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**CODE OF SAFE PRACTICE FOR THE USE OF
X-RAY SECURITY AND INSPECTION
SYSTEMS**

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1 INTRODUCTION

- 1.1 This *Code of safe practice* covers the use of fluoroscopic x-ray security systems for screening of baggage, mail or people, and fluoroscopic x-ray inspection systems used for quality control inspection of bulk foodstuffs (detection of foreign bodies), and manufactured items such as tyres and wheel castings.
- 1.2 The ownership and use of irradiating apparatus is controlled by the *Radiation Protection Act 1965* and *Radiation Protection Regulations 1982*. As well as mandatory compliance with the *Act* and *Regulations*, anyone licensed to use an x-ray security or inspection system will be required by a condition on the licence to comply with this *Code*.
- 1.3 This *Code* stipulates the specific way in which some parts of the *Act* and *Regulations* must be satisfied with respect to x-ray security and inspection systems. As well, there are further requirements that are recognised as good practice necessary for safety. All of these requirements are indicated by the word “**shall**”. They are binding on **all** people licensed to use x-ray security and inspection systems. Whenever a responsibility is shared by more than one licensee, to avoid ambiguity, one person must take the role of ensuring the responsibility is carried out. This licensee is referred to in this *Code* as the **principal licensee**.
- 1.4 General advice on the safe use of x-ray security and inspection systems and compliance with the radiation protection legislation and this *Code* is given in *Guidance notes: safe practice for the use of x-ray security and inspection systems*.
- 1.5 This *Code* deals with radiation safety only. Other legislation covering occupational safety, local body planning and other issues may overlap with the radiation protection legislation. Compliance with this *Code* in no way implies that all or any of these other requirements have been satisfied.
- 1.6 If for purely technical reasons relating to a particular piece of equipment or procedure it is either not possible or deemed unnecessary to comply with any requirement or requirements in this *Code* then an exemption from the specific requirement or

requirements for that piece of equipment or procedure may be granted on application to NRL. An application for exemption will need to demonstrate that the proposed alternative to the requirement does not compromise the intent of the relevant section of the *Code*. Written evidence of this exemption must be retained for audit purposes.

2 RADIATION SAFETY MANAGEMENT

2.1 Radiation safety plan

2.1.1 The principal licensee **shall** ensure that full and up-to-date records and documented procedures are kept in relation to every x-ray system for which they are responsible. This documentation **shall** be known collectively as the radiation safety plan, and for each facility **shall** include the following:

- a) details of radiation safety policy, responsibilities and names of persons authorised to operate the x-ray equipment;
- b) radiation protection induction and training requirements for staff, and associated records;
- c) a register of all x-ray systems;
- d) a record of the movements of all systems that may be operated in more than one location;
- e) procedures for radiation safety audits as specified in Section 2.2 of this *Code*, and associated records;
- f) records of maintenance and repair work on x-ray systems;
- g) incident and accident investigation records;
- h) written local rules for the safe operation of x-ray systems;
- i) written emergency procedures.

2.1.2 Records as required in paragraph 2.1.1 (b)-(g) **shall** be kept for 5 years.

2.1.3 The principal licensee **shall** be responsible for ensuring that all persons involved in the use of the x-ray equipment at the facility are familiar with the radiation safety plan.

2.2 Radiation safety audits

2.2.1 The principal licensee **shall** cause to be carried out on installation, after major maintenance, and at least annually a radiation safety audit that verifies compliance with this *Code*.

2.3 Storage of x-ray systems

2.3.1 The principal licensee **shall** store any x-ray equipment not in current use in the following manner:

- (a) the mains supply is disconnected from the generator, and
- (b) the x-ray unit is stored in a locked room with controlled access.

2.4 Maintenance and servicing

2.4.1 Any maintenance or servicing of x-ray systems that involves the x-ray generator or tube, or production of x-radiation, **shall** be carried out only by a person appropriately trained and licensed under the *Radiation Protection Act 1965* to carry out such servicing.

