

GUIDANCE NOTES

Safe practice for the use of x-ray security and inspection systems

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INTRODUCTION

These *Guidance notes* are advisory only and have been written to provide information for owners, licensees and users on the safety of fluoroscopic x-ray security systems used for surveillance of baggage for security and quarantine purposes, mail inspection, and surveillance of personnel, 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. They give practical guidance on compliance with the requirements of radiation protection legislation and the *Code of safe practice for the use of x-ray security and inspection systems, NRL C16*.

LEGAL REQUIREMENTS AND RESPONSIBILITIES

The ownership and use of irradiating apparatus in New Zealand is controlled by the *Radiation Protection Act 1965*¹ and the *Radiation Protection Regulations 1982*². Sales of equipment are controlled through a notification process, and users must be licensed under the *Act*. The *Regulations* contain further general requirements for both owners and licensed users of irradiating apparatus.

Both ownership and use of irradiating apparatus are controlled by law

The additional requirements specific to x-ray security and inspection systems are contained in the *Code of safe practice for the use of x-ray security and inspection systems, NRL C16*. Anyone licensed to use x-ray security and inspection systems must comply with this *Code*.

NRL C16 must also be complied with

The *Radiation Protection Act 1965* places obligations on persons who sell, and in some cases on those who buy or own, irradiating apparatus.

There are legal requirements for buyers and sellers

Selling and buying x-ray equipment

The definition of “sell” given in Section 2 of the *Act* covers a wide range of actions that result in the transfer of responsibility from one person to another. For the purpose of establishing who has responsibility for irradiating apparatus, this means either:

“Selling” includes lending or hiring

- sale, by means of a financial transaction, or
- any hire, lease or loan, involving a signed contract.

When new irradiating apparatus is bought to replace existing equipment, the old irradiating apparatus will either be rendered inoperative and disposed of directly, or will be removed for resale or later disposal. This removal for resale or disposal is itself a sale in terms of the *Act* and the National Radiation Laboratory (NRL) must be formally notified by the previous owner in the same way as for any other sale.

It also includes disposal of old equipment

This wide definition of “sell” means that a person may sometimes be unaware that their actions are bringing them under the scope of the Act and its obligations.

No person can sell irradiating apparatus to another person in New Zealand unless the prospective purchaser holds a current licence under the *Radiation Protection Act* that authorises the use of the particular type of irradiating apparatus being offered for sale.

If selling within NZ irradiating apparatus can only be sold to an appropriately licensed person

If buying irradiating apparatus directly from an overseas seller it is the purchaser’s responsibility to ensure that a current licence under the *Radiation Protection Act* is held authorising the use of the particular type of irradiating apparatus being purchased.

If purchasing from overseas a buyer must have an appropriate licence

Notification: responsibilities and procedure

NRL must be notified of any sale

NRL, under the delegated authority of the Director-General of Health, must be notified of any sale (see Section 14(2) of the *Act*).

Who is responsible for the notification?

- Where the seller is in New Zealand (this can be either the previous owner or the NZ agent of an overseas supplier) then the seller must make the notification.
- In cases where the seller is outside New Zealand, responsibility for notification of the purchase lies with the buyer.

How and when to notify NRL

Notification must take place on or before the date of the sale, and must include the name and address of the buyer. It can be by letter, e-mail or fax and should be an automatic part of the sale procedure. To help facilitate the notification process NRL has developed a standard form. This form does not have to be used but it does provide a convenient means of enabling sellers to meet their obligations. A sample copy of the notification form is attached as Appendix 1 and further copies can be obtained from NRL or down-loaded from the NRL web site. NRL will formally acknowledge each notification, thereby confirming that statutory obligations have been met.

Why is there a need for these requirements?

Irradiating apparatus is capable of producing harmful radiation. The *Act* sets up a licensing system for controlling the use of irradiating apparatus. This control needs to be from “cradle to grave”, and the requirements for selling ensure that equipment does not escape from regulatory control during movements from one owner to another.

NRL must be able to maintain an accurate register

In addition there must be control over the whereabouts of irradiating apparatus. As the national regulatory body, NRL must be able to maintain an accurate register of all irradiating apparatus, including make and model, location and who is responsible for it. Notification provides the mechanism for keeping this register current.

Where to obtain more information

More information on buying, selling and notifications can be found in *NRL matters no 8*, available from the web site or by contacting NRL.

These obligations apply to all sales irrespective of whether the irradiating apparatus is new or used. Failure to comply with these requirements is a breach of the Act and may be subject to such penalties as are prescribed in the Section 26(2) of the Act.

