

## **Risk Assessment Guidance for forms IR008 for work with Radiation Generators and IR008A for work with sealed sources**

Regulation 8 of the Ionising Radiations Regulations 2017 requires that an employer make a suitable and sufficient assessment of the risks associated with any new activity involving work with ionising radiation. The assessment should be conducted before starting the new activity.

The suggested formats for risk assessments will assist the employer in performing this risk assessment. These forms should be completed with reference to the relevant University radiations safety manuals. Where very similar activities are involved generic assessments may be suitable and may be applied with only minor modifications.

A section on Best Available Techniques (BAT) is included in the sealed source risk assessment but not the radiation generators form (BAT does not apply to work with X ray machines/generators). This section is to demonstrate that Best Available Techniques are observed in order to minimise the disposal of radioactive waste to the environment and to minimise radiation exposures of the public, as required under the Environmental Permitting Regulations 2016 (EPR). Please refer to the requirements under your EPR permit or Exemption Order as applicable and consult the Safety Office Radiation Protection Advisers.

Listed below are general notes which refer to sections of the risk assessment forms for work with X ray and sealed sources.

### Description of Work

This should be sufficiently detailed to unambiguously define the scope of the particular assessment.

### Location of Work

This may be a specific room, or a more general type of location, such as “classrooms” or “X ray laboratories”.

### Assessment Title / Code

The title chosen should enable the assessment to be readily identified in the future. It is recommended that assessments are filed together in a central location and are well indexed.

### Employees Involved

This should include staff directly involved in the activity, and those in the vicinity. Where staff performing different roles will be exposed differently, list these roles distinctly (for example, in X ray veterinary work, the operator behind the screen and the nurse holding the patient)

### Others Involved

Others are those who are not employees e.g. visitors

### Any pregnant persons involved

### Source of Ionising Radiation

For X ray equipment, specify the type and maximum energy likely to be used in practice.

For sealed sources, specify the radionuclide(s), maximum likely activity, half-life and energies of predominant emissions.

### Nature of Risk

Likely to be exposure to external radiation.

For sealed sources, contamination will only be a possibility if the source is leaking and this will be an accident or hazard situation.

For X ray equipment, state whether exposure is to scatter only, or includes primary beam.

### Estimated Dose / Dose-Rates to Persons

For each of the groups of employees and others above, identify likely dose-rates or doses. This is likely to be dose per exposure or procedure, or dose per day if more appropriate. Assumptions will normally need to be made regarding distances, exposure duration, protection provided by shielding etc. Where doses to specific parts of the body (e.g. fingers, eyes) are likely to be considerably greater than the whole-body dose, these doses should be considered in addition to the whole-body effective dose. Include normal operation and special operation (e.g. alignment).

The equipment or source manufacturer should provide information on dose rates, and the RPS, Safety Office or RPA will be able to advise you regarding typical dose-rates associated with common uses of ionising radiation. Where exact data is not available, or the factors involved vary considerably, estimates of dose should be pessimistic (but realistic), so as not to under-estimate the dose received.

### Advice about Equipment Use and Maintenance

Record frequency of quality assurance tests, services and planned preventative maintenance. Also any other advice from supplier/installer relevant to the ensuring the correct operation of equipment.

### Engineering Controls and Design Features

State any physical controls/features which are intended to restrict radiation exposure. Examples would include any shielding, enclosures, interlocks and warning lights/signs.

### Planned System of Work

Briefly summarise the main points of the system of work which relate to restriction of a person's exposure.

### Extent of Unrestricted Access

State whether unrestricted access to areas where dose-rates are high is an issue. Normally access will be restricted by the operator or engineering controls while the dose-rate is an issue.

### Designation of Controlled and Supervised Areas and Limitation of Access

Under IRR17, a controlled area is required anywhere where an employee needs to follow special procedures designed to restrict exposure. Controlled areas are definitely required where an employer is likely to receive a dose in excess of three-tenths of a dose-limit, or where the dose-rate exceeds 7.5  $\mu\text{Sv/h}$  when averaged over 8 hours.

