

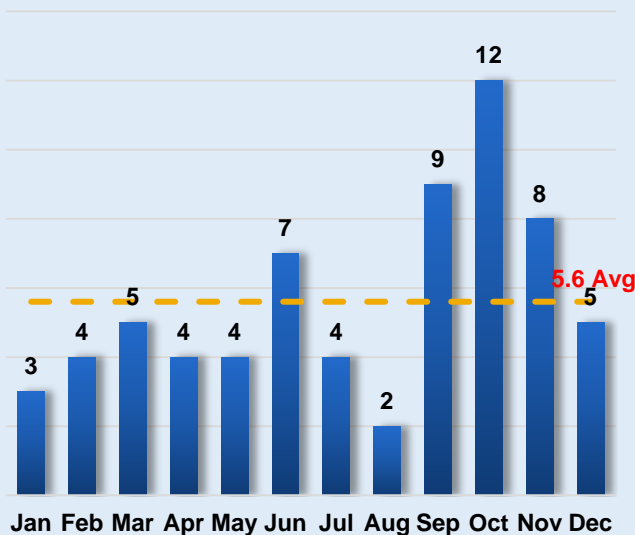
## Background Radiation Safety requirements include:

- Radiation Safety Training
- Radiation Use Authorization (RUA) & Licensing
- Inventory Management
- Sealed Sources Inspections
- Exposure Monitoring
- Laboratory Inspections
- X-Ray Producing Machines
- Annual Equipment Calibrations

## Radiation Safety Training

Before handling radioactive materials or radiation producing machines, all laboratory personnel must complete **Radiation Safety Initial Training**. After 3 years a **Radiation Safety Refresher Training** must be completed.

### 2016 Radiation Safety: Initial Training



*A total of 69 laboratory personnel have completed the initial training course and 26 completed the Radiation Safety Refresher Training in 2016.*

## Incomplete Radiation Refresher Training

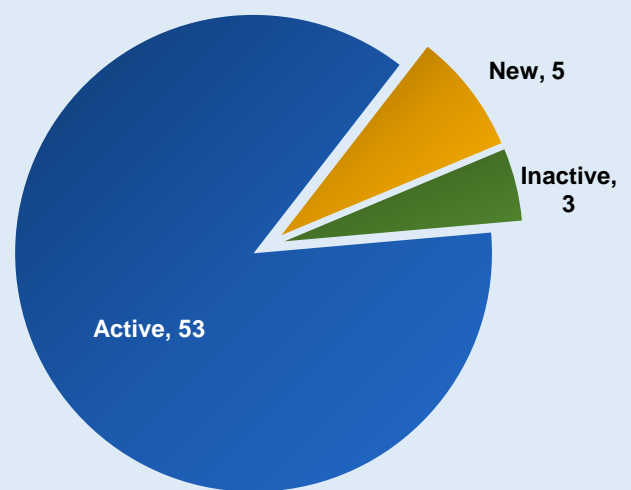
As of December 31, 2016, the following individuals were not current with their **Radiation Refresher Training** requirements.

Individual	Department
Matthew Young	Biochemistry
Selene Bobadilla	Biochemistry
Christian Craddock	Botany/Plant Sciences
Justin Dingle	Environmental Sciences
Roya Bahreini	Environmental Sciences
Wenbo Ma	Plant Pathology

