HARVARD
Campus Services
ENVIRONMENTAL HEALTH & SAFETY

Radiation Survey Information

Introduction

Routine contamination surveys are an important part of overall radiation safety in the laboratory. The information that follows is a suggested guide for performing contamination surveys. If you have any questions about the mechanics or interpretations of this guide, please contact the Radiation Protection Office at 496-3797 or **radiation_protection@harvard.edu.**

What is Contamination?

Contamination is radioactive material that is someplace other that where you want it. For example, radioactive material in a stock vial is useful, while radioactive material on the floor is not. There are two types of contamination - ***Removable*** and ***Fixed***. Removable contamination can be wiped off a surface or object, similar to dust on a piece of furniture. To determine if contamination is removable, a wipe test must be performed. Fixed contamination is contamination that is bound, chemically or physically to a surface. This form of contamination can only be detected by a meter survey.

What is a Contamination Survey?

A contamination survey is an evaluation of work areas, instruments, floors, sinks, faucet handles, telephones, light switches, etc. for the presence of radioactive contamination. There two types of surveys - wipe test and meter.

The Radiation Protection Office suggests documenting surveys, but requires documentation when using 1 mCi or more of radioactivity.

What is a Survey Meter?

A survey meter is a portable, handheld, electronic instrument consisting of three components used to detect ionizing radiation. The three elements are:

1. Probe - Converts the incident ionizing radiation to an electrical signal that is sent to the electronics package.
2. Electronics Package (or Scaler) - Converts the electrical signal to a visual indication on a meter scale of the intensity of the ionizing radiation field.
3. Speaker (Optional) - Provides an audible indication in addition to the visual.

The Radiation Protection Office recommends using a "pancake" probe to detect iostopes that emit beta particles (except ^{3}H). For low energy gamma and x-rays (^{125}I) we recommend using a "scintillation" probe. For additional information, please contact the Radiation Protection Office at 496-3797 or **radiation_protection@harvard.edu.**

Meter Function Tests

We recommend that users check the batteries frequently. There is a battery check position on the range switch of most quality units. Conducting this check will greatly increase the life of your instruments as batteries do leak a corrosive liquid that can destroy the unit or result in costly repairs.

The cable connecting the probe to the electronic package is another area that should be checked. With prolonged use, this cable may become defective, giving either no reading or false high readings continuously even in the absence of a radiation field.

To check that the meter is responding to radiation the reading for a pancake probe should be 30-50 counts per minute or 300-500 counts per minute for a scintillation probe when not in a radiation field. Then place the meter near a known radiation source and check for a response.

How to Perform a Meter Survey

With the appropriate probe, a meter survey is conducted by slowly passing the probe over the area or object to be surveyed. Be certain to survey at a constant speed - approximately 2 cm/sec. The distance from the surface or object should also be constant. A distance of 1 cm is suggested. Be careful not to contaminate the probe itself!

All readings should be recorded. Be certain to record readings as "net" (actually reading - background reading).

How Do you Do a Wipe Test?

A wipe test is simply a check for contamination that can be removed from a surface. To do one all you need is a piece of filter paper or paper towel. With a gloved hand, rub the paper over the area to be tested. Typically, one would do an area about 100 cm^2. For a quick assessment, one can check this paper with a GM (for high energy beta). For a more complete analysis use a liquid scintillation counter. Prepare that sample for the liquid scintillation counter by placing the filter paper in a liquid scintillation vial with a sufficient quantity of environmentally safe scintillation cocktail and count in a liquid scintillation counter. It is also necessary to establish a background level. To do this, follow the above procedure using an unused filter paper. Please be certain that the liquid scintillation counter is set up to count all the isotopes that are used in your laboratory. The amount of contamination is the difference between the count rate of the actual wipe test and the background count rate.

How Often Should Contamination Surveys be Performed?

The Radiation Protection Office requires two types of contamination surveys be performed after each use of radioactivity. A personal survey should be conducted after using radioactive material and before leaving the work area. A personal survey is a meter survey in which you check yourself for contamination. Check your lab coat, shoes, face, hair, and gloves to make sure you are not contaminated. If you detect any personal contamination, please contact the Radiation Protection Office at 496-3797.

Once you have completed a personal contamination survey, survey your work area and equipment used during the experiment. Check the benchtop, floor, cabinets nearby, etc. for contamination. Unless you are using 3H, a meter survey is sufficient. If you are using 3H perform a wipe test survey and keep a copy of the liquid scintillation printout.

How to Document Surveys?

The Radiation Protection Office strongly recommends documenting personal and post experimental surveys. If you are using 1 mCi or more of radioactive material, documentation is required.

Email **radiation_protection@harvard.edu** to send comments and suggestions to the Radiation Protection Office.