Safe Working with Radiation

General Principles

It is a requirement that all work involving sources of ionising radiation is carried out in a manner that restricts, so far as is reasonably practicable, the exposure to ionising radiation of those carrying out the work and of others who could be affected by the work. The framework for achieving this is defined by the Ionising Radiations Regulations.

Work with radioactive material must also be carried out in compliance with environmental protection legislation. In particular the Environmental Permitting Regulations impose conditions on acquisition, storage and disposal (including application of best available techniques to minimise releases), either by virtue of licences issued by the Environment Agency, or through standard conditions applying to the exemption from licensing of certain classes of material.

The University's arrangements for working with sources of radiation are intended to ensure that the above criteria are met.

Organisation

The Director of Health and Safety acts as Radiation Protection Officer and is responsible for developing and reviewing policies and procedures to secure compliance with the relevant legislation, monitoring their implementation, advising on standards for the design, refurbishment and decommissioning of radiation facilities and submitting the University's notifications, applications and incident reports to the relevant agencies. Matters concerning work with radiation are reported to the Safety Committee. In particular the Safety Committee shall receive an annual report of work with radiation.

Radiation incidents are reported to the Radiation Protection Supervisor and to the Safety Office as soon as possible and formally recorded and investigated via the on-line incident reporting system. Incidents are investigated by the person responsible for the area in conjunction with and support from the RPS and Safety Office as appropriate. These shall be managed to completion and reported through the local health and safety management organisation, typically via reports to the School Safety Committee which reports to the School Management Group. Incident reports, depending on the nature of the incident, might require notification by the Safety Office to the Environment Agency, HSE, Police, CQC or MHRA.

Specialist radiation protection advice to the Director of Health and Safety is obtained through a contract with the Medical Physics Department of the Nottingham University Hospitals NHS Trust. The contract provides for the following services:

- A Radiation Protection Advisor to advise in relation to best practice in minimising occupational radiation exposure and compliance with the Ionising Radiations Regulations;
- A Radioactive Waste Advisor to advise in relation radioactive waste disposal and environmental radiation protection and compliance with licences issued under the Environmental Permitting Regulations; and
- A "Medical Physics Expert" to advise in relation to equipment used in connection with medical exposures.

Matters on which the Advisor is consulted include development and review of radiation policies and Local Rules, design and commissioning of facilities for working with radiation, and compliance with radiation licences. The Advisor will also periodically review local radiation protection arrangements with the Director of Health and Safety.

The Head of any School working with sources of radiation shall appoint a Radiation Protection Supervisor to develop and monitor local radiation safety arrangements. Model duties of Radiation Protection Supervisors are described in Effective Safety Management. The Radiation Protection Supervisor shall have appropriate experience and seniority and shall receive appropriate training.

Academic supervisors are responsible for ensuring that those working under their supervision receive the necessary training and instruction to enable them to work safely and in accordance with the Local Rules. There should be sufficient supervision to enable the continuing adherence to correct procedure to be monitored. Where radiation workers will be working elsewhere, or if external workers are being hosted, a "co-operation of employers agreement" will be required to ensure that responsibilities for control arrangements such as risk assessment, training, supervision and dosimetry are agreed with the other employer.

Radiation Workers must follow the University and School Local Rules. They must be aware of the conclusions from the risk assessments relating to their work and adhere to relevant written procedures to ensure safe use. The work area must be regularly monitored and recorded in the laboratory or workstation monitoring record book. Use and disposal of labelled compounds must be accurately and promptly recorded.

Authorisation of Work with Sources of Ionising Radiation

All work with sources of ionising radiation must be pre-notified to and approved by the Safety Office. This is to ensure that suitable facilities and procedures are in place to enable the work to be carried out safely in accordance with the Ionising Radiations Regulations and that the requirements for the keeping and disposal of radioactive sources under the Environmental Permitting Regulations 2010 (replacing the Radioactive Substances Act) are in place.

There are formal notification procedures for open sources (e.g. radiochemicals), closed sources (for calibrating instruments or as part of the detection or measurement device such as gas chromatographs and liquid scintillation counters), and X-ray generating equipment. The various requirements are outlined in a summary document.

It is a requirement that for work with sources of ionising radiation to be carried out:

- The School and/or Division must have suitable organisational controls in place with competent responsible persons appointed to supervise the work,
- Local Rules and Contingency Plans have been developed,
- The room(s) in which the radioactive source is it be used and stored have been assessed for suitability by the Safety Office and designated for the work,
- The sources have been approved for the quantities to be held, used and disposed, if appropriate, and
- Work with the sources is restricted to registered radiation workers with the exception of some undergraduate work subject to risk assessment.

Registration of Radiation Areas

All areas in which radioactive work is to be carried out must be approved by the Safety Office before the source is introduced. The Safety Office maintains a register of approved radiation areas and the scope of the approval, i.e. the nature of the sources permitted and the designation of the area (Controlled, Supervised, and Registered). A request for approval of a radiation area must be submitted using either Form, Rad 1, Rad 2 or Rad 3, as appropriate to the type of work proposed.

