

PERSONNEL RADIATION DOSIMETRY

PURPOSE

This procedure provides guidelines for issuing radiation dosimeters to radiation users.

POLICY

Potential radiation exposures from any source, or within any facility, are evaluated by the RSO to determine protection and monitoring requirements.

Radiation users who are likely to receive more than 10% of any external occupational dose limit are **required** to wear personal dosimeters. Individuals who are likely to receive 2% of the limit (100 mrem) in a year or more are encouraged to wear personal dosimetry to confirm that radiation doses are ALARA. Any radiation worker may request personal dosimetry.

EXPOSURE EVALUATIONS

Exposure evaluations conducted by the RHD are often done for groups. Individual assessment of dosimetry needs may also be conducted.

Anyone who uses radiation sources shall complete the "RADIATION USER PERSONAL DATA" form (RPR1A). Individual dosimetry needs will be determined based on the location of work and the indicated job responsibilities.

Analytical X-Ray Users

Users of open beam analytical machines (as defined in RPR31), and users of enclosed units who are approved to perform maintenance or any other procedure with an exposed beam will be issued extremity dosimeters. Other analytical x-ray machine users do not require dosimeters.

Fluoroscopy Users

All individuals working with medical fluoroscopy machines are required to wear a whole body dosimeter, which will be worn on the collar outside of the radiation protection apparel. This requirement may be waived by the RHD for minimal fluoroscopy users for areas or uses for which a radiation exposure survey has been completed to demonstrate that the working environment the individual encounters will not likely result in a dose in excess of ten percent of the dose limits. (R313-15-502(e)(iv)).

When a single dosimeter is worn no correction for

radiation protection apparel will be applied unless it is determined to be necessary by the Health Physicist reviewing dosimetry. If it is determined that a correction is needed, the EDE will be calculated as specified in UT R313-201(2)(b)(i). Currently the equation used for a single monitoring device is $EDE = 0.3 * Collar$.

Users who routinely wear lead-impregnated aprons may be issued two badges, based on coworker exposure history, type and amount of work performed, and recorded survey information. One badge (black or red icon) is worn at the collar outside of any radiation protective apparel, i.e. lead apron. The second badge (yellow icon) is worn upon the trunk under any protective apparel.

When two badges are worn the effective dose equivalent (EDE) will be determined by calculation as specified in UT R313-15-201(2)(b)(ii). The calculation for two badges is given by the following expression:
 $EDE = 0.04 * Collar + 1.5 * Waist$.

Other Diagnostic Machine Users

Individuals using other diagnostic radiation generating machines will be assigned dosimetry based on the location of work, job responsibilities, or survey records. Attachment A provides a list of departments, work locations, and the default dosimetry determinations. Dosimetry needs may be re-assessed after six months of continuous monitoring results become available.

An Individual may request to withdraw from the monitoring program. Form RPR49A will be used for such requests. Requests must be approved by the supervisor/RU and by the RSO before dosimeter wearing is discontinued.

Radioactive Material Users

Radioactive material users' dosimetry needs are determined based on the amount and type of radioactive material handled as well as recorded survey information.

Special Groups

Declared pregnant radiation workers will be assigned a fetal monitoring badge if monitoring is warranted. This badge is to be worn at the belly level. The fetal badge should be worn in conjunction with any other assigned dosimeters. The waist badge for double-badged fluoroscopy users will be used for fetal dose monitoring.

Students enrolled in a program involving work with diagnostic radiation generating machines will be assigned radiation dosimetry.

Minors working in areas in which radiation generating machines, excluding enclosed analytical units, will be assigned dosimetry.

DOSIMETRY ADMINISTRATION

Issuing and Distribution of Dosimetry

Dosimeters will be issued after required documents and training have been completed for the type of work to be performed.

Dosimeters are sent to the departments before the first working day of the each month. If expected dosimeters are not received by the second working day of the month, contact Radiological Health. New dosimeters must be distributed promptly and those from the previous monitoring period must be retrieved and returned to Radiological Health.

Late and Lost Dosimeter Fees

All dosimeters shall be returned by the 5th working day following the end of the monitoring period. Dosimeters returned to the Radiological Health Department after the 5th working day of the month are considered late. Dosimeters returned more than 30 days late, damaged, knowingly misused, or not at all are considered lost.

