

Risk Assessment for Radioactive Work

Before any new or significantly altered work involving sources of radiation is started, a risk assessment must be carried out. The purpose is to identify the measures needed to restrict the exposure to ionising radiation of anyone who might be affected by it, for example the radiation worker, other people working in the vicinity, maintenance and cleaning staff, or members of the public.

A risk assessment should be submitted with each application for new work with open, closed or X-ray sources of radiation. Forms [Rad 5](#) (open sources) and [Rad 6](#) (machine sources) may be used to develop the risk assessment to accompany the application. An alternative format may be used as long as the necessary information is provided.

The risk assessment should identify the nature and extent of any radiation hazard that might arise from either:

- The intended use of the source, or
- Any foreseeable accident, occurrence or incident.

The range of hazards to be considered includes:

- i. Exposure to external radiation arising from close proximity to, limited shielding of, or prolonged exposure to a source. In addition to normal operation consider non-routine operations such as alignment or adjustment of equipment.
- ii. Internal radiation exposure through ingestion, inhalation, inoculation or skin absorption. This could occur as a direct result of poor containment, the potential for contamination, or inadequate ventilation controls (e.g. fume cupboards).
- iii. Exposure of the researcher, other laboratory workers and/or ancillary staff involved in handling and disposing of any waste produced by the experiment.

Content of Radiation Risk Assessment

The risk assessment should cover the following aspects:

1)	Outline of Procedure. Describe the radiation procedure, amounts of activity, duration, frequency, location.
2)	<p>Justification for the use of radioactive materials and for the quantities involved, i.e.</p> <ul style="list-style-type: none"> • Why does a radioactive technique need to be used? • Why are the quantities described needed?
3)	<p>Control of Exposure. Description of the steps taken to control the radiation exposure, both external and internal, i.e.</p> <ul style="list-style-type: none"> • Physical - designation and suitability of the laboratory, access restriction, containment, shielding, • Procedural - design of procedure, training and competence.
4)	<p>Dose Estimation. A prediction of the possible dose assuming that the controls are successfully implemented.</p> <ul style="list-style-type: none"> • External doses can be estimated by measurement of similar operations using a radiation monitor, for example from indicative dose rate measurements (uSv/hr) at distances from sources of relevant activity and summated for typical time spent per year. Alternatively the dose may be estimated by reference to indicative information - the Safety Office can provide such information. In the case of machine sources of radiation a survey may be required to establish dose rates in the vicinity under various operating conditions, including maintenance and adjustment etc. • Internal doses can be received through inhalation of volatile radioactive emissions, absorption through the skin (accidental spillage or contaminated surfaces) or by ingestion. The procedure should be evaluated to identify those steps that could give rise to an exposure through these routes and identify the controls to be applied to restrict this. An indication of the potential for internal hazard can be gained from comparison of the ALI (Annual Limit on Intake) for the isotope with the quantity to be handled.
5)	<p>Identification of significant foreseeable accidents and development of appropriate contingency arrangements. For most work the standard radiation accident procedures described in the local rules should be sufficient. However if the proposed work could create an unusual hazard due to its location or the nature or quantity of the source then additional consideration is required. This should identify the potential for external and/or internal dose, how these would be dealt with and any waste arising disposed of.</p>

Given the standard range of precautions in place to restrict dose and the record of minimal radiation doses in research and teaching, the residual risks in most activities will be very small and the conclusions of the risk assessments should reflect this. There should therefore be little requirement for further action over and above the careful

application of standard procedures. However, should the assessment show there to be a particular radiation hazard, then controls to prevent or minimise it will be needed.

The conclusions from the risk assessment relating to control methods to reduce or eliminate exposure will need to be incorporated into the local rules and/or experimental protocols.

The radiation worker(s) concerned should receive information, instruction and training in the risks of the work and the safe conduct of this. Records of training should be maintained. There should also be effective supervision to confirm that procedures are operating correctly.