UC RIVERSIDE | Environmental Health & Safety

Radiation Safety Program Annual Review Calendar Year 2017

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Radiation Safety Officer

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INTRODUCTION

The following document represents a review of the Radiation Safety Program of the University of California Riverside (UCR) for the calendar year 2017 as required by the Radiation Safety Committee Guidelines and the UCR Broadscope License. This review was conducted by Karen Janiga, MS, Radiation Safety Officer.

LICENSES AND REGISTRATIONS

Broadscope License #1362-33 expired 4/26/2006 (In timely renewal)

Registration # FAC10701 for Radiation Producing Machines (RPM) Expires 8/31/2019

MANAGEMENT OVERSIGHT OF THE RADIATION SAFETY/LASER SAFETY PROGRAMS

Management oversight of the Radiation Safety Program is accomplished through periodic meetings of the Radiation Safety Committee where new users of radioactive materials, radiation producing machines, and lasers, as well as amendments, are reviewed and approved. **Four** meetings were held in 2017.There were **three** new applications for radioactive material use, **one** new application for Radiation Producing Machines, and **three** new applications for laser use. The records of these meetings are on file in the Environmental Health and Safety Office and in the Office of Research Integrity and Economic Development.

A list of the Radiation Safety Committee members are as follows:

Dr. Morris Maduro-Chair	Professor, EEOB
Dr. Allen Mills	Professor, Department of Physics and Astronomy
Dr. Martha Orozco-Cardenas	Academic Coordinator, Botany and Plant Sciences
Dr. James Borneman	Professor, Microbiology & Plant Pathology
Dr. Bahman Anvari	Professor, Bioengineering (Lasers)
*Dr. Wendy Saltzman	Professor, EEOB
+Dr. Jikui Song	Associate Professor, Biochemistry
+Dr. Hyle Park	Associate Professor, Bioengineering (Lasers)
Karen Janiga	Radiation Safety Officer

*Resigned in 2017
+ Added in 2017

Staff: Dr. Patricia Steen, Office of Research Integrity

LICENSE RENEWAL /AMENDMENTS/UPDATES

On March 23, 2006, a license renewal application was submitted to the Radiological Health Branch (RHB). No correspondence requesting renewal documents was received from the RHB in 2017. A document is on file indicating that the license will not expire until final action is taken by the Radiologic Health Branch.

RADIATION SAFETY/LASER SAFETY PROGRAM OVERVIEW

RADIATION/LASER USE IN 2017

There are 2 license categories defined under 17CCR 30190. The specific license which is the broadscope radioactive materials license and a general license as defined in 17CCR 30191-30192. The investigators listed under these license categories were combined in the new UC Radiation database, which was implemented in January 2017.

Radiation Producing Machines (RPM) are machines that produce radiation only when energized and are registered with the Radiologic Health Branch.

Only Class 3b and 4 lasers are audited by the radiation safety program.

Number of Users by Department (Specific & General License)

Department	Active Users in 2017	PIs that went Inactive in 2017
Biochemistry	5	
EEOB(Biology)	1	3
Biomedical Sciences	1	
Botany and Plant Sciences	4	1
Molecular, Cell &Systems Biology	4	
Chemistry	4	
Engineering	5	
Entomology	2	
Environmental Sciences	6	
Physics and Astronomy	2	
Microbiology& Plant Pathology	6	
Totals	38	4

Number of Users of Radiation Producing Machines (RPM) By Department

Department	Users Active in 2017	Users Inactive in 2017	Total Number of RPM by Department
Biochemistry	1		1
EEOB(Biology)		1	1
Biomedical Sciences	1		1
Botany and Plant Sciences	1		1
Center for Advanced Microscopy	1		4
Campus Health Center	1		5
Chemistry	2		4
Earth Sciences/Geology	2		2
Engineering	2	1	4
Physics and Astronomy		1	2
Totals	11	3	25

Number of Class 3b and 4 Lasers (Active and Inactive)

Status	Active	Inactive
Class 3b	38	16
Class 4	62	23
Totals	100	39

Number of Users by Department (Lasers)

Department	Active Users	Inactive Users	Total Number of 3b and 4 Lasers by Department
Biology(EEOB)	0	1	1
Biochemistry	1		2
Botany and Plant Sciences	1	1	4
Chemistry	7	1	53
Engineering	8	6	39
Physics and Astronomy	5	7	40
Totals	22	16	

FACILITIES

There have been no additional buildings added to locations of use listed in the license as the entire campus is already identified on the license. The following buildings were authorized for using radioactive materials under the Broadscope license during 2017.