Approval of a new radiation area, or to use an existing radiation area for a new process, isotope or increased quantity of isotope, will normally entail an inspection of the room. The room will be designated if it satisfies the relevant requirements for the work proposed. Alternatively, recommendations for improvements will be made and following re-inspection after these have been completed it will be designated. See guidance on radiochemical laboratory design.

Once designated as a controlled or supervised radiation area it must be identified on the hazard plan for the building. Each School with significant process hazards is responsible for updating the building hazard plans. The building hazard plan is used to provide information to the emergency services and to identify hazards to maintenance staff or contractors via the works request system. This must be further updated in the event of any significant changes, including decommissioning of the facility. Further information and guidance on this is available on the Safety Office Website.

A radiation area will be designated into one of three categories which reflect the work done in them, the maximum external dose-rate likely to be present and/or the potential for contamination leading to internal exposure, and the facilities provided.

The designation categories are:

- Controlled Area - the nature of the work, the quantity and properties of the isotope and/or the external dose rates deem this to be a higher hazard radiation area and/or follow "special procedures to restrict exposure";
- Supervised Area - an intermediate hazard radiation area subject to ongoing review to ensure that conditions are maintained;
- Registered Area - an area of trivial radiation hazard requiring minimal controls but subject to ongoing review to ensure that conditions are maintained. This is the minimum designation for any area in which a radioactive source, including those found in instruments, can be used. Dispensing of radiochemicals or other

open manipulations of these should not normally be undertaken in order to avoid contamination of lower design specification areas.

Decommissioning of Radiation Facilities

The Safety Office must be notified by email in advance of any intention to discontinue radiation work in a facility, or to decommission it. This is to ensure that:

- All radioactive material has been appropriately dealt with, i.e. moved or disposed of and accounted for. Form Rad 4 must be competed for removal or disposal of sealed sources;
- Equipment, fixtures and fittings are monitored to ensure that they are uncontaminated, or that if contaminated they are identified to ensure that they are correctly dealt with or managed. This might identify items such as drains or benches that require further treatment before removal or specialised disposal; and
- Key records such as monitoring records, floor plans and Local Rules are retained. The original records shall be retained by the RPS with electronic copies sent to the Safety Office.

The Radiation Protection Supervisor shall oversee the initial clearance and decommissioning having notified the Safety Office and obtained advice as necessary. On completion a final survey shall be carried out by the Safety Office radiation technician in conjunction with the RPS and a Decommissioning Record (Rad 7) completed. If this final survey identifies components within the room that require further consideration for building alterations, such as drain removal or alteration, then these items will be labelled with trefoil tape and notified to the Estate Office for information for contractors.

Registration of Radiation Workers

Any person intending to work with a source of radiation and who may be exposed to it **must** be registered with the Safety Office as a radiation worker before starting the work. There is an exception to this for supervised undergraduate laboratory practical work.

A radiation worker can only be registered against an existing radiation project. The nature of the sources (isotope, activity, energy etc) stated in the new worker registration form must not exceed those stated in the project registration.

The registration form must be countersigned by the Radiation Protection Supervisor before it is sent to the Safety Office.

The Safety Office will determine the dosimetry requirements for the worker. The radiation worker will be issued with a copy of the appropriate University Local Rules via the Radiation Protection Supervisor. Once the Safety Office has received the acknowledgement of this the Radiation Protection Supervisor will be notified that the registration has been completed and issued with a dosimeter and/or Isostock Password as appropriate for distribution to the worker.

Radiation workers are required to attend an introductory radiation safety presentation (presentation notes) at the earliest opportunity. Failure to so may result in the registration being suspended.

Radiation workers are responsible for the care and correct use of their personal radiation dosimeter. In particular it must be worn when carrying out radiation work and at other times kept in an area away from sources of external radiation. The dosimeter must be available for prompt exchange at the end of the wear period. Loss of a dosimeter will incur a charge to the School.

The Safety Office receives a quarterly report of dosimeter readings. These are reviewed by the Safety and Radiation Protection Officer. Annual investigation levels are set at 1mSv per annum for whole body dose and 4mSv for extremities. Furthermore any readings for a quarter that exceed 0.5 mSv for a whole body badge or 2 mSv for an extremity badge are investigated via the Radiation Protection Supervisor. These levels although low exceed normal expectation for the type of work. A Radiation Worker is entitled to information concerning his or her dose history on proof of identity.

The Ionising Radiations Regulations require that workers who might receive a dose in excess of 6 mSv or three-tenths of any other relevant dose limit shall be "Classified". The nature of work with radiation at the University is such that exposures are highly unlikely to approach this hence workers are normally not classified. Any worker designated as a classified worker will require Medical Surveillance via Occupational Health.

Additionally, radiation workers intending to work with quantities of isotope in excess of the maximum usage quantity for a supervised area will also be enrolled for Medical Surveillance via Occupational Health. Approval to work will not be issued by the Safety Office until medical clearance has been received.