

A spiral-bound notebook with a light beige, textured cover. The spiral binding is on the left side. The text is centered on the cover.

Surveys

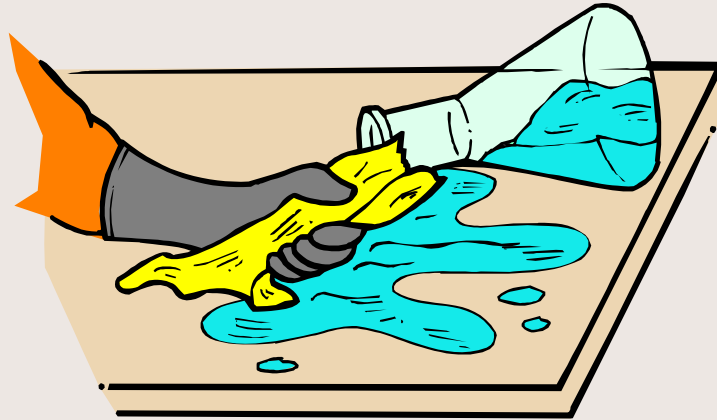
Training Notes for URI Radiation
Workers



Surveys

A survey is an evaluation of the hazards associated with the presence of radiation or radioactive materials in your laboratory.

Why Must I Survey?



1. Surveys are required by regulations.
2. Whenever unsealed radioactive materials are handled, it is possible to contaminate laboratory benches, floors and equipment.

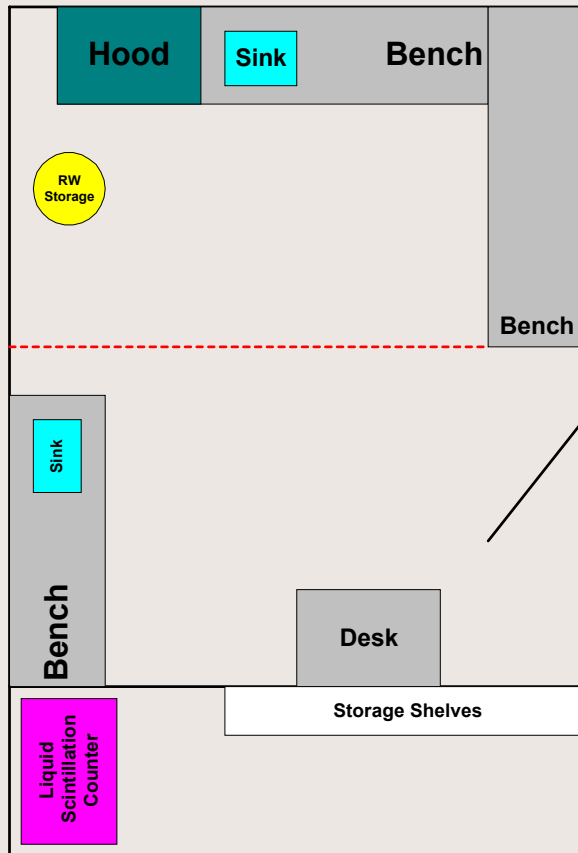
What is contamination?

Contamination is defined as the presence of radioactivity in an unwanted area.

Problems caused by the presence of contamination in your laboratory

1. Contamination can cause external radiation exposure to lab personnel.
2. Contamination can cause internal absorption if the contamination comes into contact with the skin or is inhaled or ingested.
3. Contamination can interfere with experiments being conducted in the lab.