A fee of \$10 is assessed for each late dosimeter. A fee of \$15 is assessed for each lost dosimeter. The fees are billed to the department in which the individual works. The billed department is responsible for obtaining reimbursement from the individual.

Changes, Terminations and Transfers

Any changes affecting the radiation dose or dosimetry requirements, including the amount, type, or location of work with radiation sources, for a user require written notification to Radiological Health. Written notification may be electronic or hardcopy. Dosimeters may be transferred to a new department if the user's work location changes by notifying Radiological Health of the new department and date of transfer.

Users who leave the University or discontinue all work with radiation sources can terminate dosimeters and radiation use status by filling out and returning form RPR 1C "User Termination Checklist" to Radiological Health.

Note: It may take one or more months for changes to be made due to notification requirements and printing schedules with the dosimetry vendor.

Wearing and Storing Dosimeters Properly

Dosimeters issued are required to be worn properly at all times when working with radiation sources. When not being worn, they must be kept in a location protected from radiation and heat, and preferably where they can be exchanged even if an individual is not at work. Dosimeters are not to be worn away from University of Utah affiliated work locations or during medical procedures unless special arrangements are made through the Radiological Health Department.

Whole body dosimeters

Single whole body dosimeters are worn upon the trunk of the body, above the waist but below the head. If protective equipment such as lead aprons are worn, a single dosimeter should be worn outside of the protective equipment on the collar.

Double whole body dosimeters are worn at the collar outside of the protective equipment and on the trunk under the lead apron. The collar badge is indicated by a black or red colored figure. The waist badge is indicated by a yellow colored figure. It is important that double-badged users wear the badges described. Incorrect wear affects the algorithm used to determine the effective dose equivalent resulting in an erroneously high EDE.

Extremity dosimeters

Ring badges are available in small, medium, and large sizes. If a ring size doesn't fit please request a new size.

The ring badge is to be worn on the hand so that it measures the highest potential exposure. Wear the ring so that the label faces the radiation source, on the finger that is closest to the radiation source. For example if pipetteing radioactive material the pinky finger is the closest finger to the largest source of radiation. Wear the ring badge under protective equipment such as latex gloves to reduce the chance of contaminating the dosimeter.

Fetal dosimeters

Fetal dosimeters may be issued to radiation workers who have declared their pregnancy in writing. The fetal badge is to be worn in conjunction with all other assigned dosimeters. The fetal badge should be worn at

the belly. If protective equipment is worn, the fetal badge is worn under the protective equipment. If the worker is already double badged the waist badge will be used to monitor fetal dose.

REFERENCES

Utah Department of Health, *Standards for Protection Against Radiation*, Utah Radiation Control Rules, Chapter R313-15.

ATTACHMENTS

A External monitoring criteria by department and series

RPR49A Request for Withdrawal from External Radiation Dose Monitoring Program

Attachment A:

