Radiation Monitoring & Dosimetry Badge Program

1. PERSONNEL MONITORING

Monitoring devices will be issued to personnel who work in a laboratory which uses the types or quantities of radionuclides requiring such devices. The need will be determined at the time of RUA approval and the need for, or type of, monitoring device will be noted on the RUA for each individual listed as an authorized user. Persons must wear the dosimeter when the possibility of such exposure exists.

Dosimeters are not capable of detecting alpha or soft beta emitters with an average energy less than 100 keV. The RSC or RSO may require the use of additional monitoring devices when it is felt necessary.

Each person assigned a dosimeter shall be responsible for assuring that it is returned to the departmental representative at the pre-arranged date. The RSP will arrange for routine changes of dosimeters, evaluate exposures, and maintain and provide PIs with the records of radiation exposure. Any significant increase in the monthly exposure reading will be investigated to determine probable cause and the appropriate remedial measures to be taken.

2. EXCHANGE OF DOSIMETERS

A coordinator shall be designated for each dosimetry badge group. It is the individual user's responsibility to exchange their dosimetry badges with the coordinator. All dosimetry badges are to be exchanged monthly. It is imperative that this exchange be made promptly at the end of the month to facilitate the legal responsibility to maintain current and accurate radiation dosimetry records. A "control badge" is issued with each group of dosimetry badges. This control will determine the background radiation exposure to the shipment of dosimetry badges and will serve to evaluate any exposures to the shipment during transit. The control must be stored away from any radioactive sources and in a cool, dry place. In addition to the monthly exchanges, dosimeters can also be exchanged on request by an individual or his group designated person.

3. PROPER USE OF DOSIMETERS

a. Only the person who is assigned a dosimetry badge shall wear it. Do not loan a badge or use it for monitoring an area. Area monitors will be provided through the RSP on request.

b. The dosimetry badge should be worn such that monitoring is optimized (usually on the collar) when working with ionizing radiation. Other acceptable locations include the trunk of
the body, sleeves or shirt pocket. Ring dosimeters should be worn when there is a possibility of significant exposure to the hand. It is important to wear ring dosimeters on the hand that is favored. Usually the index finger receives the greatest exposure. The ring dosimeter should be worn under gloves to protect it from contamination. The thermoluminescent detector (TLD) detector should always be turned to face the source of radiation.

c. The radiation dosimeter should always be worn whenever there is a possibility of being exposed to ionizing radiation during the work day. The dosimeter should never leave the campus. It should be stored in a safe, radiation-free location when not in use. It should not be stored at high temperatures or in areas of high humidity. The radiation dosimeter shall not be worn when receiving a medical radiation exposure.

d. The dosimetry packet must be placed in the plastic holder in order to allow interpretation of the radiation dosimetry. The holder contains a set of filters and an open window that allows the vendor to differentiate between beta and gamma radiation. It also determines the energy of the radiation and quantifies the amount of exposure that has been received by the dosimeter. If the filters should fall out of the holder, or if the holder is damaged in some other manner, return it for a replacement to the RSP. Always place the dosimeter in the holder so that the individual’s name and other data appear in the open window.

e. When wearing a lead apron, the badge should be placed on the collar or belt outside the apron. For individuals monitored using two dosimetry badges, one should be worn on the collar (outside the apron) and the other should be worn at the waist level under the apron.

f. The dosimeter must be promptly returned for processing. Delay in returning the dosimeter results in considerable extra work and delays in obtaining dosimetry reports. A dosimeter which is returned late cannot be processed with the control badge supplied with the shipment. Badges not processed during the proper time period may have their results impaired by Dosimetry fogging and image degradation.

4. HOW TO OBTAIN DOSIMETERS

A dosimeter request form is available from the RSP. The applicant must supply the following information so proper records may be maintained:

a. Full name of individual.

b. Individual's sex.

c. Date of birth.

d. Social security number.

e. Department.

f. Name of PI or Laboratory Supervisor.

g. Work areas.

h. Campus extension.
i. Radionuclide - type, amount, frequency of use.

j. X-ray device type (e.g., radiographic).

k. A series of questions pertaining to previous dosimetry history.

5. OBTAINING RECORDS OF PREVIOUS RADIATION DOSIMETRY

Upon written request to the RSP any individual may obtain a report of his/her radiation dosimetry history. The written request must include the individual's name, date of birth, social security number, the department where the individual worked, and the dates that the dosimeter was worn at this location. The Dosimetry badge results of the current month, quarterly, yearly, and lifetime dosimetry are available from the RSP. A copy of the monthly report is sent to each badge coordinator for dissemination to users.

6. ABSENCES AND TERMINATIONS

If you will be away from UCSF for over one month but less than six months, notify the RSP. Your dosimeter will be kept inactive for the duration of your leave and reissued upon return. Please obtain any records of occupational exposure if you have been working with radiation sources in another institution. If you plan to be away from UCSF for over six months, or if you are terminating employment, please return your dosimeter.

7. EXTERNAL RADIATION ABSORBED DOSE LIMITATIONS

No one shall knowingly expose themselves or others to levels of radiation greater than those given in Table 1, except in cases of extreme emergency. These exposure limits do not apply to medical and dental diagnosis or therapy.

8. DOSIMETRY ISSUANCE CRITERIA

As indicated above, the need for dosimetry will be determined during the RUA approval process for each individual. The general criteria are as follows:

a. Dosimetry badges will be issued to users of 20 mCi or more of gamma emitting or beta emitting. (Eav>100 KeV) radionuclides.

b. Finger rings will be issued to users of 5 mCi of more of gamma emitting or beta emitting (Eav>100 KeV) radionuclides.