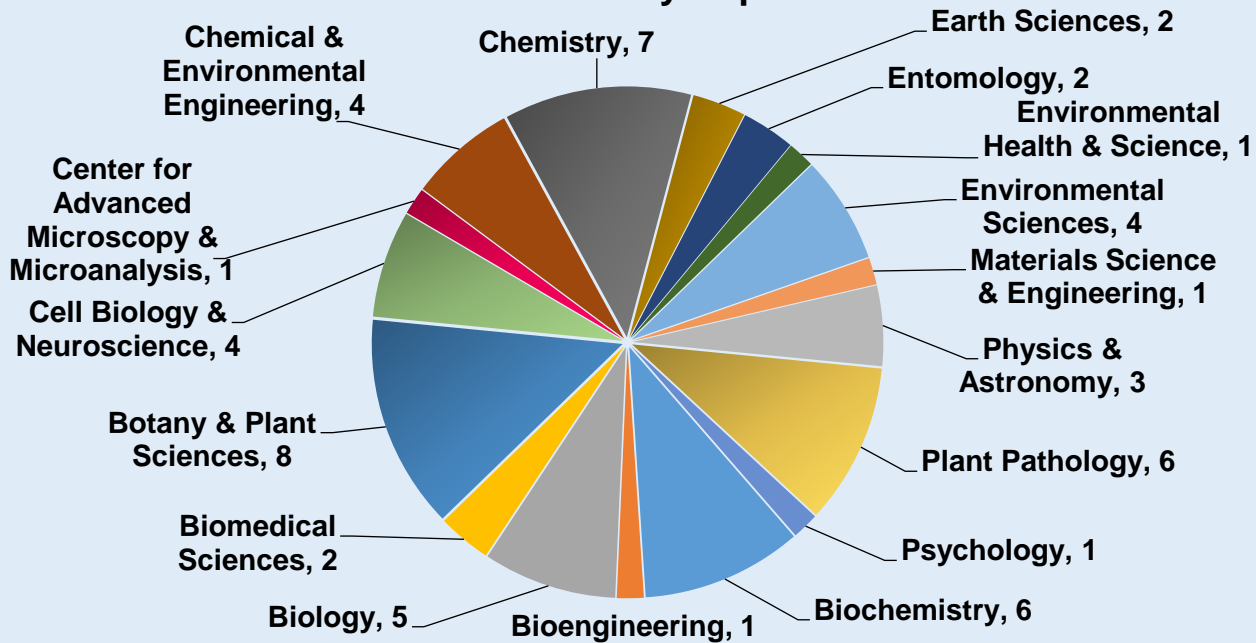
## Radiation Use Authorization & Licensing

An **RUA form** must be submitted to the Radiation Safety Officer to become active user. For new RUAs, laboratory space are inspected for best practice procedures in handling radioactive material or radioactive producing machines.

### 2016 Radiation Use Authorization



**2016 RUAs by Department**



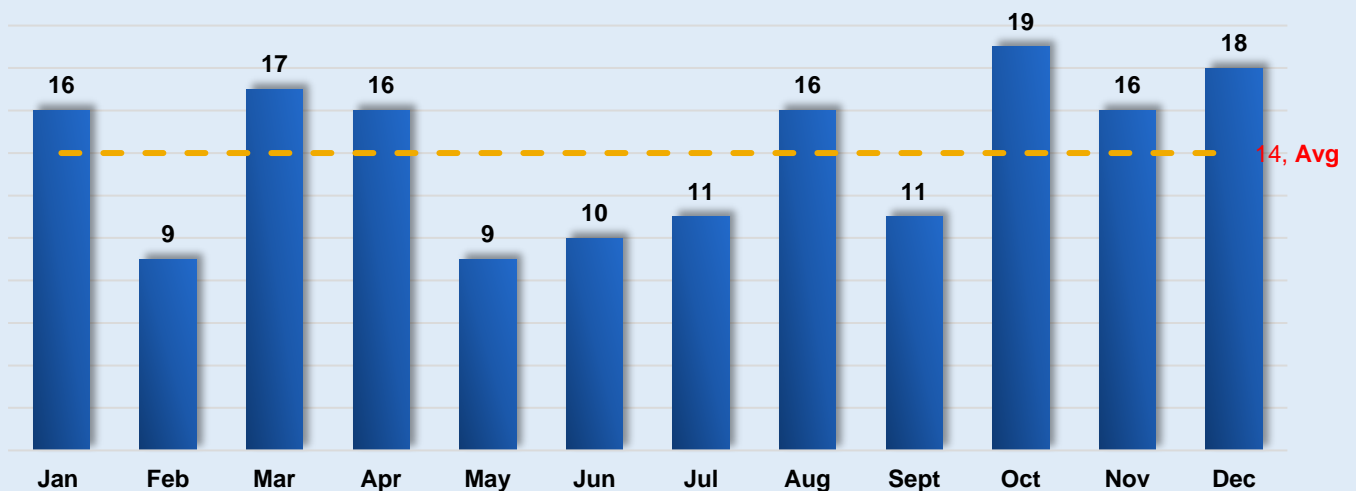
**Broadscope Radioactive Materials Licensing:**

On March 23, 2006, a license renewal application was submitted for renewal to the Radiological Health Branch (RHB). The RHB allowed EH&S to operate under the old license. No correspondence requesting renewal documents was received from the RHB in 2016.