Licences to use irradiating apparatus

Anyone using irradiating apparatus (including an x-ray security or inspection system) for any purpose must either hold a licence for that purpose under the *Act* or be acting under the supervision or instructions of a licensee (see Section 15 of the *Act*).

A licence is necessary

A licence application pack, containing an application form for a licence to use an x-ray security or inspection system and copies of the *Code of safe practice, Act, Regulations*, and these *Guidance notes*, can be obtained from NRL.

Obtaining a licence information pack

To be eligible for a licence an applicant must have received approved training in operational safety, and pass an examination on radiation safety legal requirements. The licence application form requires evidence of this training. Licensees may also be required to demonstrate on-going competency at subsequent licence renewals.

Training requirements

Training in operational safety and use appropriate to the equipment being employed may be provided by the company owning it or by the supplier of the equipment. The examination of legal requirements for radiation safety is conducted by NRL and relates to knowledge of requirements of the *Act* and *Regulations* and their application to ownership, licensing and safety matters detailed in the *Code* and these *Guidance notes*.

Who can provide training?

Where there is more than one licensee responsible for the operation of the same x-ray system, then each has full responsibility for safety and compliance with all regulatory requirements while they are rostered for use. However there are some aspects of safety management where it may be ambiguous which licensee is responsible (eg, maintenance of records). In this case one licensee must be designated the "principal licensee" (see *regulation 9(3)*). Some of the requirements in the *Code* refer specifically to the principal licensee (see *NRL C16*, Sections 1.3, 2.1.1, 2.1.3, 2.2.1, 2.3.1, 2.4.2, 3.1, 4.1.1, 4.2.1, 5.1). More information on principal licensee responsibilities can be found in *NRL matters no 10*, available from the web site or by contacting NRL.

What does the term "principal licensee" mean?

In order to ensure that equipment operation does not become too far removed from the control of a licensed person, there must be at least one licensee at each separate operational division of an organisation that operates x-ray security or inspection systems.

More than one licensee may be necessary

Licences are renewable annually on the anniversary of the date of issue. Applications for renewal must be made at least 28 days before the date of expiry of the licence. A renewal application form will be provided by NRL in sufficient time to allow the form to be returned by the due date.

Licences must be renewed annually

Use by an unlicensed person (NRL C16 Section 4.2)

Use under supervision or instructions

Section 15 of the *Act* allows a person who is not licensed to use an x-ray system *under the supervision or instructions* of a licensee. *Supervision* requires the physical presence of a licensee who oversees the work with radiation; only minimal levels of training are required for a supervised worker. Work under *instructions* does not require the presence of a licensee during the work period, but does require clear orders or guidelines, and an appropriate level of training, for the instructed worker.

There must be written instructions

For the licence purpose “use of x-ray security and inspection systems”, operation under *supervision* would be expected to occur only during training. After training, staff other than licensees would operate according to *instructions*. Such staff must be given a set of written instructions which include actions to be taken in emergencies such as major damage to the equipment or building evacuation, and how to contact the licensee.

Unlicensed users must be trained – but the licensee retains legal responsibility

It is up to the principal licensee to ensure any unlicensed person is trained in all aspects of safety as required by the degree of independence from supervision they will have. The principal licensee retains full legal responsibility for the safety of the system and must have full confidence that the unlicensed person knows what to do in all circumstances.

Responsibilities of owners

The owner must ensure there is a licensee with a suitable level of authority

Regulation 9(1) requires the owner of an x-ray system to take all reasonable steps to ensure there is always a suitably licensed person to take care of safety. There must be a licensee in each division to look after the overall management of safety. When there is more than one licensee at a division, then it is the responsibility of the owner to designate one as the principal licensee (see p 3) to attend to these matters. Licensees should be in a position within the organisation where they have line management or other authority to implement radiation protection practices and ensure compliance with the *Code*, but also retain operational involvement with the security or inspection systems for which they are the licensee.

Absence, resignation or retirement of the licensee

In the event of the pending absence of the licensee, or their resignation or retirement, then another appropriate person must be designated by the owner to apply for a licence, so that in normal circumstances there is no period without a licensee.

However, if for any unforeseen reason there is no licensee for the time being, for example, as a result of sudden death or resignation, then, as allowed under *regulation 9(4)*, the owner may store the x-ray system (without using it). Storage without a licensee would be expected to meet the same requirements as those in Section 2.3.1 of the *Code* for storage with a licensee. Within a period of three months the owner would be expected either to have sold the x-ray equipment, rendered it permanently inoperative, or have assigned another licensee to take responsibility for it. The owner must notify NRL of the action taken (see *regulation 9(4)*).