External Monitoring Criteria by Department and Series Code

External Monitoring Criteria by Department and Series Code

| Series Code | Department | Location | Default Dosimetry |
|-------------|------------------|-------------------------|---|
| ARC | ANIM..RES. | OFFICE COMPARITIVE MED. | One badge for Fluoroscopy Users Required |
| BCM | BIOCHEMISTRY | MED.RES.& ED.B RM 211 | Ring Badge |
| BIO | BIOLOGY | RM.201 BIOLOGY | As needed based on amount used |
| CCL | CARDIOLOGY | 4040B HEART SATATION | One badge for fellows and residents, Two badges for Cath Lab Doctors, Nurses, and Techs |
| CVG | CARDIO GENETICS | 410 CHIPETA WAY | |
| CYC | CYCLOTRON | HCIB | two rings and Whole body badge |
| GAS | GASTROENTEROLOGY | 4A323 U HOSPITAL. | One badge required for Fluoroscopy users |
| HCH | BREAST CARE | HUNTSMAN CANCER HOSP. | New employees. Six month reassessment |
| HEM | HEMATOLOGY | 5C402 SOM | |
| LAS | LASER SURGERY | MAIN OP.RM.W.WING | One badge for Fluoroscopy Users Required |
| MIR | RADIOLOGY | CAMT | |
| MRI | RADIOLOGY | 1829 U HOSP. | None |
| NEU | RADIOBIOLOGY | G110 RB LAB | |
| NRS | NEUROSURGERY | 3B409 SOM | One badge required for Fluoroscopy users |
| NUC | NUC.ENGINERING | C.E.N.T.E.R. | Whole body and ring |
| OBI | ORTHOPEDIC SURG. | UOC 590 WAKARA WAY | One badge for Fluoroscopy Users Required |
| ONC | EXP.ONCOLOGY | BC125 SOM | None |
| ORT | ORTHOPEDIC SURG. | UOC 590 WAKARA WAY | One badge for Fluoroscopy Users Required |
| PET | PET OPERATIONS | HUNTSMAN CANCER INST. | Whole body and ring |
| PHY | PHYSICS | 201 JFB | As needed based on Amount used |
| RAD | RADIOLOGY | 3C443 U HOSPITAL | One badge |
| RDI | RADIOLOGY | 1829 U HOSPITAL | One badge for most, two badges for Interventional Radiology techs |
| RMD | RADIOLOGY | 1829 U HOSP. | Two badges or Interventional Doctors, One for Residents, None for reading room doctors |
| RNM | NUC.MED. | 1810 SOM | Whole body and ring |
| RED | PAIN MANAGEMENT | RED BUTTE CLINIC | One badge for Fluoroscopy Users Required |
| RPH | RADIOPHARMACY | 1A71 U HOSP. | two rings and Whole body badge |
| RTH | RAD.ONCOLOGY | B0050 U. HOSP. | Whole body and ring |
| SUR | SURGERY | 3B110 SOM | One collar badge for fluoroscopy users |
| SPE | THERAPY SERVICES | A0150 U. HOSP. | One collar badge for fluoroscopy users |
| URO | UROLOGY | 3B427 U HOSPITAL | One collar badge for fluoroscopy users |
| GHC | RADIOLOGY | GREENWOOD CLINIC | One badge |
| PHC | RADIOLOGY | PARKWAY HEALTH CENTER | One badge |
| PRK | RADIOLOGY | REDSTONE CLINIC | One badge |
| RHC | RADIOLOGY | REDWOOD CLINIC | None |
| SHC | RADIOLOGY | SUGARHOUSE CLINIC | One badge |
| SJC | RADIOLOGY | SOUTH JORDAN CLINIC | One badge |
| SKI | RADIOLOGY | PARKCITY SKI | One badge |
| WAS | RADIOLOGY | MADSEN HEALTH CLINIC | One badge |
| WHC | RADIOLOGY | WESTRIDGE | One badge |

RPR49A Request for Withdrawal from External Radiation Dose Monitoring Program

| | | |
|--|----------------------|------------|
| Name: _____ | UNID: _____ | SSN: _____ |
| Current Job Title: _____ | Contact Phone: _____ | |
| Department: _____ | | |
| Supervisor: _____ | Contact Phone: _____ | |
| <p>What sources of radiation do you use or work around?</p> <input type="checkbox"/> Radioactive Materials <input type="checkbox"/> Radiation Generating Machines | | |
| <p>Describe any duties you have involving potential exposure to radiation.</p> | | |
| <p>Have there been changes to your duties that have affected your radiation exposure recently?</p> <input type="checkbox"/> Yes (Describe Below) <input type="checkbox"/> No | | |
| <p>I hereby request to withdraw from the Radiation Dose Monitoring Program. I understand that my answers above will be reviewed and that if I fall into a category of workers who must participate in the dose monitoring program, I will continue to appropriately wear my issued dosimeter. However, if my request for withdrawal is granted, I understand that it is my responsibility to notify the Radiological Health Department or the Diagnostic Medical Physicist if there is a change in my job responsibilities that will affect my dose.</p> | | |
| _____ | _____ | |
| Signature | Date | |

| | |
|--|-------------|
| Radiological Health Department Use Only | |
| Reviewer: _____ | |
| Comments: | |
| | |
| <p>Recommendation: <input type="checkbox"/> Approve Request <input type="checkbox"/> Deny Request</p> | |
| RSO Signature: _____ | Date: _____ |