Batchelor Hall
Biological Sciences
Boyce Hall
Chemical Sciences
Ce-Cert
Entomology
Environmental Health and Safety
Genomics
Headhouse 2 / Glasshouse 2
Material Science and Engineering
Physics
Science Laboratories 1
School of Medicine Research Building
Spieth Hall
Webber Hall

	Number of Rooms
Radioactive Materials	**57**
Sealed Sources only	**13**
Radiation Producing Machines	**22**
Lasers	**55**
Totals	**147**

EQUIPMENT AND INSTRUMENTATION

Electronic calibration of survey meters is completed by Graham Instruments and efficiency calibrations are completed by EH&S Radiation Safety. Liquid scintillation counters and ion chambers are calibrated by outside contractors.

	Active	Inactive
Survey Meters	**29**	**8**
Liquid Scintillation Counters	**7**	**5**

MATERIAL USE, CONTROL, AND TRANSFER

All uses of radioactive materials and sealed sources in 2017 were used in research and teaching laboratories. ***There are 145 sealed sources on the UCR campus.*** A sealed source is a radioactive substance sealed in a capsule in order to prevent the dispersion of radioactive material but allows the emission of radiation.

Procedures for receipt and transfer of licensed material: Licensed material is surveyed for contamination following existing procedures. A paper use log is no longer generated since the PI can document use in the UC Radiation Database. A receipt is printed for each lab and is signed off at time of delivery. All package receipts are scanned on a monthly basis and kept in the departmental shared drive.

One hundred and five orders for P-32, 2 orders for C-14 and 2 orders for Po-210 sealed sources were received in 2017. There was no internal or external transfer of licensed material in 2017.

AREA RADIATION SURVEYS AND CONTAMINATION CONTROL

Radiological audits and surveys: Contamination surveys are performed at least monthly and documented by each principal investigator. The Radiation Safety Office performs confirmatory surveys/audits 3 times per year for the 34 investigators under the specific license. **The Radiation Safety Office performed 85/117 (73%) audits for users of radioactive material.**

Radiation Producing Machines: Audits of radiation producing machines are performed annually. **All 14 investigators possessing radiation producing machines were audited in 2017.**

Laser safety audits: Audits of Class 3b and 4 lasers are performed annually. **All 38 investigators possessing class 3b and 4 lasers were audited in 2017**.

Sealed source leak tests: Leak tests are performed every six months for beta/gamma emitters over 100 uCi, and every three months for alpha emitters over 10 uCi (17CCR 30275). **Of the 145 sources, 43 are required to be leak tested.** No sources were leaking based on leak test results**.**

Air sampling: No air sampling was required in 2017.

Compliance with Title 40 Part 61 (Clean Air Act for Radionuclide Emissions) Since UCR did not use any volatile radioactive materials in 2017, a calculation for compliance with 40CFR Part 61 was not required.

Inventories: Inventories are maintained in the UC Radiation Database.

Contamination controls: Good housekeeping, use of proper PPE, use of appropriate absorbent materials, and periodic monitoring have resulted in no contamination discovered above limits.

Records: Each principal investigator keeps a record of their own surveys. Audits and surveys performed by EHS are scanned and are placed on the departmental shared drive.

Emergency situations: No emergency situations were encountered with radioactive materials during 2017.

TRAINING AND INSTRUCTIONS TO WORKERS

Initial training is required prior to using radioactive materials, radiation producing machines (RPM), and Class 3b and 4 lasers. Refresher training for radioactive materials, and radiation producing machines is completed every 3 years. There is currently no laser refresher training course at UCR. **A total of 218 individuals completed initial on-line laser safety training, 53 completed initial on-line radiation safety training, and 28 completed radiation refresher training**.

RADIATION PROTECTION

Doses to workers are maintained as low as reasonably achievable(ALARA) by instituting an administrative action level of 400 mrem for either whole body dose or dose to the extremities. If these action levels are exceeded, the Radiation Safety Officer is notified. There were no personnel doses that exceeded the administrative action level in 2017.

An area badge that was posted in April 2017 in the EH&S radioactive waste decay area was 131mrem above the action level. This area contained gamma emitting sealed sources awaiting disposal and were located on the back shelf of the EHS decay waste area.