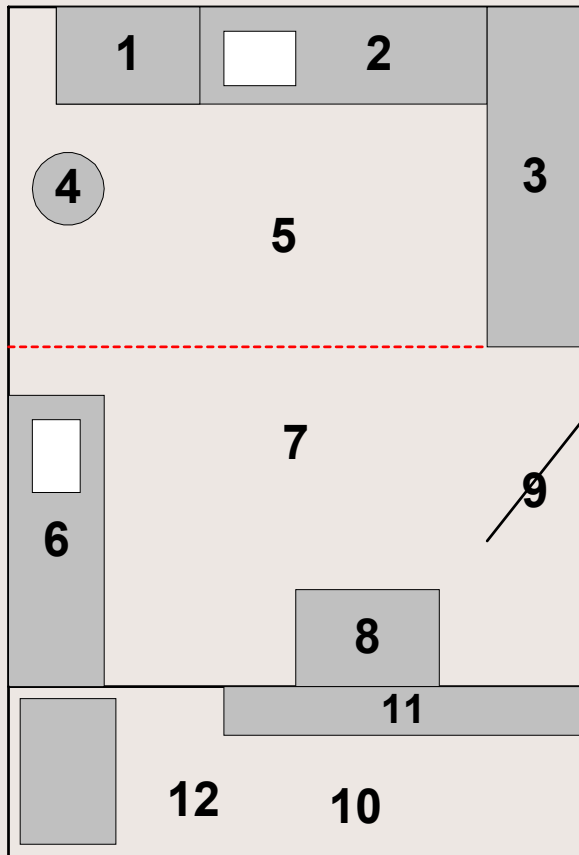
Radioisotope and Count Lab



This is our model introduced in other radiation worker training notes- a Type C laboratory with an adjacent Type D counting laboratory.

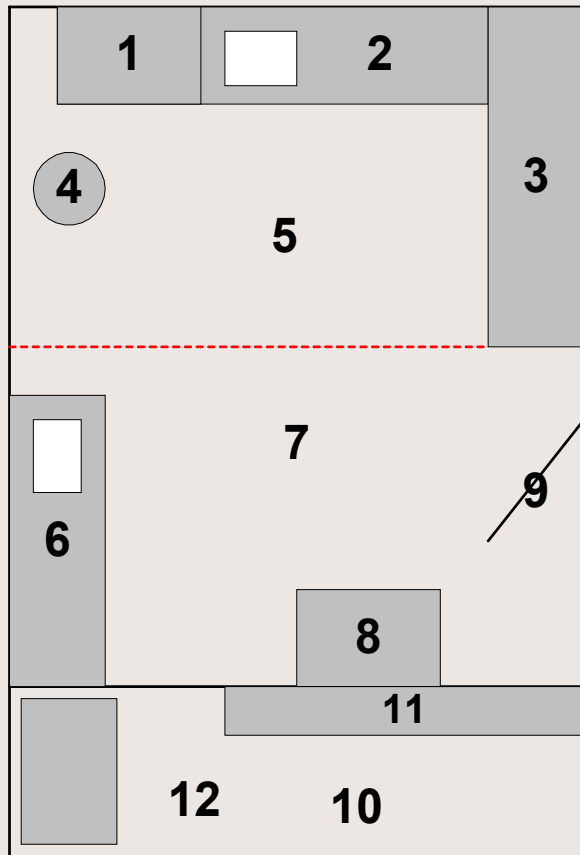
We'll divide the two labs into two basic survey areas - "hot" and "clean."

“Hot” Areas



1. Hood
2. “Hot” Bench
3. Counting Sample Preparation Area
4. Radioactive Waste Storage Area
5. “Hot” Area Floor

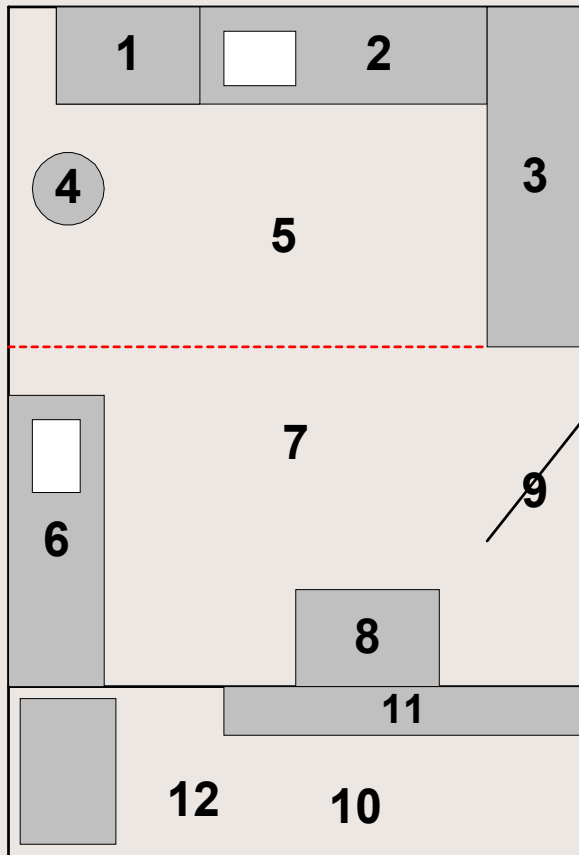
Survey Recommendations for Areas 1 through 5



Active radioactive materials handling areas should be surveyed at least weekly for contamination.

