

Annual Radiation Safety Training

2014

Annual Training

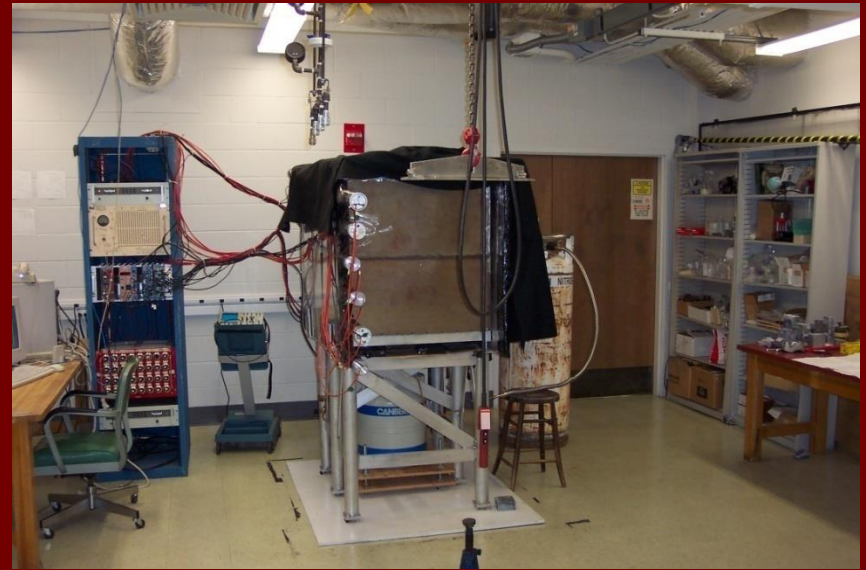
- Is required of all persons who work with radiation producing machines or radiation sources.
- Sublicensees, workers, students and visitors are required to complete annual training.
- Even if initial training was completed this year you still must receive annual training.

Radioactivity

- Refers to the process by which nuclei spontaneously decay or disintegrate by one or more energy steps until a stable state is reached.

Radiation Units

- Are specified for activity, absorbed dose, dose equivalent and exposure.



Activity

- Normally expressed in units of Curies (millicurie or microcurie). 1 Curie is equal to 3.7×10^{10} disintegrations/sec.
- 1 Becquerel equals 1 disintegrations/sec.
- The radiation safety program normally uses the curie.



- The largest single source on campus is a Shepard calibrator. At the reference date it had an activity of 1 curie of Cs 137. Currently the activity is a little more than 500 milliCurie. It is used to calibrate meters and sometimes for physics demonstrations.

Units of Radiation Dose

- A Rad is equal to an absorbed dose of 0.01 joule/kg.
- A Rem is equal to the absorbed dose in rads multiplied by the quality factor. 1Rem is equal to 0.01 Sievert.



Exposure



- Expressed in Roentgen (R). 1R is equal to 2.58×10^{-4} Coulomb/Kg⁽⁻¹⁾.
- Exposures at UA are generally measured in microR (uR). This is a very low level. In terms of exposure it is normally insignificant.

- It is very rare for anyone on campus to receive a significant exposure. The last time was many years ago.

Ionizing Radiation

- Radiation capable of displacing electrons from atoms or molecules producing ions.



Background Radiation



- The average American receives 360 millirems of radiation from all background sources.

Radon

- Not a problem in the Tuscaloosa area.
- Significant problem in some parts of US including some areas around Birmingham.



Regulatory Limits

- Radiation Worker
- Whole body-5rem/yr
- Extremities-50rem/yr
- Skin-50rem/yr
- Organs-50rem/yr
- Lens-15rem/yr
- Non Radiation Worker
- Fetus-0.5rem
- Public-0.1/yr