Internal Dosimetry: No internal dosimetry was required in 2017 since no volatile reactions were performed.

External Dosimetry: External dosimetry is provided through Mirion Technologies. Film badges are used for whole body monitoring and TLD rings are used for the extremities. Individuals that receive monthly badges include users of medical/dental x-ray machines. Individuals that receive quarterly badges are radioactive material users in research laboratories. Dose records are kept on the departmental shared drive. Workers are sent a copy of their dose report. The number of badges that were cancelled were for those individuals who had left the university.

Number of Quarterly badges issued	**17**	**5/17 were cancelled**
Number of Monthly badges issued	**11**	**2/11 were cancelled**

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RADIOACTIVE WASTE MANAGEMENT

Disposal: Solid waste and liquid mixed waste is disposed using qualified waste brokers.

Effluent pathways and control: Liquid waste disposal in laboratories is not permitted. All liquid waste is picked up by EH&S and disposed into the sewer by EH&S waste staff, and only after the waste has been analyzed for solubility and radioactive content. Liquid waste disposal records are reviewed by the Radiation Safety Officer and were below the activity limits as stated in 10CFR 20.2003.

Storage areas: Dry solid and liquid waste is segregated into short and long-lived isotopes and kept in a designated room in the EH&S waste area.

Fume Hoods: Certification of laboratory fume hoods is up to date

DECOMMISSIONING/FINANCIAL ASSURANCE

Records relevant to decommissioning: No UCR buildings were decommissioned for radioactive materials use in 2017. However, the liquid radioactive waste room in the old EH&S building was decommissioned on November 15-17, 2016 ,by Philotechnics after our move to the new EH&S building. No changes to the financial assurance documents were required during 2017.

TRANSPORTATION

Quantities and types of licensed material shipped: There were 2 Polonium-210 sources shipped back to the manufacturer for recycling in 2017.

NOTIFICATIONS AND REPORTS

Reporting and follow-up of theft, loss, incidents and overexposures: One incident involved 2 individuals using dosimetry badges of 2 other individuals that had already left UCR. A personal visit was made to the laboratory by the Radiation Safety Officer and a letter was sent to the investigator by the Chair of the Radiation Safety Committee. This incident was not required to be reported to the Radiologic Health Branch since no doses were recorded on either badge.

INDEPENDENT AND CONFIRMATORY MEASUREMENTS

Areas surveyed, both restricted and unrestricted, and measurements made: No contamination in unrestricted/restricted areas.

EXTERNAL AND INTERNAL AUDITS

An audit of the X-ray program was conducted by the California Department of Public Health Radiologic Health Branch in 2017. One violation involving training and a second violation involving the annual survey of a cabinet x-ray irradiator located in the V3 vivarium were noted, and were corrected within the 30 day time frame.

A peer audit of the UCR Radiation Safety Program was conducted by James Casto, the RSO at UC Santa Barbara in October of 2017. No issues were noted on the inspection. It was recommended that P-32 users be issued ring badges in addition to body badges for dosimetry, and that wipe surveys of radioactive waste drums being disposed by outside vendors are documented.

COMPLIANCE ISSUES

No compliance issues were found during audits of the radiation and laser safety programs.

ACCOMPLISHMENTS FOR 2017

- Implementation of UC Radiation Database
- Updates of Radiation/Laser Websites and Fast Facts
- Addition of a second laser expert to Radiation Safety Committee
- Implementation of Inspect Program for Radiation/Laser Audits
- Developed internal procedures for major Radiation Safety Program areas
- Implementation of Storage Mode Category for Authorized Users

GOALS FOR 2018

- Implementation of updated Radiation Database (Radiation 2)
- Disposal of Cs-137 and Co-60 Irradiators (in progress)
- Peer Audit of Laser Safety Program by UC Berkeley
- Update Radiation Refresher Training
- Update Radiation Use Manuals
- Implementation of Laser Refresher Training course

In Gratitude

A special thank you to Ondra Carter, Radiation Safety Specialist, who keeps the operational areas of the radiation safety program running efficiently, and to Dr. Patricia Steen of the Office of Research Integrity for administrative support. Another thank you to UC IT Safety Solutions who are helping update the UC-wide Radiation Safety Database and for the development of the Inspect Tool.