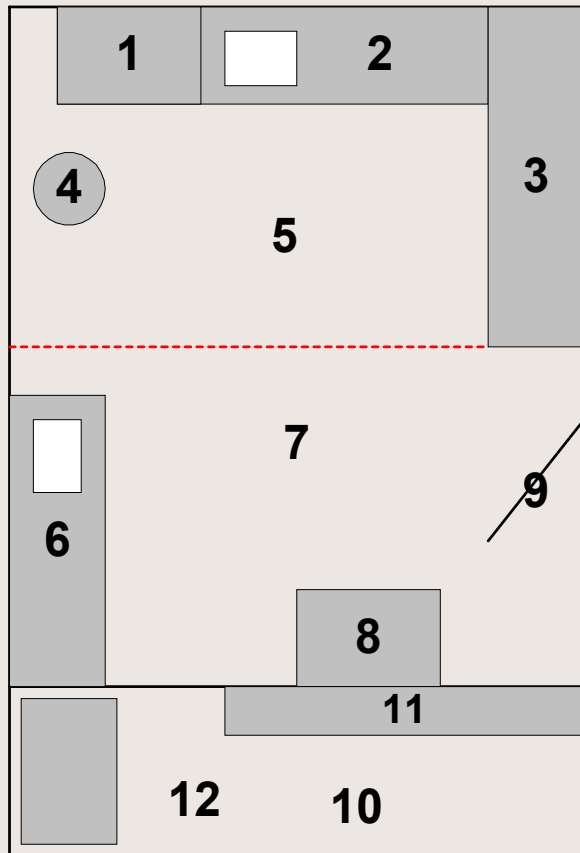
It is good laboratory practice to do a contamination survey after each use of radioactive materials.

“Clean” Areas



- 6. “Clean” Bench
- 7. “Clean” Area Floor
- 8. “Clean” Desk
- 9. High Traffic Area
- 10. Count Room Floor
- 11. Storage Shelves
- 12. Liquid Scintillation Counting Area

Survey Recommendations for Areas 6 through 12



Nominally “clean” areas within the radioisotope laboratory and the count room should be spot checked weekly and thoroughly surveyed monthly during periods of radioactive materials use.

What about areas used by more than one radioisotope laboratory?



Common-use areas (e.g., freezers, cold rooms, count rooms and centrifuge rooms) should be checked monthly.

A contamination survey report by the host department should be kept for those surveys.

What kinds of contamination are there?

Fixed contamination - radioactivity remaining on a surface after repeated decontamination attempts fail to significantly reduce the contamination level.

Removable contamination - radioactivity that can be transferred from a surface to an absorbent material, such as filter paper or cotton swabs, by rubbing with moderate pressure and covering an area of at least 100 square centimeters.

How do I determine the levels of fixed or removable contamination?

1. Use a survey meter to determine total contamination.
2. Use a wipe test to determine removable contamination.
3. Subtract the wipe test contamination from the total contamination to determine fixed contamination.

What instruments do I use to detect contamination?