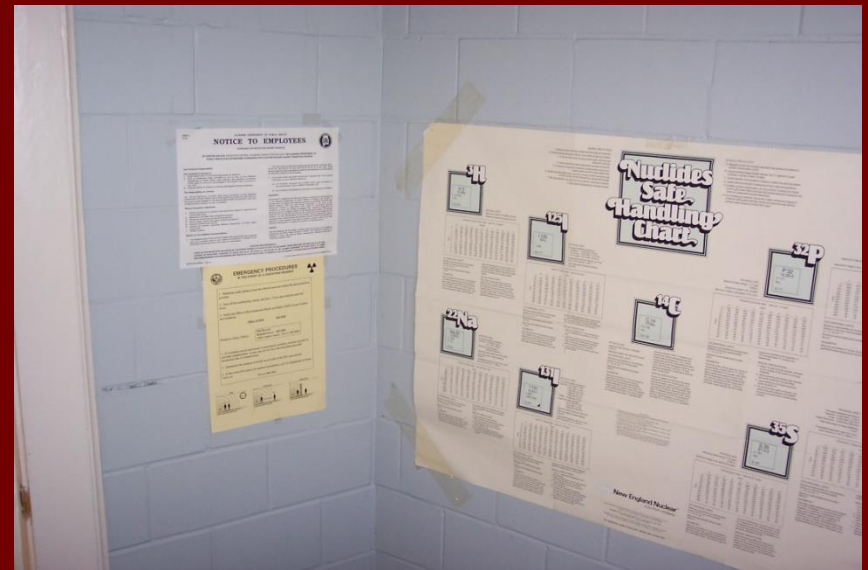
Acute Exposure

- Absorption of a relatively large amount of radiation over a short period of time. Seen in early radiologists, atomic bomb survivors, people near Chernobyl and certain medical treatments.



Chronic Exposure

- Absorption of radiation over a long period of time.



Bioeffects



- May be prompt and appear quickly or delayed which may take years to appear.

Radiation damage



- Is more likely in rapidly dividing cells such as:
- Blood forming cells
- Intestinal lining
- Hair follicles
- fetus

- Contrary to popular belief baldness or excessive size is not necessarily an indicator of exposure to radiation.

Genetic Effects

- May be somatic which damages genetic material in the cell and may lead to cancer or heritable changes which are passed on to offspring.



Prenatal Exposure

- Very hazardous because the rapidly dividing cells are very radiosensitive. Potential adverse effects include low birth weight, retardation and increased risk of cancer.



ALARA

- Basic principle to follow whenever working with radioactive material. All exposures should be
- As-Low-As-Reasonably-Achievable



Basic Protection Guidelines

- Time-limit your time around radiation.
- Distance-stay as far away as possible.
- Shielding-use shielding whenever possible.



Dosimetry

- Quarterly dosimetry is used for persons who work with x-ray units and certain isotopes. Labs that use C14 or Tritium are not issued dosimetry, the energy is too low to be detected.



Lab Security

- Make sure your lab is locked at all times when no one is present. This is one of the major inspection areas which will be utilized by the State.



Work Area Surveys

- Following the use of unsealed sources the work area must be surveyed for possible contamination and cleaned as needed.



EHS

- Is responsible for overall operation of the Radiation Safety Program. Activities include:
- Lab surveys,
- Training
- Dosimetry
- Inventory management



EHS PERSONNEL

- A number of EHS personnel are involved in the operation of the Radiation Safety Program. This includes:
 - Hal Barrett
 - Jay Thomas
 - Jeff Hallman
 - Marty Sumners
 - Darren Moss

RCAC

- The Radiation Control Advisory Committee is made up of faculty and staff who provide oversight and guidance to EHS. Oversight includes ionizing as well as non ionizing radiation.



RCAC Members 2014-15



- Dr Steven Secor(Chair)
- Dr Andreas Piepke
- Dr Tonya Klein
- Dr Carol Duffy
- Dr Rainer Schad
- Rob Holler
- Dr Robin Rogers

Radiation Safety Officer

- The RSO works out of EHS. Contact number is 348-5905.



Sublicensees

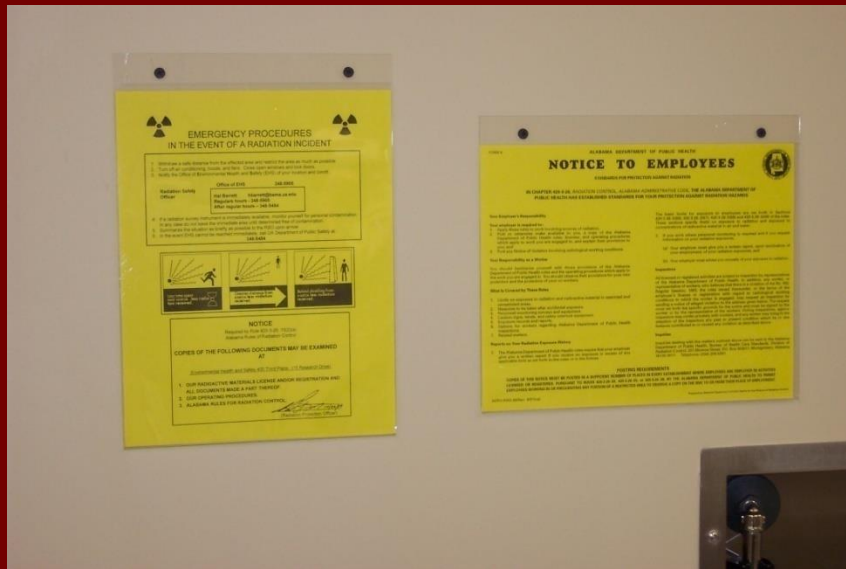
- Sublicensees are full time faculty or staff members who are approved by the RCAC for supervision of radioactive sources or labs where work with radioactivity is occurring. There are only 20 sublicensees on campus. Each sublicense is reviewed for renewal each August.

