NRL
National Radiation Laboratory

Core of knowledge for a licence to use irradiating apparatus for the purpose of installation and servicing (general medical x-ray equipment - including CT, fluoroscopy and mammography equipment)

This core of knowledge summarises the basic level of radiation safety knowledge an applicant must demonstrate to be granted a licence under the *Radiation Protection Act 1965* to use irradiating apparatus for the purpose of Installation and Servicing, restricted to general medical x-ray equipment (including CT, fluoroscopy and mammography equipment).

Applicants can demonstrate that they have the required knowledge by:

1. completing an NRL-recognised training course (including an end-of-course assessment), or
2. providing documented evidence of other training addressing the core of knowledge.

Please contact the National Radiation Laboratory for further information regarding recognised training courses, and written or verbal assessments conducted by NRL.

Required knowledge

Applicants must display knowledge in all of the modules set out below.

The depth of knowledge required for each topic is indicated using the following scale:
(1) Introductory. Overview and familiarity only.
(2) Working. Knowledge gained should be able to be used in problem solving and practical situations.
(3) In depth. In addition to a working knowledge there should be a good understanding of the underlying basis or theory.

Module Standard 1 — **Nature and sources of ionising radiation**

- Electrical production of X-rays (2).
- Types and characteristics of radiation (*X-ray, gamma and beta)* and its interaction with matter (1).
- Quantities and units (activity, absorbed dose and effective dose) (2).
- Sources of ionising radiation (natural and artificial) (1).

Module Standard 2 — **Biological effects of ionising radiation and associated risks**

- Damage mechanisms (1).
- Whole body and extremity exposures (1).
- Deterministic effects; skin erythema, cataracts, LD_{50} etc (1).
- Stochastic effects; cancer and hereditary effects (1).
- International Commission on Radiological Protection's risk factors and radiation risks in perspective (1).
- Public perception and communication of radiation risk (2).

Module Standard 3 — **International Commission on Radiological Protection's principles of radiation protection**

- Justification (2).
- Optimisation ('as low as reasonably achievable') (2).
- Individual dose limits (occupational and public dose limits, extremity dose limits and pregnant women) and
- Dose constraints (2).

Module Standard 4

Legal framework and regulatory authority

- The *Radiation Protection Act 1965* and amendments and the *Radiation Protection Regulations 1982*. Particular emphasis should be placed on owner and licensee obligations (2).
- Role of the National Radiation Laboratory (NRL) and compliance monitoring (2).
- Reporting of radiation incidents to NRL (including NRL's incident report form) (2).

Module Specific 1

Incidents (focussing on general medical x-ray equipment)

- Review of incidents reported worldwide (1).
- Discussion of lessons learned (2).
- Practical exercises based on plausible scenarios (2).
- Recognition of a radiation incident, immediate actions, and how it should be investigated and reported (2).

Module Specific 2

Practical radiation protection

- *Code of Safe Practice for the use of x-rays in medical diagnosis NRL C5, 1994* (2).
- Model radiation safety plan (2).
- Critical safety assessment (2).
- Radiation measurement instrumentation likely to be encountered (2).
- Performance of radiation measurements (2).
- The need for and the benefits of personal monitoring. To include: advantages and uses of different types (electronic and passive) of personal monitors and the meaning of doses reported in relation to dose limits and dose actions levels (2).

Module Specific 13

Radiation protection characteristics of radiographic, CT, fluoroscopy and mammography equipment and their safe use

As applicable:

- Types, principles and known hazards of operation (3).
- Primary beam characteristics (filtration, kV, mAs) (2).
- Scattered radiation (characteristics; dependence on radiation output, beam area, distance; angular dependence) (2).
- Leakage radiation (1).
- Practical application of the 'as low as reasonably achievable' principle with a particular emphasis on minimising personnel doses (time, distance, shielding) (2).
- Typical patient doses (1).