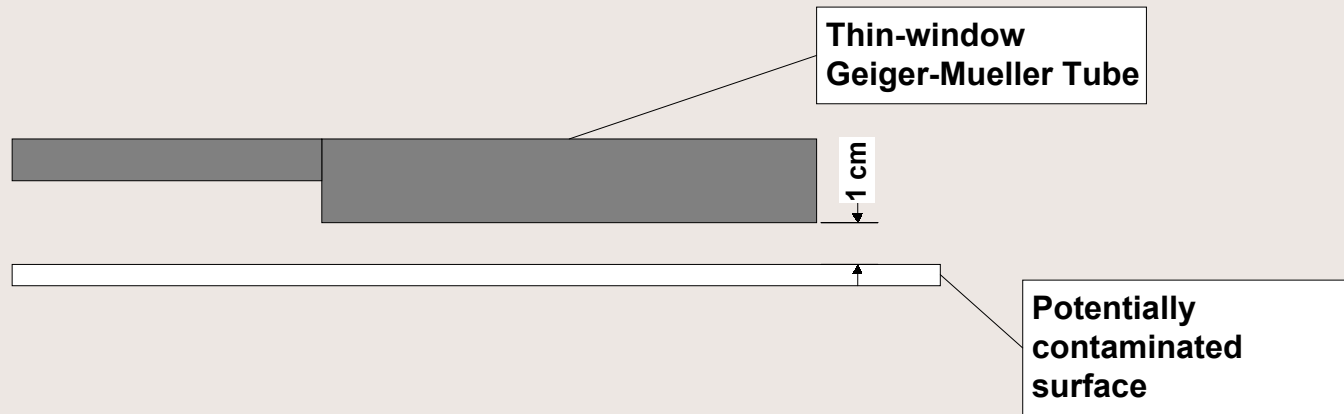
Contamination can be detected with wipe testing using a liquid scintillation counter or a gamma counter, and an area survey using a survey meter.

Both tests are needed to determine if it is fixed or removable contamination.

Low-energy Beta Emitters

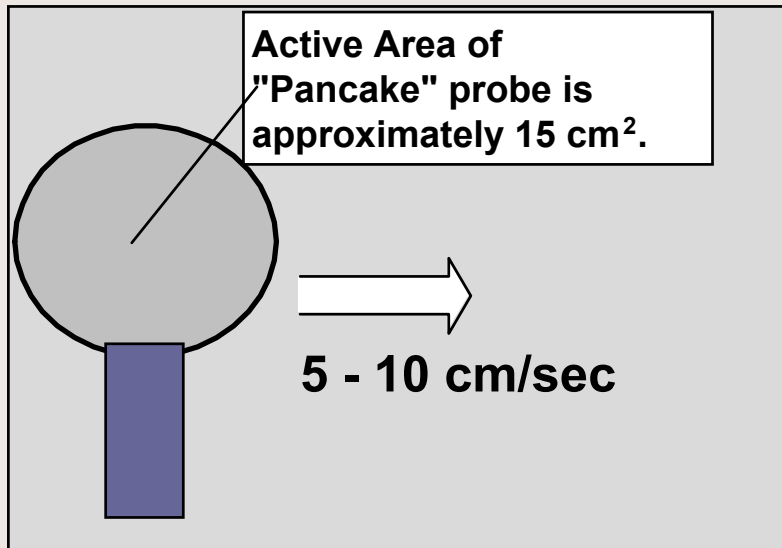
Wipe testing is the best method for checking laboratories for contamination resulting from the use of C-14 and S-35 and the only method for checking for H-3.

Determining Total Contamination - The Instrument Survey



Hold the probe approximately 1 cm above the surface and move slowly (about 5-10 cm/second) listening for a change in the audible count rate signal.

The Instrument Survey (continued)



Stop over areas of increased count rate.

Allow the instrument sufficient time (its response time) to reach its maximum meter reading.

Record the count rate and location.

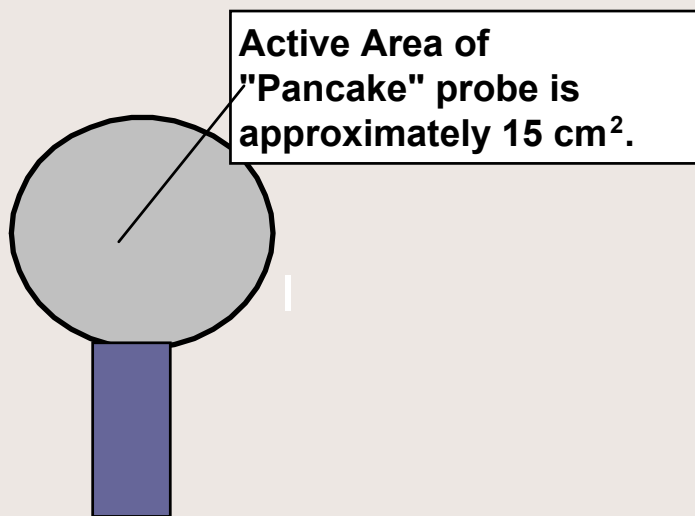
How do I know when I have detected contamination with my survey meter?

