Radioactive sources in laboratory equipment

Introduction
This advice note has been prepared by the MRC Corporate Health and Safety Function in consultation with its Radiation Protection Adviser and is aimed at MRC units that own or are otherwise responsible for laboratory equipment containing radioactive sources. This advice is provided solely for use by MRC units. It is not intended to be a definitive statement of all possible legal requirements and should not be used by MRC units as advice to other organisations. In respect of these sources MRC units should also comply with any requirements imposed on them by host organisations such as university departments.

While the advice in this note is relevant to MRC units that hold permits for radioactive sources under the Environmental Permitting Regulations 2010 (EPR 2010) those units need to ensure that they comply with all the requirements of their permits and this will require them to consult the Radiation Protection Adviser covering the unit. (EPR 2010 came into force in April 2010 and replaced most of the provisions of the Radioactive Substances Act 1993.)

What types of radioactive sources are found in laboratory instruments?
There are two common applications:

- Liquid scintillation counters incorporate an internal calibration source, usually caesium-137, barium-133, europium-152 or radium-226, with a typical activity 370–1100 kBq.
- Many gas chromatographs employ an electron capture detector (ECD) that incorporates a nickel-63 source (typically 370 or 555 MBq).

Some other equipment such as gamma counters may also incorporate internal sources.

What risks do these sources present?
The radiation risk presented by these instrument sources is low. However, they are subject to regulations and if not properly cared and accounted for there is a risk of breaching these, which could easily lead to enforcement action taken against MRC. It is very important that these sources do not get mislaid and that at the end of life of the equipment they are not forgotten about and inadvertently disposed of via normal equipment disposal routes.

What regulations apply?
These sources are subject to the Ionising Radiations Regulations 1999 (IRR99) and also fall within the remit of the EPR 2010, although currently they do not require an EPR permit because of the provisions of the Radioactive Substances (Testing Instruments) Exemption Order. However, the exemption order has conditions which must be complied with, some of which overlap with IRR99 requirements.

What do MRC units need to do?
Those procuring laboratory equipment that may contain a source for use by MRC on any premises must determine if a source is present and what type: If in doubt the supplier should be asked to confirm this before procurement takes place.
The proposed equipment procurement must be discussed with the MRC unit source coordinator (*terminology?*) and if necessary with an RPA to ensure that the source can be legally held by MRC. If the Testing Instruments Exemption Order does not apply a permit under EPR 2010 will be required - this will mean a delay before the equipment can come onto site. If the MRC equipment is to be used on another organisation’s site the relevant person at the host site, e.g. a university radiation protection officer, must be consulted. (Responsibility for MRC owned equipment continues to lie with MRC even if the source is also subject to the host site’s rules).

All radioactive sources belonging to or under the responsibility of MRC, including those installed in laboratory equipment, should be on a central register of sources maintained by a co-ordinator at each MRC unit.

All equipment containing a radioactive source should come with a suppliers “leak test” certificate for the source – this proves that the source is intact and not leaking contamination.

Once the equipment arrives the MRC source co-ordinator must be informed so that the source can be put on the central unit register, and a copy of the supplier’s leak test certificate should be filed with them (keep the original with the equipment).

Essential contents of the unit’s central record of instrument radiation sources are:

- Radionuclide, source serial number, and activity at a reference date.
- The date received onto the premises.
- Type of equipment (make, model, serial number)
- Current location of the equipment and the name of the nominated responsible person.
- Eventually, the date and manner of disposal of the source.

Where not known any missing details may be accessible via the instrument supplier or maintenance engineer.

Each individual piece of equipment containing a source should be made the responsibility of a nominated individual. The nominated person is responsible for notifying the unit source co-ordinator of any changes including movement of the equipment. They must also ensure that there is a physical check made to confirm the equipment and its source are present. This must be done at no more than monthly intervals for static equipment and this check must be recorded.

The site source co-ordinator should verify at least once a year that the local records are being completed correctly and also ensure that a source leak test is undertaken at least once every two years, and a record kept of this. The wipe test can comprise simple swabs of external surfaces of the equipment including around the sample well which are counted in a scintillation counter. Record the date of the test, counter details, the name of the person who performed the test, and the result.

As an additional precaution, it is suggested that on the front of the equipment should be fixed a radiation warning (trefoil) sign and a notice with a legend such as “EQUIPMENT CONTAINS A RADIOACTIVE SOURCE AND MUST NOT BE MOVED OR DISPOSED OF WITHOUT PERMISSION OF [NAME OF SITE SOURCE CO-ORDINATOR].

Note that all the above requirements still apply even if the equipment is not in current use.

**Disposal of equipment containing sources**

The MRC unit source coordinator should be consulted prior to disposal of the equipment and/or the source. The coordinator will normally need to consult an RPA about disposal arrangements unless they have organised this before.

Equipment containing radioactive sources can be transferred to other bona-fide users, provided that this is agreed in writing and MRC obtains written confirmation of receipt of the source and that the recipient is fully aware of their duties and responsibilities.

If the equipment is to be scrapped then the radioactive source must be removed first and the source disposed of by one of the specialist contractors that can provide this service. (Some equipment suppliers may be willing to do this but there is currently no UK statutory requirement for them to offer this as a service.)

A receipt should be obtained from the radioactive source disposal company and kept by the MRC source co-ordinator.

Prior to disposal the equipment should be monitored for possible contamination since surfaces including sample trays, etc. may have become contaminated by radioactive samples put through a counter.

All “radioactive” markings must be removed from the equipment including any internal source housings labels (see photo). The equipment can then be disposed of in accordance with waste electrical equipment and other relevant requirements. (Note that liquid scintillation and gamma counters incorporate a heavy lead metal shield)