**Inventory Management**

Deliveries of radioactive materials are recorded by EH&S upon receipt and must be delivered to the requested department users immediately.

**2016 Radioactive Material Deliveries Activity**

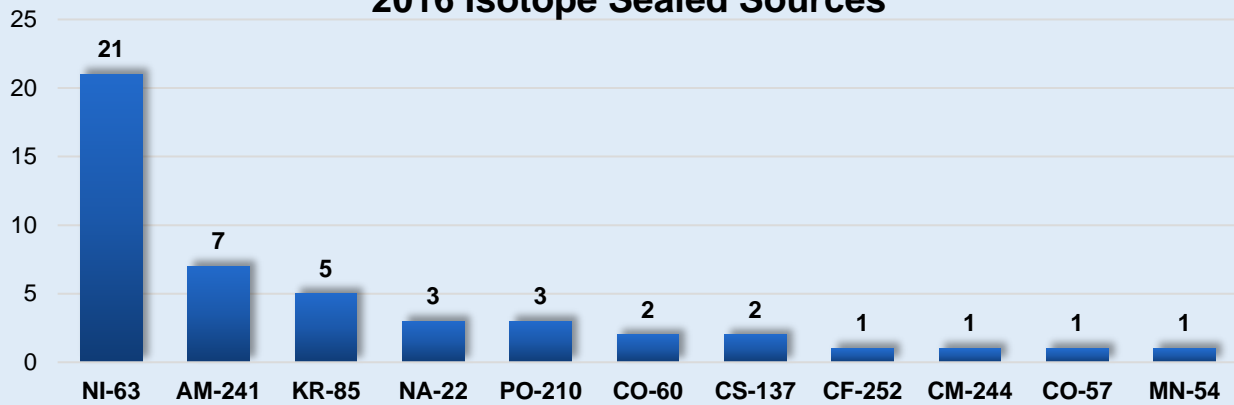


*On average, 14 radioactive materials were delivered each month.*

### Sealed Sources Inspection

Sealed sources are radioactive material that is permanently sealed in a capsule or closely bonded in a solid form. Biennial leak tests are conducted for beta/gamma emitters over 100  $\mu\text{Ci}$  and alpha emitters over 10  $\mu\text{Ci}$ . A sealed source fails a leak test if the contamination on the filter paper used exceeds 0.005  $\mu\text{Ci}$ .

#### 2016 Isotope Sealed Sources

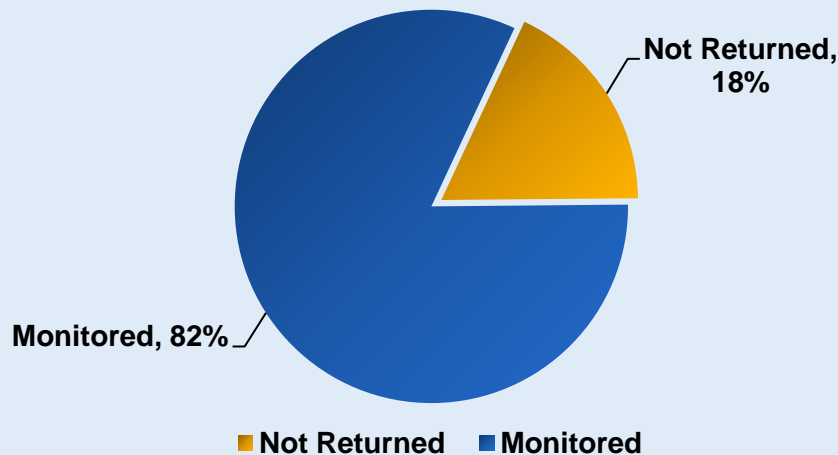


*Out of 152 sealed sources a total of 47 were inspected biannually in June and December.*

### Exposure Monitoring

Laboratory personnel must be monitored for radiation exposure using dosimeter badges. Badges are requested online via the EH&S [Dosimeter/Badge Request Form](#). Dosimeter badges are processed monthly, or quarterly depending on the type of radioactive materials being used. *In 2016, there were 103 monthly dosimetry badges monitored out of a total of 104, averaging 8.6 badges a month. 99% of the monthly dosimeter badges were returned for monitoring.*