Signage



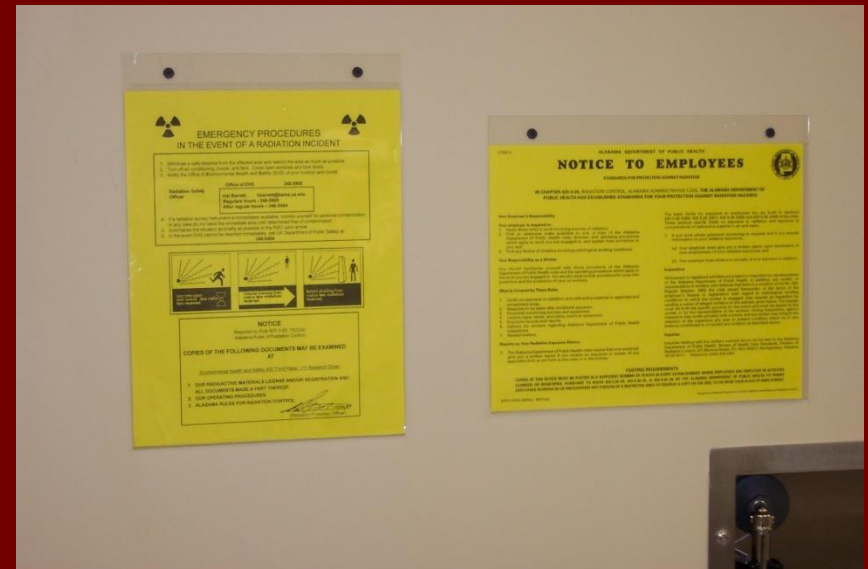
- Should be posted at each entrance to the lab and within the work area.

Types of Signage



Interior Signage

- Two types of signage is required to be posted in all labs, the state notice to employees form and the EHS emergency procedures form.



Training

- All persons who work with radiation must complete initial training on line or at EHS and annual training thereafter.



Regulatory Inspection

- The state conducts routine compliance inspections at UA. The next on site inspection is due by December 2014. However an inspector could show up at any time.



- What to do if the inspector shows up in your lab
- Answer questions
- Be truthful
- Don't volunteer info
- If you don't know say so
- Even if they are very nice remember this is a regulatory inspection



Completion

- You have almost completed annual training for 2014. In order to get credit for completion you must do the following:

Answer the following 10 questions. E mail the answers to EHS along with information requested on the slide following the last question.

- 1.How often is radiation training taken?
- A.at least annually
- B.often as needed
- C.when job title changes
- D.whenever sublicensee is out of town

- 2. What expression of activity is normally used by the radiation safety program?
- A. becquerel
- B. dose exposure
- C. curie
- D. rem

3. Average amount of background radiation received annually?

A. 0.5 uR

B. 360 millirems

C. About 500 mCi

D. Almost zero

4. Acute exposures are

A. Mostly from xrays

B. Usually caused by human error

C. Anything over 100 uR

D. Absorption of a large amount over a short time

5. ALARA is

A. A basic principle for working with radiation

B. Used in unsealed source labs

C. An outdated research technique

D. As Long As Research Allows

The 2014-15 Chair of the RCAC is

A. The Radiation safety Officer

B. A retired professor

C. Dr Robert Oppenheimer

D. Dr Steven Secor

7.A sublicensee is

A.A faculty member

B.A member of the RCAC

C.Tenured faculty

D.Faculty or staff approved by the RCAC to supervise radiation work in a lab or area.

8. Sublicenses are

A. Good for 5 years

B. Renewed each August

C. Approved by faculty senate

D. Available for review on line

9. The next state inspection is due by

A. January

B. December 2014

C. The end of our 5 year term

D. Don't know completely random

10. The radiation safety program is administered by

A. Faculty who work with radiation.

B. EHS

C. Alabama Health Dept.

D. Dean's office

E mail your answers to the 10 questions to hbarrett@fa.ua.edu along with the following: your name, CWID, the room number and building where you work with radiation. You must do this to get credit for annual training.