

Transport – Wipe Tests and Monitoring

Radioactive contamination detection and surface dose rate monitoring (of packages consigned for transport, and on fixed surfaces), using direct monitoring, wipe testing and liquid scintillation counting

1. Introduction

In order to comply with the current road transport regulations, it is necessary to test for the presence of non-fixed contamination on the external surface of 'excepted' packages, and to check the surface dose rate of the packages prior to transport.

The use of wipe testing is a means to identify any non-fixed contamination. Wipe testing is also used for determining contamination of laboratory fixtures and fittings.

Wipe testing in conjunction with liquid scintillation counting is used predominately for the testing of low energy beta emitters such as Tritium. For general information on Tritium wipe test see the 'Tritium Wipe Tests' publication on the HSD website. For higher energy beta emitters and for gamma emitters, a wipe followed by monitoring with an appropriate 'Mini' contamination monitor (Series 900/EP15 or 44A) is the method of choice.

2. Wipe Testing

Wipe testing is carried out by HSD staff to check for non-fixed contamination on the external surfaces of containers prior to transport for disposal of waste (Guidance on transport procedures can be found on HSD's website). Wipe tests are also carried out for contamination monitoring (See departmental local rules) and for the decommissioning of laboratories where no further radioactive work is to be carried out (see the *'Decommissioning of Laboratories used for Work with Unsealed Radioactive Sources'* publication also on the HSD website). Departments are also required to carry out wipe tests on waste containers prior to consigning to HSD's collection service. For Beta and Gamma emitters, non-fixed contamination must not exceed 4 Bq/cm²

The wipe testing kit should contain the following items:

Gloves

5.5cm diameter glass fibre filter papers

Forceps

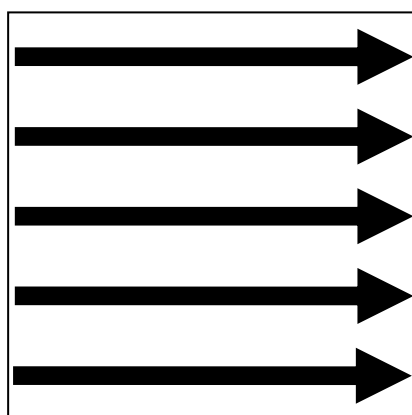
Distilled water in dispensing bottle

2" x 1/2" size plastic disposable scintillation vials and lids

Permanent marker

Surface Wiping

- 1) A 5.5cm Glass Fibre filter paper is folded to form a small swab. This swab is held with forceps and moistened with a little distilled water.
- 2) For fixed surface (i.e. non-transport activities) and decommissioning surveys, a 10 * 10 cm area is then wiped moving in the same direction with each wipe in order to avoid tearing the paper i.e.



Under the relevant transport regulations (*The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations*) the area of a transport container to be wiped should be 300cm². At least two such areas on opposite sides of the container should be wipe tested.

- 3) The swab is placed 3mm away from either or of both the EP15 and 44A probes as appropriate, to check for any non-fixed contamination. (4 Bq/cm² wiped – check the monitor calibration certificate for conversion factor cps/Bq)
- 4) If a check on Tritium contamination is needed, the swab is then put into a scintillation vial and labelled with a unique reference number. Scintillation counting can, if wished, also be carried out for other radionuclides.

3. Monitoring of surface dose rates of packages

For excepted packages, it is necessary that the surface dose rate of the package does not exceed 5 microsieverts/hour. Thus, the surface dose rates of containers consigned from departments to High Cross and those consigned from High Cross to the disposal site must be checked. In practice, provided the HSD advised limit of 200 MBq of radionuclide per waste drum is adhered to, it is extremely unlikely that problems will be encountered, except for consignments of ³²P, ⁵¹Cr, ⁷⁵Se and ¹³¹I and certain other Gamma emitters. HSD staff that collect waste containers from departments have been provided with a dose-rate monitor, and they will check all containers before accepting these for transport. Consigning RPSs are required to sign transport documents to confirm that surface dose rates of drums are less than the limit defined above.

Where a package exceeded the 5 μ Sv/hr limit this can still be transported by over packing in steel container. The surface dose rate and the steel container must still not exceed the limit stated above. Further details can be found the High Cross Local Rules.

When using the dose rate monitor, the base plate of the monitor should be brought to within one millimetre of the surface of the drum, avoiding if possible actually resting the monitor on the drum. The dose rate monitor should be checked for contamination after use, by means of a 900 series/ EP15 and 44A type monitor.

4. Analyses of Results

If we make some assumptions about the wiping and counting efficiency we can obtain a figure in counts per minute (cpm) that reflects the 4Bq/cm² 'non-fixed contamination' level for an excepted package. *Note that this transport 'action level' is more restrictive than levels quoted in the 'Tritium wipe tests' paper on HSD s website in respect of general decontamination surveys of laboratory fixtures and fittings.*

4Bq/cm² over a 100cm² wipe is 400 decays per second (dps)
Assuming a 10% contamination removal with a wipe and a 40% tritium counting efficiency then:

400/10 * 40% cps = 16 cps
16 cps is 960 cpm

If any samples return a scintillation count result of more than 960 cpm then this reflects a level of removable contamination in excess of the 4Bq/cm² waste transport limit.

This figure becomes 2880 cpm for a 300cm² wipe as required in the transport regulations.

5. Action to be taken on results

All results should be compared with the 'Blank' to identify any contamination. There will always be some deviation from the blank due to varying levels of quenching from the dirt and other non-radioactive contamination from the surfaces being wiped. The level of 4Bq/cm² should not be seen as the point at which decontamination should stop; Under the ALARP principles any level of contamination that can reasonably be dealt with, should be reduced. In practice where the sample cpm is more than double the blank cpm then action should be taken.