#### 2016 Quarterly Dosimetry Badges

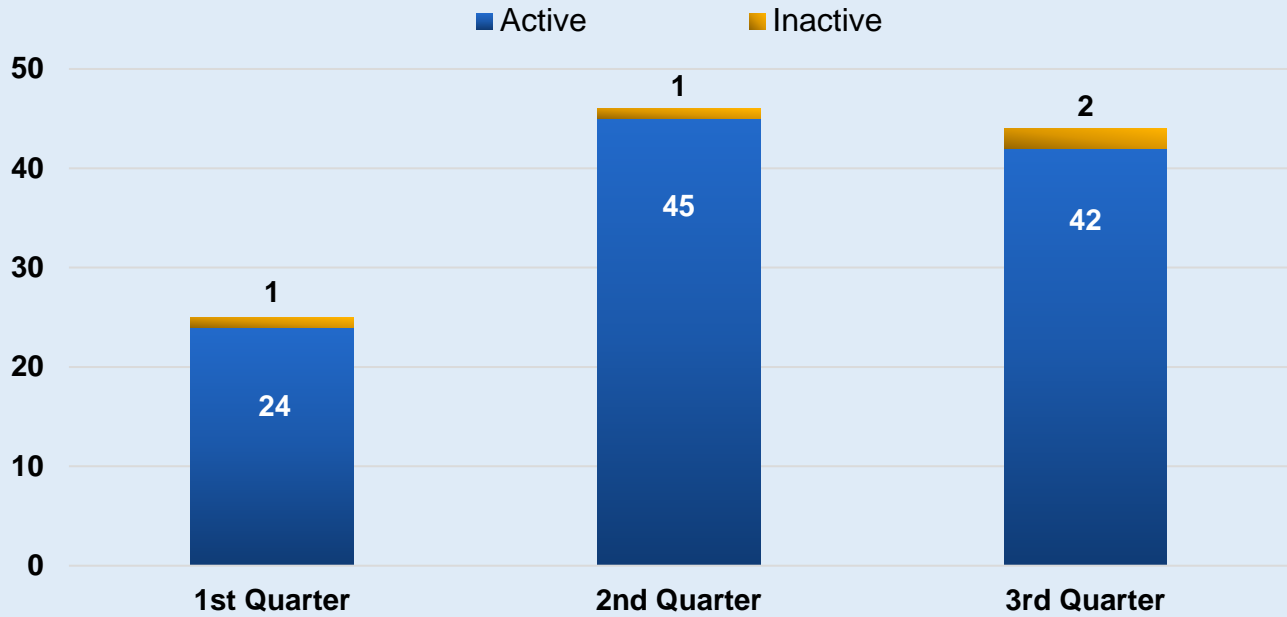


*In 2016, 55 quarterly dosimetry badges were monitored out of a total of 67. 82% of the quarterly dosimetry badges were returned for monitoring. 6 primary investigators did not turn in their badges for 2 quarters.*

