



Radiation Contamination Detectors and Monitors

The Australian National University has a range of radiation monitors and contamination detectors that contribute to the overall risk management strategy associated with ionising radiation work that is undertaken on campus. This equipment can be divided into three groups:

1. Radiation monitors
2. Standard radiation contamination detectors
3. Special radiation detectors

To provide users with confidence and assurance that the equipment is performing as expected, the following guidelines are recommended.

Radiation Monitor efficiency checks and calibration

Radiation monitors are those devices that measure radiation in terms of an exposure assessment (i.e., dose rate meters). These may display readings in units such as $\mu\text{Sv/hr}$ or mREM/hr .

- These monitors must be calibrated by an accredited or approved calibration service annually.
- Efficiency checks must be conducted annually and recorded in a logbook.

Radiation Contamination Detector efficiency checks and calibration

Radiation detectors are devices that measure count rate such as counts per second.

These detectors must be calibrated every five years by an accredited or approved calibration service. Efficiency checks must be conducted annually and recorded in a logbook. A basic detector test should confirm that the probe can detect the type of radiation being used.

Efficiency check

This check determines the detector's response to relevant radioactive sources.

A pure beta source (e.g. $^{90}\text{Sr}/^{90}\text{Y}$)

A gamma source (e.g. $^{137}\text{Cs}/^{137}\text{Ba}$).

One of these sources should be used at two (or three) activity levels to check the linearity of the detector. Varying the distance from the source can also achieve different count rates.

Approved Calibration Providers

Calibration can be undertaken by the following services:

- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) calibration services,
- NSW Australian Radiation Services,
- VIC Gamma Sonics,
- NSW Safe Radiation Australia Pty Ltd,
- Others

Special Radiation detectors

Special radiation detectors, such as those for low-energy X-rays, or neutrons should be calibrated as per the manufacture's recommendations. Basic checks and/or detector operation should be verified regularly.

Results Recording

All radiation monitors and contamination detectors must be identified by –

- Make
- Model
- (Probe model)
- Serial Number (and/or year of manufacture)
- Date of test/check
- Pass (Failed detectors shall be repaired/serviced and calibrated, or replaced)

- Initials of person testing

All radiation detectors (not monitors) must be entered into a central database along with their efficiency check results. This database is maintained by Safety and Wellbeing (S&W)). Any detector with a larger than normal variation from the average reading (for that type of detector probe) must be repaired, rechecked and calibrated by an approved external service.

Radiation Detector Efficiency Check

The local area Radiation Safety Officer must conduct the following radiation efficiency checks while following general ionising radiation safety protocols:

1. Enter the equipment's details in the attached form.
2. Visually inspect the detector for cleanliness, damage and wear. If damaged, have the detector serviced by a qualified repairer.
3. Switch on the detector and confirm that the battery is OK.
4. If the probe is covered with a protective film -remove it.
5. Uncover one radioactive source at a time.
6. Place the detector probe on top of the source to best obtain a maximum reading. Allow at least 20 seconds for the probe to respond, taking note of the upper and lower count rates. Record the average or medium count rate in the appropriate column on the form. Reject the detector if the count rate is too unstable.
7. Cover the radioactive source.
8. Repeat step 4-6 with the other two radioactive sources.

Radiation detectors that fail the efficiency test must be labelled and removed from service. They should be checked by a qualified person and repaired or replaced as appropriate.