Storage without a licensee

Most of the owner's responsibilities are met once a licensee has been assigned. From then on most of the legal responsibility for compliance with the *Regulations* and the *Code* lie with the licensee. However, the owner must ensure that equipment requested by licensees for safety is provided (see *regulation 9(1)*). More information on owners' responsibilities can be found in *NRL matters no 10*, available from the web site or by contacting NRL.

Owner's responsibilities to licensee

RADIATION SAFETY MANAGEMENT

Radiation safety plan (NRL C16 Section 2.1)

What is a radiation safety plan?

The radiation safety plan is a collection of documents that records who at the facility is authorised to use x-ray equipment, specifies local safety rules, and contains other records. The documents that comprise the plan may be dispersed in location, but if so, there should be a document which specifies the whereabouts of each part. Any audit of the facility for compliance with regulatory requirements will normally start with these documents to assess how all the requirements have been addressed, and that the written procedures are being followed.

What should it contain?

The content of the safety plan is prescribed in the *Code*. Sections are described briefly here, and examples are given in Appendix 2.

➤ *Details of radiation safety policy, responsibilities and authorisations*

There must be a policy statement that demonstrates a commitment to ensuring the safe use of equipment. It must name who has responsibility as principal licensee, and must also list all other staff who are authorised by way of licensing or training to operate x-ray systems.

➤ *Radiation protection induction and training of staff*

All staff, including licensees, must be familiar with the contents of the safety plan. The training necessary before an unlicensed person is authorised to work must be outlined, and it must be documented that this training has been given in each case.

➤ *A register of x-ray equipment*

The register or record must contain identification details of each system (make, model, serial number) and where it is located.

➤ *A record of the movements of all systems that may be used at more than one location*

This is like an asset register, and gives a single checklist that can be used to verify that each system is accounted for.

➤ *Procedures for radiation safety audits*

Records of initial and routine internal radiation safety audits must be maintained. Components of audits are described in more detail in the section on **Radiation safety audits** (p 7).

➤ *Maintenance and repair of equipment*

This section must set out the timetable and other details for routine maintenance and other repairs of equipment that have implications for radiation safety (see also p 8).

➤ *Incident and accident investigation records*

This should contain a record of any incident or accident as required by Section 5.1 of the *Code*. The purpose of any investigation is to modify procedures in order to minimise the recurrence of such events.

Local rules or written instructions required by the *Code* must be kept in the radiation safety plan, irrespective of whether or not they are displayed and used elsewhere. The local rules must include specific instructions for unlicensed operators. There should also be a statement concerning who can make changes and how they are promulgated.

➤ *Written local rules for safe operation of x-ray systems*

The facility must have written procedures detailing actions in case of an emergency, such as fire or earthquake. These procedures need to cover actions required with respect to x-ray equipment.

➤ *Emergency procedures*

Maintenance of these records will both help aid the quality management of radiation protection and safety within the organisation, and the conduct of compliance monitoring audits carried out by the National Radiation Laboratory.

Radiation safety audits (NRL C16 Section 2.2)

Radiation safety audits are an in-house means of ensuring that the *Code* is being complied with at all times. The *Code* requires the internal radiation safety audit to be carried out at installation, and thereafter as specified in the manufacturer's manual or at least annually. The scope of the radiation safety audit will vary, depending on the reason for it being performed:

Frequency and scope of audit varies

- if it is a new facility, the scope of the radiation safety audit is compliance with all aspects of the *Code*;
- if a new x-ray system is being installed in an existing facility, the radiation safety audit must ensure the x-ray equipment complies with the relevant parts of the *Code*, and must also ensure that the radiation safety plan is modified or amended to incorporate the change in x-ray equipment;
- if it is after major maintenance, the scope of the radiation safety audit can be limited to those areas of the *Code* that are relevant, but wider implications for the radiation safety plan need to be checked;
- if it is the routine annual radiation safety audit then again the scope is all of the *Code*.

It is strongly recommended that a checklist be used to confirm compliance with the requirements of the *Code*. The checklist should be completed, signed, and filed so that when NRL does a radiation compliance monitoring inspection there is evidence that the safety audits have been done.

Use a checklist

The radiation safety audit may be conducted as part of a wider audit of health and safety items within the organisation. Anything found during the audit that is not satisfactory should be noted with details of remedial actions.

