415-7231  
E-mail: LWC@nrc.gov

Attachments:

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

DOCUMENT NAME: c:\IN97-XX.BWS

OFC	SSSS	C	Tech Editor		SSSS		IMAB		IMNS	
NAME	BSmith		EKraus//EK		SBaggett		L Camper/LC		DCool	
DATE	12/21/97		12/18/97		12/ /97		12/18/97		12/30/97	

OFFICIAL RECORD COPY

cables represent a generic safety issue. The NRC will coordinate with the Commonwealth to determine if any actions are necessary based upon the findings from the failure analyses being performed by Amersham.

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.

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

Technical contact: Larry W. Camper, NMSS  
301-415-7231  
E-mail: LWC@nrc.gov

Attachments:

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

DOCUMENT NAME: c:\IN97-XX.BWS

OFC	SSSS	Tech Editor	SSSS	IMAB	IMNS
NAME	BSmith	EKraus	SBaggett	LW Camper	DCool
DATE	12/ /97	12/ /97	12/ /97	12/ /97	12/ /97

OFFICIAL RECORD COPY



failed control cables represent a generic safety issue. NRC will coordinate with the Commonwealth to determine if any actions are necessary, based on the findings from the failure analyses being performed by Amersham.

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.

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

Technical contact: Larry W. Camper, NMSS  
301-415-7231  
E-mail: lwc@nrc.gov

Attachments:

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

DOCUMENT NAME: 97-91.IN

OFC	SSSS		Tech Editor		SSSS		IMAB		IMNS	
NAME	BSmith//BS		EKraus//EK		SBaggett		LCamper//LC		DCool	
DATE	12/22/97		12/18/97		12/ /97		12/18/97		12/30/97	

OFFICIAL RECORD COPY