Indoor Air Quality and the Limits of Testing

By Peter J. Nowak

Indoor Air Quality (IAQ) has been a topic that has been front and center in the news for nearly 2 decades. Modern construction techniques, as well as the concerns to make buildings much more energy efficient, has led to an increase in complaints of so called "sick buildings," as well as advancements in the science of investigating and finding solutions for these issues. IAQ can cover a wide range of issues from odors, to heating and cooling, high and low temperature, moisture and dryness. These problems most often occur in older buildings, but can also be found in new construction. Tufts Environmental Health and Safety (TEHS), along with our partners in Facilities Services, has been investigating problems for many years. Over that time, the technology has improved and our understanding has led to quicker resolutions of many of these problems.

The most common question encountered when we are informed of an IAQ concern is: Can you test our indoor air quality? There is no magic wand. One technique, or instrument alone, is not capable of getting all answers. As advanced as this science currently is, there are significant limitations. If someone states, "there is a bad smell," no instrument exists that can identify a single odor. We may be able to narrow it done by the process of elimination, but we cannot find the answer without a complete investigation.

Moisture, especially in older buildings, is often the source of many IAQ related problems. Some examples of IAQ issues that can be identified and resolved once the source of the moisture has been located and repaired are mold trapped behind a wall, a musty odor in a basement/office space, and mushrooms growing near a baseboard or carpet. As a general rule, Tufts does not test for mold if it is visible at all. The reason is that all mold is treated with the same method: disinfect the area, remove the source of moisture, and repair any damage by replacing any material contaminated with the mold. When mold is suspected from a hidden source, the techniques to identify it get a little more complicated. One method is to test the air, but that includes comparing the samples with outside air, because mold spores are found in all environments. IAQ investigations involve many different things. Looking at the building history, interviewing occupants, visual searches, and the final method is by using available instruments to sample when and where necessary. Even with all of this, sometimes the answer eludes the best investigators.

If you are concerned about indoor air quality, the first call should be to Facilities Services on your campus. If they are unable to resolve the concern, then TEHS will become involved and work closely with them to find an answer.

External Radiation Dosimetry

By Geoffrey C. Sirr, Jr.

Dosimetric methods are used to evaluate external radiation dose to assigned areas or individuals while handling radioactive materials or working with radiation producing machines. External dosimetry services are implemented by Radiation Safety staff, and exposure assessment is performed using dosimeters that are supplied and processed by an accredited outside vendor. The Radiation Safety Officer or designee is responsible for assigning personnel to the external radiation dosimetry program. Any person on the Boston, Medford or Grafton Campus may request to be assigned a dosimeter. However, routine radiation exposure monitoring may not be necessary or required per regulation for personnel that work in laboratories permitted for radioactive materials or radiation emitting machines.

Personnel dosimetry assignment is based upon the likelihood to exceed 10% of the regulatory radiation limit or when working with quantities that exceed the Tufts University Radiation Safety Committee established radioactive material threshold limits. Other individuals who work in or adjacent to radiation sources but who are unlikely to exceed 10% of the annual occupational external dose limits do not need to be provided with personnel dosimeters. One practical way to confirm that these individuals do not exceed 10% of the dose limit in a year is to assign a proxy badge for an exposure group or assign an area badge.

The potential for individuals to receive radiation dose varies considerably according to the type of radiation (alpha, beta-soft or hard, x-ray, gamma) and quantity (1uCi, 5mCi) of radioactivity they are exposed to. Monitoring for external radiation exposure is achieved at Tufts University by employing optically stimulated luminescent dosimeters (OSLD). These dosimeters are designed to monitor different types of radiation and energy spectra from impinging photons or particles while worn in radiation fields. The dosimeters are structured with different absorber thicknesses and materials to determine the radiation dose at comparable tissue depths of concern. For example, radiation dose can be assessed to the skin of the whole-body or extremities (shallow-dose equivalent, .007 cm depth in tissue), lens of the eye (lens dose equivalent, 0.3 cm depth in tissue), or whole-body (deep-dose equivalent, 1 cm depth in tissue).

Radiation dose at Tufts University remains to be well below regulatory limits for researchers and medical staff. Radiation Safety staff are available to assist researchers and other groups that work with radioactive materials or radiation producing machines and to ensure exposure control measures are optimized and ALARA (as low as reasonably achievable) conditions exist. Please contact EHS for additional information or questions regarding proper use, placement, storage, pick-up schedules, lost, damaged, or contaminated dosimeters.