Core of knowledge: X-ray analytical equipment

This 'core of knowledge' is the basic level of training in radiation safety an applicant must demonstrate to be granted (additional conditions apply) a licence under the *Radiation Protection Act 1965* to use:

irradiating apparatus

for the purpose of

X-ray analysis.

Continuing education

Once every **3 years**, licensees will be required to demonstrate evidence of continuing education. Guidance on continuing education is available from the National Radiation Laboratory (NRL).

Training courses based on this core of knowledge

Practical component

Practical experience with radiation measuring instrumentation and X-ray analytical equipment is expected.

Assessment

Following completion of the training course, each participant who intends to apply for a licence is required to complete a written assessment designed to confirm that the objectives of the training course have been met.

Duration

It is expected that a training course (including assessment) will be approximately 4 to 6 hours in duration.

Modules

Each core of knowledge is made up of standard-modules, and where applicable, one or more specific-modules. A standard-module (small variations can be expected between individual cores of knowledge) is common to all cores of knowledge.

Guide to depth of knowledge required

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.

Core of knowledge

Modules

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

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

Standard 2 **Biological effects of ionising radiation and radiation 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).

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 workers) (2).

Standard 4 **Legal frame work and regulatory authority**

- The *Radiation Protection Act 1965* and amendments and the *Radiation Protection Regulations 1982* (2). Particular emphasis should be placed on owner and licensee obligations.
- Role of the National Radiation Laboratory (NRL) and compliance monitoring (2).
- The reporting of incidents to NRL.

Modules

Specific 1 **Incidents**

- Review of incidents reported worldwide (1).
- Practical exercises based on plausible scenarios (2).

Specific 2 **Practical radiation protection**

- *Code of Safe Practice for the Use of X-ray Analytical Equipment, NRL C17, 2001* and associated *Guidance Notes: Safe Practice for the Use of X-ray Analytical Equipment, 2001* (2).
- Radiation safety plans.
- Radiation measurement instrumentation likely to be encountered (2).
- Performance of radiation measurements (2).

Specific 5 **X-ray analytical equipment**

- Types, principles and known hazards of operation (2).