Supervised areas are unlikely to be required in many situations. They should be designated where the employer wishes to keep the area under review, with a view to designating the area as controlled. Also where a whole body dose of 1 mSv, or one-tenth of any other dose-limit might be exceeded.

Describe areas to be designated, and how access is to be restricted.

#### Local Rules Required and RPS

Local Rules will be required for each controlled area, and normally for supervised areas. Brief details of important systems of work should be included, and the RPS named. An RPS is only required where an area has been made subject to local rules.

#### Training Requirements

Detail relevant training including reference to practical hands on training. Highlight need for ongoing training and how this is to be provided.

#### Altered working for pregnant staff

Changes are unlikely to be required in the majority of situations, but it should be made clear to female workers whether or not this is likely to be an issue. State that employer will re-assess risks once pregnancy is declared in writing by employee.

#### Possible Accident Situations

IRR17 requires that the risks associated with reasonably foreseeable radiation accidents are evaluated, as well as the risks associated with normal use. Radiation accidents are defined as any accident where immediate action would be required to prevent or reduce exposure to ionising radiation. List any such accidents here. Equipment failures, failures of systems of work and predictable forms of unauthorised behaviour should all be included.

#### Steps to Prevent Accident

State how the likelihood of the accident can be minimised.

#### Steps to Limit Consequence of Accident

State how doses could be minimised in the event of the accident occurring.

#### Likelihood of Accident

For accidents detailed overleaf, state the likelihood of accident occurring, in general terms – e.g. low (unlikely), medium (possible), high (likely).

#### Consequence of Accident and Maximum Dose Estimate

State likely consequences, who might be exposed and estimate maximum doses to exposed persons.

#### Results of Previous Dosimetry / Monitoring

State any dosimetry/monitoring results from similar situations. These should confirm the dose estimates made. Typically, this might include that staff whole body doses are normally less than 0.15mSv per month, or similar.

#### Personal Monitoring and Need for Classification

As a general rule, doses should be monitored where it is anticipated that doses might exceed one-tenth of a dose limit. Additional monitoring might be of value as reassurance, or to demonstrate that systems of work are effective. Classification will only be required where it is anticipated that doses might exceed three-tenths of a dose limit. The need for classification is rare in the University, but consult the Safety Office/RPAs.

#### Personal monitoring and the Dose Investigation Level

To ensure that doses are kept ALARP, the employer must perform an investigation when for the first time in a year an employee's cumulative whole body dose exceeds the dose investigation level. The employer may set this level at 15 mSv or any lower dose deemed more appropriate. For most situations, the University recommends that this level is set at 2.0 mSv. This is one-tenth of the dose-limit, and will also correspond

to the '1mSv to the foetus' recommendation in pregnancy. The Investigation Level must be specified in the Local Rules.

To calculate the estimated maximum annual dose to employees and others, multiply the doses evaluated above by appropriate frequency factors to derive likely annual doses. This is likely to involve further assumptions about workload, patterns of work etc. Frequencies should refer to the maximum likely frequency for a single member of staff (e.g. If a department performs a process 70 times a month, but three staff share the work approximately equally, it might be reasonable to assume no single member of staff would perform more than 30 procedures.) In general, persons other than employees are likely to be exposed very rarely compared with employees.

#### How compliance is to be Achieved

That is, compliance with the local rules and/or safe working procedures, monitoring etc, normally through appropriate training and supervision of practice by the RPS.

#### Any additional actions needed to ensure doses are kept ALARP

The next section on the form relates to additional control measures required to restrict doses further. Clearly, as many dose restricting measures as are reasonable should be used, so as to keep doses ALARP. However, as a rule of thumb, if the annual whole body dose to employees closely involved is more than one tenth of the dose limit (2.0mSv) further dose reduction should be sought. Further dose reduction should also be sought if members of the public are exposed to doses in excess of the recommended dose constraint of 0.3 mSv. Where the assessment indicates that exposures will already be restricted sufficiently, this section need not be completed. In identifying ways to restrict exposure, it is important not to consider radiation risks in isolation from other risks.

On the basis of the assessment performed, the employer should now be in a position to finalise the ways in which exposures are to be restricted as basic safe working procedures should be written into Local Rules.