**Table 1**

Maximum Permissible Doses

<table>
<thead>
<tr>
<th>Occupational Dose</th>
<th>Annual Dose Limit (rem)</th>
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<tr>
<td>Whole Body</td>
<td>5</td>
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Dose in any unrestricted area can not exceed 2 mrem in any hour.

9. OVEREXPOSURE

Report any actual or suspected over-exposure to radiation immediately to the RSP. Depending upon circumstances, the RSP will take all necessary actions. This may take form as a note to the file, a note to the individual Dosimetry badge record, or referral to a physician. The physician shall be instructed to inform the RSO whenever an individual is diagnosed as having received a radiation exposure related injury or disease, or whenever any individual claims the existence of such an injury or disease.

10. EXPOSURE TO PREGNANT PERSONNEL

Current National Council on Radiation Protection and Measurements recommendations and Nuclear Regulatory Commission Regulations state that during the entire gestation period, the maximum permissible dose equivalent to the embryo-fetus from occupational exposure of the expectant mother should not exceed 500 mrem.

11. INTERNAL RADIATION DOSIMETRY

When quantities of radioactive material present a potential for internal contamination, a bioassay will be required. Specific routine requirements established for personnel using radioiodine, tritium, and other isotopes are listed in the RUA approval.

12. INVESTIGATIONS OF OVEREXPOSURES

The Radiation Safety Office will investigate all exposures exceeding the guidelines below. When indicated, a bioassay will be performed. The record of these investigations will be added to the radiation exposure file of the individual, and the individual and his Laboratory
Supervisor will be informed of the results. The RSO is responsible for notification to the State of California Department of Health Services in cases of known or suspected exposures that exceed the permitted limits. Whenever these exposure limits have been reached or exceeded, depending upon the extent of the overexposure, personnel may be required to avoid future work with radiation for a period of time.

a. UCSF Investigational/Action Limits Due to UCSF’s commitment to the of As Low As is Reasonably Achievable (ALARA) principle, the investigational/action limits have been set as follows:

i. Persons working in non-clinical areas of UCSF: 300 mrem/quarter

ii. Persons working in clinical areas of UCSF: 450 mrem/quarter; which includes radiology, nuclear medicine, radiation oncology, and cardiology

iii. Interventional Radiology: 750 mrem/quarter iv. Extremities: 1,800 mrem/quarter

13. DOSIMETRY RECORDS

The RSP maintains complete and accurate personnel dosimetry records for review by the RSC and for transmittal to authorized agencies outside the University. Copies of monthly dosimetry reports are sent to each PI for his/her group. An individual can obtain his own exposure record by request to the RSP. In cases of exposures which require notification to the State of California Department of Health Services, a report will be provided to the individual involved. Copies of internal dosimetry reports are sent to each individual for his/her personnel records. The law requires that dosimetry records of non-UCSF exposures be obtained and retained on file. Each individual who has previously used radioactive material or worked with sources of ionizing radiation will be requested to sign a Radiation Exposure History Form to release this information.

14. SUBCONTRACTORS, VISITORS AND GUESTS

The PI is responsible for the presence of either outside contractor employees, visitors, or guests in any radiation laboratory or radiation-producing facility. They shall inform the RSO of the presence of any such person prior to their entry. The RSO will decide whether or not the visitors will be permitted to enter the laboratory and if so, what personnel dosimetry is necessary.

15. SPECIAL MONITORING

PIs should notify the EHS Specialist in advance of performing any experiment or procedure involving new, unusual, or unknown potential radiation hazards. When necessary, special monitoring can be provided.

16. SEALED SOURCE WIPE TESTS

The EHS Specialist will perform leakage testing of all non-exempt radioactive sources. UCSF will comply with all statutory sealed source leak test requirements. As needed, additional sealed source leak tests may be performed.
17. EXPOSURE

In an attempt to follow the guidelines of the ALARA concept of radiation exposure, UCSF has established that the maximum permissible radiation exposure on this campus shall not exceed the investigational limits set.

The exposure of personnel not directly involved with the use of radiation on campus shall not be greater than 100 mrem per year.

RECORD KEEPING

All users must maintain written records of receipt, use, transfer and disposal of all radioactive materials.

A usage log giving the date of receipt, identity and activity of the radioisotope, the manufacturer's lot number, the date and the amount of usage must be maintained for each radioisotope. A physical inventory and correction of the log must be done at frequencies prescribed by the RSC/RSO.

The RSP requires that records showing the monitoring of the laboratory area(s) and equipment must be maintained. These records must be available for periodic review by the Radiation Safety Office and may be requested by the RSC. In general the formats presented in the "Laboratory Radiation Safety Logbook" should be followed.

Note: Usage, Transfer and Disposal must be recorded on the UCSF form provided by OEH&S. Any variances from record keeping requirements must be pre-approved by the RSO and/or RSC.

REPORTING OF ACCIDENTS/INCIDENTS

1. LOSS OR THEFT

Each loss or theft must be reported to OEH&S as soon as it is discovered. Any quantitative discrepancy in a shipment of radioactive material received from a vendor is considered reportable.

2. SUSPECTED EXPOSURE OR CONTAMINATION

Actual, or suspected exposure of the whole body to 100 millirems or more of radiation, or exposure of the skin, feet, ankles, hands or forearms to 500 millirems or more must be immediately reported to the RSO.

Any ingestion or personnel contamination must be immediately reported to the RSO.

Any accidental release of radioactive material to the environment, must be reported immediately to the RSO for monitoring and decontamination assistance.

PIs are required to document carefully any losses or incidents that occur.