

TRITIUM WIPE TESTS

Introduction

In order to check for any possible removable contamination, it is required that users and RPSs of Tritium take routine and programmed wipe tests. (Because of the low beta energy it is not practicable to detect tritium with a portable monitor). Advice is given below on what it has to be said is not an exact science! A factor that must be considered is that Tritiated materials may have penetrated *into* the surface of benches and other structures and become fixed contamination. It is not possible to quantify this type of contamination by means of the wipe test, and therefore fixed contamination is an issue that must be considered even after decommissioning a laboratory. Fixed contamination could also become dispersible if certain actions were taken. Drilling or cutting a bench for instance, would disrupt the surface and may disperse contamination.

Method

1. A 6cm Whatman GF/A filter paper (or No.1) is folded to form a small pad. This is then moistened with distilled water, held with forceps, and the area to be tested is then wiped. It is usual to wipe approximately 100cm^2 . This can be done by wiping a $10\text{cm} \times 10\text{cm}$ square or a straight or random transect of approximately 50cm in length (pad should be approximately 2cm wide). The filter paper is then put in a vial of scintillant that accepts aqueous samples and prepared for liquid scintillation counting.

2. Alternative techniques have been suggested using cellulose filter paper, or thin expanded polystyrene sheets (the later can be easily solubilised in some scintillation solvents to give a 'clear' solution). Also the use of glycerol or 5% 'Decon' to moisten the wipe has been suggested as a means of more effectively removing contamination.

Whatever mechanism is chosen, try to be consistent, in order to achieve a reasonable degree of reproducibility of results! Sometimes chemicals present on the wiped surface can give a false-positive reading (e.g. chemoluminescence). Resting the samples for an hour or over night before reading them again will alleviate this.

It is advised to compare blank samples with background samples from a similar (but known non-contaminated) surface in order to correct, if necessary, for any 'quench' effects introduced into the counting process by traces of polish or other surface contaminants, leading to false-negative readings.

Results

In analysing the results, it is assumed that the wipe test takes 10% of *removable* contamination from the surface, and that 100 cm^2 are sampled.

Taking an **action level** of 37 Bq/cm^2 , therefore one would detect $37 \times 0.1 \times 100$ (dps) (at 100% counting efficiency).

=370 dps

= **22,000 dpm**

For tritium, 37Bq/cm^2 could be seen as an excessively restrictive action level, however on the basis of ALARP, aiming to action at this level is good practice, but removal/decontamination to this level *may not* be possible depending on the surface characteristics.

Action to be taken on results

- a) $>220\text{ dpm}$ $<22,000\text{ dpm}$ – clean if practical, importance of removal dependent upon nature of work, and the nature of the facility. (Remember it is important to keep contamination as low as reasonably achievable).
- b) $>22,000\text{ dpm}$ – clean as soon as possible and remove as much contamination as reasonably practicable. Retest after cleaning. Look into possibility of other items in the laboratory being contaminated.

A record must be kept of the results of the wipe tests. (Two years)

Where to Wipe?

The most obvious places are bench tops adjacent to where the work with Tritium took place. Also, anything that could have been accidentally handled, e.g. fridge doors, cupboard fronts, automatic dispensers or pipettes, inside centrifuge lids and the floor beneath work stations. Fridge/freezer plastic linings are also a prime target! A formal 'map' or list of locations should be appended to the monitoring sheet or book.

How often to wipe?

User routine monitoring: This is at the RPS/users' discretion, but user monitoring should be carried out according to the amount and frequency of experiments, e.g. if experiments are once every 3 months, after each experiment has finished would be sufficient, but if the work was continuous for a period of time routine checks of work areas would be expected, depending on the risk assessment.

RPS programmed check monitoring:

When work is in progress in a non-designated area then a minimum of a monthly recorded survey should be performed, and in a supervised or controlled area a minimum of a weekly survey should be performed by the RPS.

If users/RPSs have any difficulty in removing contamination or require further information on wipe tests or monitoring in general they should contact their RPO/RPA as appropriate.

References

1. *The Ionising Radiations Regulation 2017, Approved Code of Practice and Guidance, Regulation 20:* Health and Safety Executive. www.hse.gov.uk.
2. *AURPO Guidance Notes on Working with Ionising Radiations in Research and Teaching:* Association of University Radiation Protection Officers.

3. *A Practical approach to the use of Radiation in Molecular Biology*: Gillian Scott-Wood, (Marie-Curie Research Institute). Published by H and H Scientific Consultants, Leeds, 1998

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