2.4.2 The principal licensee **shall** ensure that all information necessary for the radiation safety of a contractor is fully disclosed and effectively communicated to the contractor prior to the commencement of any work.

3 FACILITIES AND EQUIPMENT

3.1 The principal licensee **shall** ensure that:

- (a) no new x-ray system is put into routine operation until after an initial radiation safety audit has been carried out and compliance with the *Code* established;
- (b) each x-ray system is either sufficiently well shielded and interlocked or sufficiently remote from occupied areas to ensure that no person receives an effective dose exceeding 0.3 mSv per year;
- (c) any x-ray system is switched on using a removable key which cannot be withdrawn when in the 'on' position, or an equivalent device which prevents unauthorised use and allows the system to be turned off easily in case of emergency;
- (d) a warning light readily visible to equipment operators is illuminated whenever high voltage is applied to the x-ray tube. A second warning light is illuminated whenever x-rays are being produced. If the period of exposure is intended to be less than one second the light **shall** be activated for at least one second for each exposure. The light **shall** be interlocked with the x-ray generator so that in the event of bulb failure x-rays cannot be produced;
- (e) a durable label showing the instrument model and serial number is displayed in an accessible position on the outside of the x-ray system and maintained in a clean and legible condition;
- (f) a radiation warning, either a radiation warning symbol as described in Part 1 of the Second Schedule of the *Regulations*, or suitable cautionary wording, is affixed in a readily visible position to the exterior of the equipment;
- (g) the removal of any interlocked shielding component prevents x-ray generation, and the replacement of such a component does not allow x-ray generation until the equipment operation is re-set;
- (h) if a personnel surveillance x-ray security system is employed, the equipment settings result in the lowest practical exposure per surveillance procedure and are within guideline values approved by NRL.

3.2 All operators **shall** ensure that:

- (a) when unattended the equipment is switched off and the key (or equivalent device) is removed;
- (b) all shielding is in place and no interlocks are disabled during operation.

4 OCCUPATIONAL SAFETY

4.1 General requirements

4.1.1 The principal licensee **shall** ensure that use of x-rays for security and inspection systems takes place only if the facility has written local rules for user radiation safety (as required in paragraph 2.1.1h).

4.2 Use by an unlicensed person

4.2.1 In addition to the requirements of Section 2.1.3 of this *Code*, the principal licensee **shall** ensure that any unlicensed user is familiar with the component of the written safety procedures (as required in paragraph 2.1.1h) detailing instructions for contacting a licensee in case of an accident or emergency. (See also Section 15 of the *Act*.)

5 INCIDENTS, ACCIDENTS AND EMERGENCIES

- 5.1 The principal licensee **shall** be responsible for investigating any x-ray equipment damage or malfunction, or departure from local rules, to ascertain whether persons may have been exposed to abnormal levels of radiation.
- 5.2 In the event of an accident suspected of causing material damage to an x-ray system, the equipment **shall** be turned off and the licensee notified. Damage and repair assessment **shall** be undertaken by a person with appropriate training.
- 5.3 There **shall** be written procedures for fire and civil defence emergencies, including who is responsible for the shut-down of the equipment in the event of building evacuation (as required in paragraph 2.1.1i).

CROSS-REFERENCE INDEX

The regulatory framework for this *Code* is provided by the radiation protection legislation.

This index provides references to specific parts of the legislation, some of which, while not directly cited in the *Code*, do provide the regulatory authority for its requirements. It also indicates where practical compliance information can be found in the *Guidance notes*.

The references are from this *Code of safe practice for the use of x-ray security and inspection systems, NRL C16* to:

- *Radiation Protection Act 1965*;
- *Radiation Protection Regulations 1982*;
- *Guidance notes: safe practice for the use of x-ray security and inspection systems* (NRL, August 2001).

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