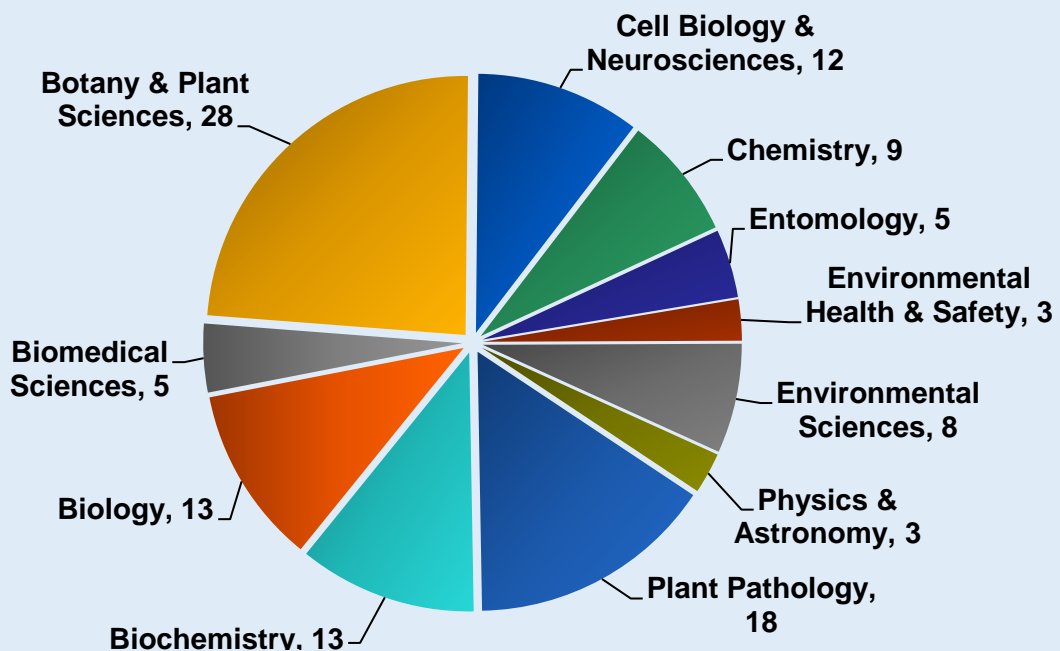
### Laboratory Inspections

Laboratories with radioactive materials are inspected three times a year. Radiation detection meters and swipe tests are performed in both controlled and uncontrolled areas of the lab to measure radiation contamination levels higher than 2 mR/hr.

### 2016 Radiation Laboratory Inspections



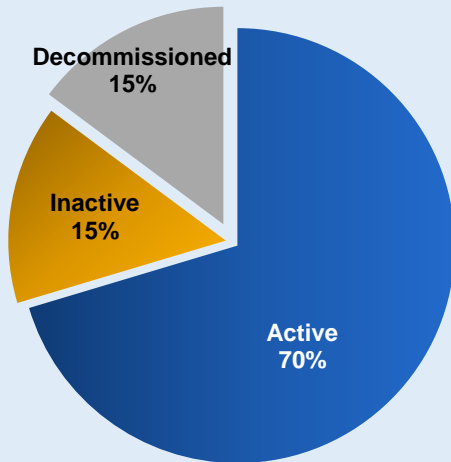
### 2016 Radiation Laboratory Inspections by Department



### X-Ray Producing Machines

Radiation producing machines (RPMs) include: X-ray diffraction units, electron microscopes, and medical/dental x-ray machines, which must be inspected annually.

#### 2016 Active X-Ray Producing Machines



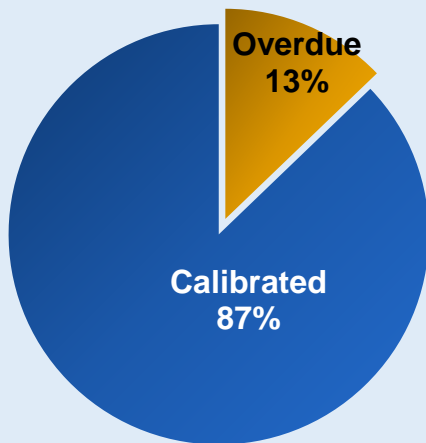
Department	Active	Inactive	Decommissioned
Campus Health Center	5		
Advance Microscopy	4		
Chemistry	4		1
Earth Science	2		3
Biochemistry	1		
Biomedical Sciences	1		
Botany & Plant Sciences	1		
Chemical & Environmental Engineering	1		
Electrical Engineering		1	
Biology		1	
Physics & Astronomy		2	

*In 2016, a total of 27 of RPMs were inspected and only 19 of these machines are active. Out of the 8 inactive RPMs 4 were decommissioned. RPM licensing cost ~\$200 per year regardless if they are in use.*

### Annual Survey Meter Equipment Calibration

Survey meters are used to check people, equipment, and laboratories for either fixed or removable radiation contamination. The most common type of survey meter is the Geiger counter, which is used to measure alpha, beta, and gamma levels. All active Survey Meters are required to be calibrated annually.

#### 2016 Calibrated Instruments



Department	Calibrated	# of Overdue Instruments
Environmental Health & Safety	13	
Plant Pathology & Microbiology	5	1
Biochemistry	4	2
Botany & Plant Sciences	3	1
Biology	2	
Chemistry	2	
Entomology	2	
Bioengineering	1	
Environmental Sciences	1	
Physics & Astronomy	1	
Cell Biology & Neurosciences		1

*In 2016, a total of 34 active instruments have been calibrated annually and 5 instruments were overdue for calibration. Only 13% of these instruments were overdue for calibration. The new UC Radiation System will automatically remind users to calibrate their system annually.*