UNIVERSITY OF PITTSBURGH
RADIATION SAFETY OFFICE
POLICY AND PROCEDURES

SUBJECT:	**PERSONNEL RADIATION EXPOSURE MONITORING**	**POLICY #:**	**201**
		INDEX TITLE:	**RADIATION SAFETY**
		SECTION:	**GENERAL**

POLICY

To outline the procedures for monitoring individuals who are occupationally exposed to ionizing radiation while working with or around radiation producing equipment or radioactive materials.

SCOPE

This policy covers radiation monitoring requirements for those individuals classified as radiation workers

CLASSIFICATION OF PERSONNEL

A. Radiation Workers – Individuals who are occupationally exposed to ionizing radiation in the performance of their normal work activities and are likely to receive an exposure greater than 100 mrem in a year. Personnel that fall within this group include, but are not limited to interventional radiologists, interventional cardiologists, x-ray technologists, nuclear medicine/PET technologists, medical physicists, and radiation therapists.

B. Non-Radiation Workers – Individuals who work in areas where they may be exposed to ionizing radiation from patients undergoing nuclear medicine or diagnostic imaging procedures but are not likely to receive an exposure greater than 100 mrem per year. Personnel that fall within this group include, but are not limited to nursing and surgery personnel, patient escorts, respiratory therapy technologists, ultrasound technologists, laboratory personnel and, housekeeping personnel.

C. Members of the General Public – Individual members of the general public are expected to remain in unrestricted areas to avoid unnecessary radiation exposure. In the event that an individual of the public is required to enter a controlled area, that individual will be supervised. If an unintended radiation exposure to a member of the general public is suspected, the Radiation Safety Office must be notified immediately.

PROCEDURE

A. External Exposure Monitoring

1. Personnel monitoring devices will be issued to all radiation workers who could likely receive an exposure greater than 10 percent of the occupational limit (500 mrem), as determined by the Radiation Safety Officer. Personnel monitoring devices may also be issued to non-radiation workers if warranted by their potential exposure to ionizing radiation in order to assure that they are working within the exposure limits for members of the general public (100 mrem).

2. Extremity monitors (TLD ring badges) may also be issued to radiation workers who routinely prepare or administer doses of radiopharmaceuticals, handle sealed sources, or are likely to receive direct extremity exposures from radiographic procedures and fluoroscopically guided interventional procedures.

3. The body badges should be worn on the front of the upper torso or near the part of the whole body expected to receive the highest dose. If a leaded apron is worn, the body badge is to be placed at the collar level outside the leaded apron. Ring badges should be worn under gloves and on the dominant hand. The active surface of the ring should be turned towards the source of exposure in accordance with the radiation safety training for the specific exposure.

4. Requests for personnel monitoring devices should be made prior to working with sources of ionizing radiation by submitting a completed badge request form to the Radiation Safety Office. Termination of employment or other changes, with regards to personnel monitoring, should be reported to the Radiation Safety Office.

5. Personnel monitoring devices will be distributed by the Radiation Safety Office on a monthly, quarterly or semi-annual basis. Monitoring devices shall be returned to the Radiation Safety Office within 21 days after the end of a wear period. When badges are not returned within 90 days after the end of a wear period, the Landauer late fee plus a service charge may be billed back to the individual's department. A current charge of $25 was approved by the RSC.

6. An individual who is assigned a personnel monitoring device is required to wear it when and where the possibility of occupational exposure to ionizing radiation exists. When it is not being worn, it should be stored in a location not subject to ionizing radiation.

7. If an individual loses or damages their personnel monitoring device, they must notify the Radiation Safety Office. A new monitoring device will be issued. The Radiation Safety Office will then review exposure history and assign an estimated dose when appropriate.

8. Individual summary reports are available on the myLDR.com website. An individual summary of the person's annual radiation exposure will be sent to each monitored radiation worker through the department coordinator. Upon termination of employment, a copy of the radiation worker's final exposure report will be sent to the department after processing of the last issued radiation monitor. The report should be forwarded to the worker by the department, along with a copy to the Human Resources Department.

9. Exposure of a personnel monitoring device to deceptively indicate a dose to an individual is expressly prohibited.

10. Personnel should notify the Radiation Safety Office if they are occupationally exposed to ionizing radiation through their employment at institutions other than UPMC.

B. Lead Garments in Conjunction with Monitoring Devices

When an individual's monitoring device is issued for use outside of a lead garment at the level of the neck, a correction factor of 0.3 will be applied to the recorded deep dose equivalent value to obtain the effective dose equivalent. This correction (EDE2/Webster) is recommended by Landauer, the monitoring device vendor for UPMC, when monitoring devices are used in conjunction with lead garments. The resultant value will be used to assess individual ALARA Levels.

C. Internal Exposure Monitoring

1. Personnel involved in the administration of more than 10 mCi of I-131 as sodium iodide must have a thyroid bioassay performed. I-131 diagnostic capsules are considered sealed form and excluded from this requirement unless a breach of the capsule is suspected. For occasional administrations, this bioassay must be performed within 6 to 72 hours post administration. For routine administrations, the bioassay must be performed at least monthly, as long as no ALARA levels have been reached.

2. Other bioassay measurements may be required following contamination incidents or exposures to radionuclides. The Radiation Safety Office will evaluate such situations and determine the need for non-routine bioassay.

D. ALARA Action Level

1. The Radiation Safety Office will perform a review of the individual occupational radiation exposures, as soon as practical after they become available, to assess trends and identify high exposures. This review should follow up on any observation of unexpected conditions or unusual readings.

2. The Radiation Safety Office will identify and review any cumulative annual exposures reaching ALARA level I. (See chart below.) The Radiation Safety Office will perform and document an investigation for any cumulative annual exposures reaching ALARA Levels II and III. The individual exceeding any ALARA Level will be notified in writing of his/her exposure and any required corrective action.

ALARA Levels

	Dose equivalent in mrem			
	Regulatory Limits	Investigation Levels		
		Level I	Level II	Level III
Deep Dose	5000	500	1500	4000
Eye Dose	15,000	4500	7500	12,000
Shallow Dose (Skin or Extremity)	50,000	5000	15,000	40,000

3. The ALARA Level II investigation will include a projection of the individual's potential annual dose to the end of the calendar year to determine whether it is likely that ALARA Level III will be reached. This projection will be recalculated after each subsequent dosimeter report for the calendar year. If the individual is projected to reach ALARA Level III before the end of the calendar year, then both the individual and management having oversight of the individual's work functions will be contacted so that measures for dose reduction including possible work restrictions can be considered in a timely manner.

4. If an individual reaches ALARA Level III, he or she may not be permitted to continue working in areas which normally would expose him or her to radiation without prior approval of the Radiation Safety Officer.

5. The Radiation Safety Office will investigate any thyroid bioassay measurement in excess of 0.04 uCi of I-131. The individual exceeding the investigation level will be notified in writing of his/her exposure and any required corrective action.

E. Compliance

1. The Radiation Safety Office will perform periodic reviews of the Occupational Monitoring and ALARA programs. These reviews may include, but are not limited to, field observations, review of timely exchanges, quarterly audits and an annual review of the radiation safety program.

2. Failure of an employee to use a required badge may result in disciplinary action. When badges are issued, it is both the individual's and the supervisor's responsibility to ensure that dosimeters are worn and returned properly.

Sponsor: Radiation Safety Office

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