

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

September 29, 2000

NRC INFORMATION NOTICE 2000-15: RECENT EVENTS RESULTING IN WHOLE BODY  
EXPOSURES EXCEEDING REGULATORY LIMITS

Addressees:

All radiography licensees.

Purpose:

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to alert addressees to recent events that resulted in radiographers receiving occupational whole body doses in excess of the 0.05 sievert (5 rem) total effective dose equivalent limit specified in 10 CFR 20.1201(a)(1). It is expected that recipients will review this information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not new NRC requirements; therefore, no specific action nor written response is required.

Description of Circumstances:

In March of this year, the NRC was notified that several radiographers had exceeded the annual whole body dose limit of 0.05 sievert (5 rem) for calendar year 1999. The following describes the two cases:

Case 1:

A licensee reported that four radiographers received total effective dose equivalents of 7.224, 6.534, 6.104, and 5.112 cSv (rem) for 1999. The licensee stated that the exposures arose from an unprecedented workload during 1999. Radiographers were using daily pocket dosimeters, although readings did not reflect the exposures expected for a larger workload. The reason for this discrepancy was not determined, although improper use of the daily pocket dosimeters may have been the cause. Dosimetry records for the fourth quarter of 1999 were not received until late February 2000. Thus, the licensee did not realize that its employees had exceeded exposure limits until the dosimetry reports arrived. The dosimetry processor stated that the delay in dosimetry record returns was caused by computer difficulties, which it encountered when upgrading its system for year 2000 compliance.

The licensee took several corrective actions. It now has a database program, allowing it to determine the total personal pocket dosimeter readings at any given time. On a monthly basis,

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the licensee will review the pocket dosimeter readings to ensure that radiographers are not approaching a dose limit. If an individual receives a personal dosimetry reading of greater than 0.4 cSv (rem) in any month, the individual will be notified and a plan will be developed for keeping the dose within limits.

Case 2:

A licensee reported that two radiographers received annual doses that exceeded the yearly limits for 1999. One individual received 2.14 cSv (rem) during the last quarter of 1999, which put his total dose at 5.23 cSv (rem) for the year. Another individual received 0.93 cSv (rem) for the last quarter of 1999, which made his total year dose 5.16 cSv (rem).

The licensee was slow to return the badges to be processed, sometimes delaying returning badges up to 6 weeks after receiving them from the field. The control badges were not being returned with the employee badges, further delaying the process time. Also, the dosimetry processor had computer problems that delayed the generation of dose reports. The licensee did not receive one radiographer's 1999 fourth-quarter badge results until late February 2000, and the second radiographer's quarterly badge results until March 2000. The provisions in 10 CFR 34.47 (a)(4) require that, after replacement, each film badge or TLD must be processed as soon as possible.

The dosimetry processor notified the licensee that an employee had exceeded his/her ALARA level for the second quarter of 1999. The licensee did not document or follow up this notification.

The licensee also stated that there were discrepancies between the weekly dosimeter records and the quarterly film badge results from the processor. Pocket dosimeters were being used and recorded weekly, although the licensee did not review the records. The licensee's weekly records indicated that one radiographer had exceeded the yearly limit of 0.05 sievert (5 rem) in August 1999, but no action was taken to remove the individual from duties involving exposure to radiation. At year end, the weekly pocket dosimeter records indicated 6.905 cSv (rem) for one individual and 1.678 cSv (rem) for the other individual, which differs significantly from the film badge results of 5.156 cSv (rem) and 5.233 cSv (rem). Although dosimeter sharing was a possibility, this could not be determined. The provisions in 10 CFR 34.47(a)(2) require that each film badge and TLD must be assigned to, and worn by, only one individual.

Three major causes contributed to these overexposures: 1) the licensee did not return employee badges and control badges together to the processor; 2) the licensee did not return the badges to the processor in a timely manner; and 3) the licensee did not review pocket dosimeter results.

The licensee's corrective actions included: 1) shipping the badges to the processor using an express mail carrier; 2) documenting telephone notifications from the dosimetry processor that quarterly ALARA dose levels are exceeded; 3) reviewing the weekly pocket dosimetry reports; and 4) retraining personnel and emphasizing that the sharing of dosimeters is an unacceptable practice.

Discussion:

Some of the contributing causes of these exposure events can be summarized as follows:

- Licensee failed to monitor pocket dosimetry results;
- Dosimetry badges not mailed to the processor in a timely manner by the licensee;
- Dosimetry badges and controls were not mailed together to the processor;
- Dose determined solely on the results of quarterly dosimeter records;
- Radiographers were assigned jobs before knowing their current cumulative doses;
- Impact of the workload was not assessed regarding its impact on exposures.

All licensees using radiography devices are reminded of the importance of:

- Tracking doses on a timely basis, to ensure that an individual is not approaching a dose limit;
- Timely return of badges and controls, together, to the dosimetry processor;
- Obtaining reports from dosimetry processors in a timely manner;
- Training employees on the importance of not sharing pocket dosimeters and badges;
- Assessing increased workload and its impact on employee exposures;
- Not allowing work pressures and workloads to interfere with appropriate radiation safety practices and the radiation safety program; and
- ALARA programs reflecting appropriate and timely actions.

Licensees are ultimately responsible for ensuring that their workers do not exceed the annual dose limits in 10 CFR Part 20. Licensees may wish to consider actions to improve the tracking and control of worker doses.

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: Linda M. Psyk, NMSS  
(301) 415-0215  
E-mail: [Imp1@nrc.gov](mailto:Imp1@nrc.gov)

Attachments:

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

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OFC	MSIB	E	MSIB	TECH ED	IMNS
NAME	LPsyk		JHickey	EKraus	DCool
DATE	8/2/00		9/20/00	8/3/00	9/25/00

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LIST OF RECENTLY ISSUED  
 NMSS INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
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
2000-02	Failure of Criticality Safety Control to Prevent Uranium Dioxide (UO <sub>2</sub> ) Powder Accumulation	2/22/2000	All NRC licensed fuel-cycled conversion, enrichment, and fabrication facilities

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NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2000-14	Non-Vital Bus Fault Leads to Fire and Loss of Offsite Power	9/27/2000	All holders of licenses for nuclear power reactors
2000-13	Review of Refueling Outage Risk	9/27/2000	All holders of OL for nuclear power reactors
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
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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 removed from the reactor vessel
2000-08	Inadequate Assessment of the Effect of Differential Temperatures on Safety-Related Pumps	5/15/2000	All holders of operating licensees for nuclear power reactors

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OL = Operating License  
CP = Construction Permit