COLUMBIA UNIVERSITY MEDICAL CENTER
College of Physicians and Surgeons

RADIATION SAFETY OFFICE

New York-Presbyterian Hospital
New York State Psychiatric Institute

722 West 168th Street, 4th Floor (MC70)
New York, NY 10032
212-305-0303 Tel
212-305-0318 Fax
rsocumc@columbia.edu
www.rso.cumc.columbia.edu

STANDARD OPERATING PROCEDURES: CARBON-14

INTRODUCTION:

Carbon-14 is a commonly used radionuclide with a half-life of 5,730 years, emitting only beta particles with a maximum energy of 0.156 MeV (Million Electron Volts) and an average energy of 0.049 MeV. The beta particles from C-14 travel a maximum of 22 cm.

CONCERNS:

- The major concern with using C-14 is that it cannot be easily monitored during it's use, therefore, special precautions are needed to keep the work environment clean.
- The regular use of wipe testing is the only way to insure that your work space is not contaminated.
- Contamination on the skin will not likely cause a significant dose to the dead layer of skin, however, it could lead to the internal absorption of C-14.
- The maximum permissible body burden to the whole body is 0.4 millicurie.

SHIELDING:

Glass and plastic are the best shields for beta particles from C-14.

DETECTION:

A tiny drop of contamination from C-14 can be easily detected with a wipe test from a Liquid Scintillation Counter. Most Geiger Counters will not efficiently detect the presence of C-14.

EQUIPMENT / SUPPLIES:

The following equipment and supplies must be available:

- A Liquid Scintillation Detector.
- Disposable latex or plastic gloves.

- A full-length lab coat.
- Radioactive waste receptacle
- Pipettes dedicated to the use of C-14.
- Commercial decontaminate, i.e., Dupont's "Count Off."

SAFETY RULES:

If the following safety precautions are used, personnel radiation exposure will be as low as reasonably achievable.

- Designate a specific area of the lab for C-14 handling.
- Full-length lab coats must be worn by all persons who handle C-14.
- Protect your hands from becoming contaminated from spills by wearing two pairs of disposable gloves.
- Never pipette C-14 by mouth.
- Only use pipettes which have been dedicated to your specific use of C-14.
- Pipettes will easily become contaminated and therefore, should not be shared with others.
- If you have reason to believe that your gloves are contaminated, immediately dispose of them in the radioactive waste container

POST-USE PROCEDURES:

After handling C-14:

1. Conduct a wipe test and count the wipes in a Liquid Scintillation counter:
2. Check all equipment, centrifuges, water baths for contamination.
    - If any contamination is found, use a commercial radiation contamination remover (i.e. Count Off) with paper towels to clean up the equipment.
    - Place the towels in the radioactive waste receptacle.
3. If contamination cannot be removed, place a "radiation" label on the equipment indicating that it is C-14, maximum cpm found, and the date you measured the level.
4. Check the work bench and floor.

- If contamination is found, it can usually be removed easily with “Count Off.” If it cannot be removed, contact the RSO to obtain shielding materials.

- Inform your fellow lab workers if any unremovable contamination is found.

5. Check the normal trash container to make sure no radioactive waste has been accidentally placed there.

6. Store the waste temporarily in containers marked with labels “Radioactive Waste-Do Not Empty.” These labels are available in the RSO.

7. Send a Radiation Contamination Survey Report to the RSO.

   - Call the RSO if you have any questions about where to survey, or how to fill out the form.

8. Wash your hands thoroughly.

9. Bring the waste frequently to the RSO. We accept waste every Tuesday and Thursday from 10:00 AM - 12:00 PM. Call 212-305-0303 0r X5-0303 to make an appointment.

ANY QUESTIONS ABOUT THESE PROCEDURES?

Call the Radiation Safety Office, 212-305-0303 or X5-0303, or email rsocumc@columbia.edu