Note remedial actions

Maintenance and servicing (NRL C16 Section 2.4)

Follow the instruction manual Maintenance and servicing should follow closely the instructions given in the manufacturer's instruction manual. The manual will usually provide good advice on safe ways of doing things, and what extra equipment is needed.

Who can undertake servicing? Servicing of the x-ray generator or tube, or production of x-rays with any shielding removed, must be carried out only by a licensed person with appropriate training.

Ensure the service person has all relevant information Before work commences the principal licensee has responsibility to ensure that the service person is informed of all matters relevant to radiation safety, such as an adequate description of faults or missing components.

Disposal of x-ray systems

NRL must be notified If an x-ray security or inspection system is to be disposed of then the licensee responsible has the options of sale or write-off as scrap. If the equipment is sold in New Zealand it must be purchased by a holder of a licence issued under the *Act* for an appropriate purpose and the sale notified to NRL (see **Notification: responsibilities and procedure**, p 2). If the equipment is not sold it must be rendered permanently inoperable by, eg, breakage of the x-ray tube, or destroying the generator. Again NRL must be notified.

FACILITIES AND EQUIPMENT (NRL C16 Section 3)

Equipment safety

X-ray security and inspection systems must incorporate sufficient radiation shielding so that there will be no external radiation hazard to operators or other persons in the vicinity. The exposure limit set in Section 3.1(b) of the *Code* will certainly be achieved if the dose rate is less than 0.5 μGy in any hour of operation, averaged over an area of 100 cm^2 at positions 5 cm outside the shielding. Doses to operators will then be less than 0.3 mSv per year, the constraint dose for members of the public recommended by the ICRP³ for exposures arising from single practices. The constraint dose may be achieved even if dose rates exceed 0.5 μGy at 5 cm in any hour of operation in some positions; measurements should be made in operator positions if these are fixed. Dose rate measurements are considered further on p 11.

There are limits on doses

For x-ray security and inspection systems that are to be used for personnel surveillance there is an additional requirement for the surveillance to occur for the lowest dose possible to the person being x-rayed. Many factors influence both image quality and dose, and for further guidance and requirements on a particular installation, NRL must be contacted.

Personnel surveillance requirements

X-ray security systems are commonly operated in places of public access. This means there are special requirements for radiation protection. Access must be controlled by the licensee so that no unauthorised person can tamper with the equipment when in operation. Equipment operation must therefore be controlled by a key which is removed when the equipment is unattended, or some other device which both prevents unauthorised use and also allows the machine to be switched off in case of emergency, quickly and easily. (See Sections 3.1(c) and 3.2 of the *Code*.)

Prevent unauthorised tampering

Labelling and warning signs

Cautionary wording such as “CAUTION – X-RAYS”, or a trefoil radiation warning symbol, the dimensions for which are given in Part 1 of the Second Schedule of the *Regulations*, must be affixed in a readily visible position to the exterior of the equipment (see Section 3.1(f) of the *Code*).

A radiation warning sign is required

In addition to the radiation warning symbol, warning lights must be installed to alert staff and the public when the high voltage is applied and when x-rays are actually being produced (see Section 3.1(d) of the *Code*).

As are warning lights

An identification label is required

The machine must be labelled. Section 3.1(e) of the *Code* requires labelling of the equipment with information which is sufficient to allow unequivocal identification of the system with the item in the licensee's register. If desired, the identification label may be incorporated with the warning symbol.

Metal labels are best

The labels must be maintained in a clearly legible condition, and replaced if worn or defaced. This will be more easily achieved if the labels are made from a durable material such as embossed metal.

OCCUPATIONAL SAFETY (NRL C16 Section 4)

Safety during normal use

X-ray security and inspections systems are designed to be inherently safe in normal use. Nothing other than commonsense should be needed to minimise operator or public exposure. Nevertheless there must be local rules to ensure that staff are always in attendance, the equipment is used according to the manufacturer's manuals, and suspected faults or malfunctions are quickly reported to the principal licensee.

There must be local rules to ensure safety

A radiation survey to check that external radiation levels are within manufacturer's specifications must be carried out at normal maximum operating settings on installation and as part of organisation radiation safety audits. External dose rates can be measured either with a dose rate meter, by a person trained in its use, or by means of an integrating dosimeter such as a personal monitoring badge. Compliance with external dose limits can be assessed, using a dose rate meter, by relating measured exposure rates to the maximum likely beam-on time per hour, or using an integrating dosimeter, by comparing measured doses over a period of time with equipment workload over the same period.

