Ohio University has a Broad Scope Radioactive Materials license to obtain and use radioactive materials. There are also a significant number of “registered” Radiation Generating Equipment (RGE) units on campus. The radioactive material license and registration of RGE mandates Ohio University to have a qualified Radiation Safety Officer (RSO) employed. Therefore, this position is a requirement as noted by the Code of Federal Regulations, Ohio Administrative Code, Ohio Revised Code and the license that the University operates under. Radioactive materials and RGE are used for the purpose of diagnostic medicine as well as research and development and academic instruction. Radiation Safety areas of responsibility include but are not limited to all ionizing and non-ionizing radiation sources from procurement, use and disposal, as well as DOT training of all hazardous material employees. Radiation Safety is regulated as well as inspected by numerous federal and state agencies: US Homeland Security, US Nuclear Regulatory Commission (NRC), US Department of Transportation (DOT), US Department of Energy, US Federal Aviation Administration / International Air Transportation Association, State of Ohio Department of Health (ODH), Bureau of Radiation Protection – Licensing and Inspection, Radiologic Technology and Decommissioning divisions. The Radiation Safety Officer and staff are responsible to the Ohio University Radiation Safety Committee (RSC) and are independent of any college, division or department in administrating the rules of the Radiation Safety Committee.

continued on pg. 6
Hazards of Ultraviolet Light

UV or ultraviolet lamps are used in biological safety cabinets, light boxes, and crosslinkers in many University laboratories and in some patient care rooms. One of the problems in working with UV radiation is that the symptoms of overexposure are not immediately felt so that persons exposed do not realize the hazard until after the damage is done.

UV radiation is that radiation just outside the visible range, or under 400 nanometers (nm). There are three ranges of UV (see table 1 on next page.)

The biological effects of the 3 regions vary greatly as implied by the “hazard potential” column on the table. The health effects of exposure to UV light are familiar to anyone who has had a sunburn. However, the LTV light levels around some UV equipment greatly exceeds the levels found in nature. Acute (short-term) effects include redness or ulceration of the skin. At high levels of exposures, these burns can be serious. For chronic exposures, there is also a cumulative risk of harm. This risk depends upon the amount of exposure during your lifetime. The long-term risk for large cumulative exposure includes premature aging of the skin and even skin cancer.

The eyes are also susceptible to UV damage. Like the skin, the covering of the eye or the cornea, is epithelial tissue too. The danger to the eye is enhanced by the fact that light can enter from all angles around the eye and not only in the direction you are looking. The lens can also be damaged, but since the cornea acts as a filter, the chances are reduced. This should not lessen the concern over lens damage, however, because cataracts are the direct result of lens damage.

Burns to the eyes are usually more painful and serious than a burn to the skin. Make sure your eye protection is appropriate for this work. There are specially-made safety glasses for the different UV ranges.

NORMAL EYEGLASSES OR CONTACTS OFFER YOU VERY LIMITED PROTECTION

Burns can happen in a very short time, especially under your chin (where most people forget to cover). Fullface shields are really the only appropriate protection when working with UV light boxes for more than a few seconds.

Be sure to protect your arms and hands by wearing a long-sleeve lab coat and gloves.

Equipment Uses

Germicidal lamps emit radiation almost exclusively in the far-UV range of 254 nm, and are commonly used in Laminar Air Flow hoods or biological safety cabinets and should be treated with extreme caution. DO NOT expose yourself to those lights. The UV light box is another source in the laboratory. This instrument is literally a box with a glass top and a UV lamp inside. Some units have multiple lamps that allow a choice of wavelength. Most of these instruments are stationary, but there are a few hand held types that carry the same hazards as the stationary models. Nucleic acid (DNA or RNA) which has been stained with the chemical...
Hazards of Ultraviolet Light

An apparatus called a UV-Crosslinker is used to literally “cross-link” to covalently attach nucleic acid to a surface or membrane following Southern blotting, Northern blotting, dot blotting, and Colony/Plaque lifts. Since the DNA will be used in place, a 254 nm wavelength is used to maximize adherence.

Signs and Notices
This notice has been prepared to remind all personnel that there are federally mandated regulations that require posting of potentially hazardous areas or locations where radiation producing materials or devices are being used. The signs and notices used are to ensure compliance with Ohio University policy, U.S. Nuclear Regulatory Commission (NRC) and Ohio Department of Health (ODH) regulations and OSHA requirements.

Hazard signs and notices are posted to warn unsuspecting employees of potential hazards in their workplace. Warning signs should be “OFFICIAL” notices and therefore should follow the National Standard and shall be approved by the Radiation and Laboratory Safety office.

Hand-made “unofficial” signs should not be used
Whenever a temporary hazard exists, appropriate signs should be posted for ONLY the time the hazard is present. If no hazard potential exists, signs should be removed or hidden from view. Uniform sign configuration should be maintained to provide adequate and familiar warnings. Standard color-coded signs referenced in 29 CFR 1910 and 10 CFR 20 should be used.

