

# Radiation and Contamination Surveys

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## **1.0 Purpose**

- 1.1 The purpose of this procedure is to define how to conduct radioactive contamination surveys. The performance of periodic surveys and the way in which they are performed are required under sections of the (regulatory reference). This procedure is based on the model radiological survey procedure developed by the Nuclear Regulatory Commission.

## **2.0 Scope**

- 2.1 This procedure applies to all research laboratories at (your facility).

## **3.0 References**

- 3.1 NUREG 1556 vol. 11, Appendix S (Radiation Safety Survey Topics)

## **4.0 Equipment**

- 4.1 one inch (2.5 cm) diameter filter paper smear wipes (or equivalent)
- 4.2 impermeable gloves
- 4.3 radiation detection instrument (liquid scintillation counter or hand-held meter)

## **5.0 Precautions**

- 5.1 Protective gloves should be worn when smear wiping potentially-contaminated surfaces
- 5.2 Wipes should be separated to avoid cross-contamination
- 5.2 Do not use a single smear wipe to survey multiple 100 cm<sup>2</sup> locations or to survey areas significantly larger than 100 cm<sup>2</sup> (for example, one smear wipe may not be used to survey an entire bench top or to survey several 100 cm<sup>2</sup> locations on a work bench)

## **6.0 Procedure for conducting smear wipe surveys for radioactive contamination**

- 6.1 Areas where unsealed sources of radioactive material are used shall be surveyed monthly.
- 6.2 Pay special attention to posted work areas, fume hoods, waste disposal areas, storage areas, floor surfaces. Also check non-use areas in labs such as desks, trash containers, phones and areas where possible cross contamination might occur.

- 6.3 Conduct wipe tests to measure contamination levels from H-3, C-14, S-35, Ni-63 and/or other beta-emitting radionuclides with decay energies less than 300 KeV. Wipe tests may be used to detect other beta-emitting radionuclides (e.g. P-32) if desired. Wipe tests are performed by wiping a piece of dry filter paper or equivalent over an area of 100 square centimeters.
- 6.4 Count smear wipes for removable contamination in an appropriate counting device (i.e. liquid scintillation counter or beta counting system)
- 6.5 Record results as described below

## **7.0 Procedure for conducting a meter survey for radioactive contamination**

- 7.1 Radiation meter surveys may only be performed for isotopes emitting gamma radiation or beta particles with an energy greater than 300 KeV.
- 7.2 Prior to conducting a radiation meter survey, the following checks shall be performed:
  - 7.2.1 All radiation detection instruments must be calibrated annually. Verify the meter to be used is in calibration
  - 7.2.2 Verify proper battery operation by taking the main switch to the "Battery Test" position (or equivalent) and observing the needle deflection to the "Battery Test" (or equivalent) position
  - 7.2.3 Verify the physical condition of the instrument is satisfactory
  - 7.2.4 Verify the instrument cable is intact, in good physical condition, and does not have any cuts or tears in the insulation
  - 7.2.5 Set the audible response switch to the "On" position and set the response switch to the "F" (fast response) position
  - 7.2.6 Verify the meter has been checked for proper response against a source of known strength on the day of use.
- 7.3 Hold the radiation detector between 0.5 and 1 cm from the surface to be surveyed and move at a rate of 3-5 cm per second. **NOTE:** holding the probe at an excessive distance or moving the probe too rapidly may result in not detecting radioactive contamination. Holding the probe too close to the surface surveyed may result in contamination of the probe.
- 7.4 Record the highest net count rate reading noted on the survey map as noted.
  - 7.4.1 To determine the net count rate, subtract background count rate from the instrument reading. For example, if you have 50 cpm from background radiation (measured outside the area being

surveyed) and the instrument reads 300 cpm, your net count rate is 250 cpm.

7.4.2 *Convert this count rate to a disintegration rate using the meter efficiency for the isotope in use.* For example, if a count rate of 250 counts per minute is noted for P-32 and the meter efficiency for P-32 is 50%, the disintegration rate is 500 disintegrations per minute (dpm).

## **8.0 Recording survey results**

- 8.1 *Records will be kept of **all** survey results, including negative results.* These records shall be maintained in the radiation safety record binder.
- 8.2 *The record will include location, date, serial numbers of instruments used, results of the daily instrument response check (see 7.2.6, above), and the name of the person conducting survey.* Record background count rate in units of counts per minute if a direct radiation meter survey was used instead of smear wipes.
- 8.2.1 The survey record will include drawings of areas surveyed, identifying relevant fixtures such as active storage areas, waste, and work areas.
- 8.2.2 *Results shall be noted in units of disintegrations per minute per 100 cm<sup>2</sup>.* To convert instrument count rates to disintegration rates, divide the count rate by the instrument efficiency for the specific nuclide detected.
- 8.3 The RSO will be immediately notified if contamination levels exceed 1000 dpm per 100 cm<sup>2</sup>. Any areas containing removable contamination in excess of 200 dpm per 100 cm<sup>2</sup> shall be decontaminated to less than these levels.