External dose rates must be assessed/monitored

Personal monitoring

Regulation 20 sets a threshold above which personal monitoring is mandatory. However, x-ray security and inspection systems are designed so that under normal use the amount of radiation emitted is very small with doses to operators below minimum reporting levels of personal monitoring devices. The *Code* therefore does not require the wearing of a personal monitor. If wanted, monitoring services are available commercially.

Personal monitoring is not normally required

Radiation survey meters

An ionisation radiation survey meter is capable of detecting both x-ray and gamma radiation. An instrument of this type is therefore useful for surveying for leakage radiation around x-ray security or inspection systems. The survey meter must be routinely calibrated and, in between calibrations, a check source needs to be used to verify that the meter is functioning correctly.

What sort of radiation meter can be used?

Because the external radiation hazard is low, the purchase of a survey meter is not mandatory. However, a directly measuring instrument or integrating dosimeter such as a film badge must be used for the initial radiation safety audit required in Section 3.1(a) of the *Code*, and if such dosimeters are not held by the licensee they need to be available to the installation engineer or other person undertaking the survey. Contact NRL for further advice on dosimeter types.

Other options

INCIDENTS, ACCIDENTS AND EMERGENCIES

(NRL C16 Section 5)

Incidents and accidents

Do not compromise radiation safety

An incident can be considered as an event which disrupts normal operation and may have radiation safety implications. An example for a baggage inspection system would be a conveyor belt jammed with a large piece of baggage. Operators must have training and instructions on methods of dealing with incidents in ways which do not compromise radiation safety.

What if the equipment is damaged?

It is conceivable an impact accident might occur such as a collision by a fork lift truck or transporter that might damage the shielding of an x-ray security or inspection system. The equipment should be switched off and the licensee notified. Damage assessment and repair must be undertaken by a person with appropriate training.

Incidents should be used to improve safety measures

Section 5.1 of the *Code* requires the principal licensee to investigate whether an incident has resulted in abnormal levels of exposure to staff or members of the public. Apart from the dose assessment, the purpose is to determine whether there is a need to change work practices, local rules etc, in order to minimise the likelihood of a recurrence of the incident or accident.

Fire and civil defence emergencies

Every organisation's emergency handbook must have a section on x-ray systems

Every facility should have a general manual of procedures to be followed in the case of an emergency, including evacuation from buildings, dealing with medical emergencies, earthquakes, etc. This must have a section dealing with procedures covering emergencies involving x-ray systems. However, if there is no general procedures manual, there must be specific written procedures in case of an emergency involving an x-ray system.

Responsibilities must be assigned

In each case the procedure must establish who is responsible for the shut-down of the x-ray system in the event of evacuation.

COMPLIANCE MONITORING AND ENFORCEMENT

The National Radiation Laboratory, as New Zealand's regulatory authority under the *Radiation Protection Act 1965*, is empowered to carry out compliance monitoring audits of facilities where ionising radiation is used. These compliance monitoring audits occur at frequencies determined by the National Radiation Laboratory. Advance notification of an impending audit is normally given to the principal licensee of a facility where radiation is used.

NRL carries out audits of facilities

During the audit evidence will be looked for that the use of radiation at the facility is in compliance with the *Radiation Protection Act*, the *Radiation Protection Regulations* and the *Code NRL C16*.

Compliance with legislation and the Code is required

The audit commences with an entrance interview between the NRL representative and the principal licensee, plus any other person the principal licensee wishes to have present. The principal licensee would make available the facility's radiation protection safety plan documentation. This is reviewed by the National Radiation Laboratory representative, to check for compliance with the *Code*. In addition particular measurements or tests may be performed. Observation of the use of x-rays may also take place.

The audit process

The compliance monitoring audit concludes with an exit interview at which the results of the audit are presented and discussed. Any items of concern will be explained and for those items of actual non-compliance, corrective actions will be agreed upon, including a time-frame for compliance.

Items of non-compliance

The compliance monitoring audit cycle for a given facility remains open in those cases where there is non-compliance until the principal licensee notifies the National Radiation Laboratory in writing that the agreed corrective actions have been implemented.

Corrective actions must be implemented

Further information on compliance monitoring can be found in NRL matters no 10, available from the web site or by contacting NRL.

REFERENCES

- 1 *Radiation Protection Act 1965*. Govt. Print, Wellington.
- 2 *Radiation Protection Regulations 1982*. Govt. Print, Wellington.
- 3 *1990 Recommendations of the International Commission on Radiological Protection*. Oxford: Pergamon Press, 1991. *ICRP publication 60*.