<table>
<thead>
<tr>
<th>Region</th>
<th>Also known as</th>
<th>Range in nm</th>
<th>Hazard Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV-A</td>
<td>near UV</td>
<td>320-400</td>
<td>high</td>
</tr>
<tr>
<td>UV-B</td>
<td>mid UV</td>
<td>290-320</td>
<td>mid to high</td>
</tr>
<tr>
<td>UV-C</td>
<td>far UV</td>
<td>190-290</td>
<td>low</td>
</tr>
</tbody>
</table>

Be Careful During Exposure to Sunlight or Tanning Beds

Sunburns are caused by exposure to too much UV light. Ultraviolet A (UVA) and Ultraviolet B (UVB) are the two types of radiation most responsible for sunburns. UVB can also cause DNA damage. As much as 80% of UV rays pass through clouds, so, beware!
Ohio University’s NRC/Ohio Department of Health (ODH) Broad Scope License requires “the Authorized User conduct the following surveys with noted frequency:

See Appendix 13 of the Radiation Safety Handbook: Laboratory Rules For Radioactive Material Users, section II. Laboratory Rules A. and B., which state -

A. At the end of each day’s work, survey all work surfaces, hoods, sinks, cabinets, floors, equipment used, waste storage areas, stock storage areas, counting room, as well as your hands, clothing, and shoes. Surveys must include both radiation (meter) surveys and removable contamination (wipe) surveys. Record all results (pre and post clean up) in a logbook. All levels greater than twice background are considered contaminated. Document background values.

B. Proper decontamination of all contaminated areas, equipment and personnel, as well as surveying the areas involved, is to be carried out prior to leaving the lab (not the next day).

Survey yourself each time before leaving the immediate radioisotope use area.

You MUST perform surveys after every use of radioactive material, regardless of isotope, at the end of each day’s work. NO EXCEPTIONS. Documentation of surveys must include:

1. Background data for both survey meter and scintillation counter;
2. Statement indicating all areas checked with meters are less than twice background; exceptions are areas found twice background or greater - record these;
3. Scintillation counter data for all locations checked (wipes);
   a. Areas greater than twice background must be decontaminated and rechecked of area must be performed (survey meter and wipes); document results

b. Areas surveyed must be described and/or denoted on a schematic of the lab by letter or number designation.

4. Date of survey;
5. Authorized user name;
6. Name of person performing survey;
7. Model numbers of instrumentation used.

Reasons for doing both meter and wipe surveys (in addition to being required by regulation) include:
1) a double check of an area - you may miss something with one survey that the other will pick up;
2) the meter helps identify where to wipe;
3) the wipe will tell you (quantify) what you have and help identify unknown radio isotopic contaminants;
4) you must show by documentation that you have not exceeded a reportable NRC (ODH) limit as discussed in the regulations for both exposure (meter) and removable contamination (wipe) surveys.
**Proper Survey Meter Check/Operation**

Before one picks up a survey meter to perform a “radiation” survey, the user should conduct a background check and an operations check of that instrument, EACH time it is to be used. The operations check and use of the instrument should occur as follows:

1) Read the operations manual to understand the conditions of the instrument as well as the proper operating voltage.

2) Verify that the date on the calibration sticker is within six months of the day it is being used. If not, contact the RSO.

3) Perform a battery check. The instrument needle must be completely inside the battery check range and not on the line. If it is not, replace the battery.

4) Perform an operating voltage check. This should be a set value input by the manufacturer and should never need “tweaking,” but can drift from that setting under certain conditions. If a lack of sensitivity response by the instrument is suspected, or there is difficulty duplicating that required voltage, then you should contact the RSO.

5) Turn the instrument on by turning the selector switch to the most sensitive scale (lowest valued decade or number indicated on that face).

6) The “window” of the probe should be one centimeter from the object being surveyed.

7) Move the probe five to 10 cm (two to four inches) per second over the surface(s) that you check.

If something contaminated is found, and it is “hot” enough to “peg” the needle, avoid the site and advance the selector switch to the next higher decade of (lower) sensitivity until a reading can be determined.

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**Radioactivity**

What drink is slightly radioactive?
- A. Beer
- B. Apple juice
- C. Soda

What household item gives off the most radiation?
- A. Toilet
- B. Alarm clock
- C. Fluorescent lights

Which item gives off the most radiation?
- A. Sand
- B. Old pottery and glassware
- C. Televisions

Answers: A,C,B

www.ohio.edu/riskandsafety/radiationsafety
Radiation Safety Program Summary

(cont. from page 1) The RSO is appointed by the Vice President for Finance and Administration on recommendation of the Radiation Safety Committee. The Ohio Department of Health (ODH) or the Nuclear Regulatory Commission (NRC) must approve the RSO being recommended for hire by Ohio University and maintains the regulatory authority to remove the RSO and any radiation safety staff member. The RSO must be evaluated annually by the Radiation Safety Committee with sign off by ODH/NRC and the Vice President for Finance and Administration. The RSO is responsible for managing the radiation protection program established by the Radiation Safety Committee (RSC) and will direct the Laboratory and Radiation Safety Office. The Radiation Safety Officer reports through the Senior Associate Vice President for IT & Administrative Services and the Radiation Safety Committee regarding program implementation and compliance status to the Vice President for Finance and Administration.

Alan E. Watts
Laboratory & Radiation Safety Officer
wattsa@ohio.edu

Who you gonna call?
Radiation Safety Contacts

<table>
<thead>
<tr>
<th>Name</th>
<th>Office</th>
<th>Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUPD</td>
<td>593-1911</td>
<td>740-517-5075</td>
</tr>
<tr>
<td>Alan Watts</td>
<td>593-4176</td>
<td>740-517-5075</td>
</tr>
<tr>
<td>Crystal Brooks</td>
<td>597-2950</td>
<td>330-903-0506</td>
</tr>
<tr>
<td>David Schleter</td>
<td>593-1662</td>
<td>740-591-0557</td>
</tr>
<tr>
<td>David Ingram*</td>
<td>593-1705</td>
<td>740-707-5362</td>
</tr>
</tbody>
</table>

* Chair Radiation Safety Committee