To determine if an area has contamination, compare the background counts/minute to the counts/minute determined by the survey meter over the spot.

If the ratio of counts/minute exceeds 3:1, the area should be considered contaminated.

For example, if your background is 25 cpm, you should consider an area to be contaminated if the survey exceeds 75 cpm.

The Instrument Survey (continued)



To determine dpm/100 cm², divide the recorded count rate by the efficiency (cpm ÷ cpm/dpm).

Multiply the resulting dpm by 6.67 to get dpm/100 cm².

This is your total contamination.

What is wipe testing?

Wipe testing is the swabbing of areas of a laboratory to determine if removable contamination exists.

Swabbing may be done with Q-tips, filter paper, or any other dry absorbent material.

Wipe Samples

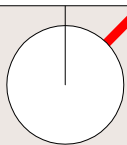
As a general rule of thumb, you should wipe about 1% of the accessible surface area in “hot” areas.

In “clean” areas, take wipes of frequently used items or areas - calculators, phones, door knobs, high traffic floors, etc.

Each wipe should sample about 100 cm².

Recommended Technique

Whatman No.
40 Filter
Paper



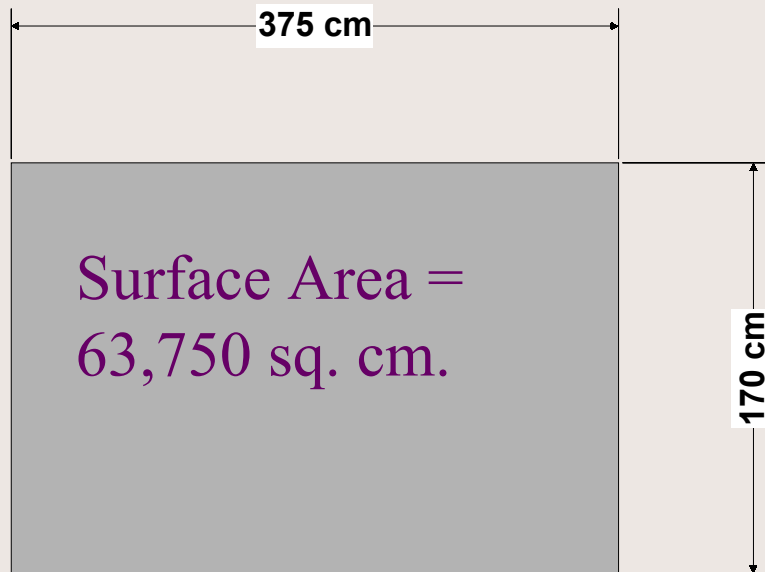
"Zig-zag" Path

Wipe along a 10-12 inch zig-zag path using a dry filter paper.

Use normal pressure (equivalent to the amount of pressure exerted in writing with a number 3 pencil).

Wear gloves!

1% Sampling Example



You would have to take
6-7 wipes to sample
1% of this surface
area for removable
contamination.

1% of 63,750 sq. cm. =
637 sq. cm.

Each wipe is 100 sq. cm.

Do I need special equipment for counting "wipes"?



No, the "wipes" can be counted in the liquid scintillation counter or gamma counter normally used for experiments.

Must I Survey During Periods Of Inactivity?

If no radioisotopes are handled in a particular week, no survey is required.

A log entry or survey report should be kept indicating that no radioisotopes were handled during the week.

Since a handling lab may also store radioactive materials, a survey should be performed at least once per month, even if no radioactive materials were handled during that month.

Where do I expect to find contamination?

Areas with a high potential for contamination include everything in the “hot” areas - work benches, fume hoods, pipettes, syringes, centrifuges, the floor, inside refrigerators/freezers, etc.

Where should I not expect to find contamination?

Contamination can be found anywhere.

Do not assume something is “clean” because it is in a nominally clean area.

Door handles, telephones, calculators and sink faucets in nominally clean areas are frequently found to be contaminated.

What actions should I take if I find a contaminated area?



Detergent



Paper Towels

1. Apply a commercial detergent to the contaminated area.
2. Allow the detergent to settle on the contaminated area for several minutes.
3. Use a paper towel or other absorbent material to remove the detergent.
4. Survey the area to determine if you were successful.
5. Discard the absorbent material (radioactive waste)