APPENDIX 1

Form for notification of sale of irradiating apparatus

(Note: this is also available on the NRL web site: www.nrl.moh.govt.nz).



NRL

National Radiation Laboratory

**RADIATION PROTECTION ACT 1965
NOTIFICATION OF SALE OF IRRADIATING APPARATUS**

Use one notification form per apparatus

Name and address of seller (trade name):

Seller's fax number:

Name and address of buyer (trade name):

Name of principal licensee responsible for safe care of equipment:

NRL licence number:

Purpose for which apparatus is (or was) used:
(eg, medical diagnostic, chiropractic, medical therapy, dental, veterinary, industrial, analytical, etc)

Equipment make:

Equipment model:

Enter the control panel* serial number:

Maximum operating rating:

kV/MV:

mA:

State the physical location the apparatus is to be installed or if a portable unit, the base location:
(eg, facility, street address, department, room, etc)

If apparatus is *second-hand*, state the physical location from where the apparatus was removed:
(eg, facility, street address, department, room, etc)

If apparatus is being *disposed of*, enter the process for rendering it inoperable and means of disposal:
(eg, x-ray tube punctured and placed in bin, etc)

Name and signature:

Date:

* If control panel identification plate is missing, enter 'missing' and record any other ID tracking number and corresponding component.

Please send to: National Radiation Laboratory
Attn: Licensing
PO Box 25-099
CHRISTCHURCH

Fax: (03) 353-5667

NRL acknowledgement of notification

Name and date:

V4.03

APPENDIX 2

Components of an example *Radiation safety plan* (see also p 6 – 7)

The following pages give examples of some of the documentation in a *Radiation safety plan* for a facility where x-ray security and inspection systems are used.

The *Code* requires the following documents to be included in a *Radiation Safety Plan*:

- Details of radiation safety policy, responsibilities and names of persons authorised to operate the x-ray equipment;
- Radiation protection induction and training requirements for staff, and associated records;
- Register of all x-ray equipment at the facility;
- Records of the movements of x-ray systems;
- Procedures for radiation safety audits and associated records;
- Records of maintenance and repair work on x-ray equipment;
- Incident and accident investigation records;
- Written local rules for the safe operation of x-ray equipment;
- Emergency procedures.

It should be noted that the following are examples only and some of the “in-house” rules for “Aviation Security Ltd” may not be appropriate or applicable in other facilities where x-ray security and inspection systems are used.

Occasional editorial comments are given in parentheses, as here: <<editorial comment>>.

SAMPLE RADIATION SAFETY PLAN

AVIATION SECURITY LTD (ASL) RADIATION SAFETY PLAN

X-ray security and inspection systems

Radiation safety policy

ASL will ensure, as far as reasonably possible, the health and safety of its employees, contractors working on the premises, and members of the public who may be exposed to hazards arising from the use of x-ray security and inspection systems.

No member of ASL staff is permitted to use or operate an x-ray security and inspection system unless he/she is so authorised in this *Radiation Safety Plan* and has signed the relevant entry to indicate familiarity with and acceptance of the requirements and procedures in this *Radiation Safety Plan*.

Responsibilities and authorisations

Principal licensee

Overall responsibility for ensuring this *Radiation Safety Plan* is implemented and reviewed lies with the principal licensee for ASL.

Name	Licence number	Position title	Signature
Mr PL	11011	Section Head	

Licensed users

The following licensed persons are authorised to use x-ray security and inspection systems at ASL and are responsible for complying with the procedures in this *Radiation Safety Plan*.

Name	Licence number	Position title	Signature
Mr L2	11012	Inspection officer	

Persons authorised by the principal licensee to use x-ray equipment under instructions

The following persons are authorised to use x-ray security and inspection systems at ASL under the instructions of the principal licensee, and are responsible for complying with the procedures in this *Radiation Safety Plan*.

Name	Position title	Date of initial authorisation	Signature
Mr R1	Inspection officer	01/03/99	
Ms R2	Inspection officer	03/02/00	
Ms R3	Inspection officer	28/11/00	
Mr R4	Inspection officer	15/02/01	

Induction and training procedures for staff

<< Please note these are the “in-house” rules for induction and training. In addition there are licensing requirements of the Act to be met. For staff to be granted a licence to use x-ray security and inspection systems they will need to satisfy the criteria set by the National Radiation Laboratory and previously discussed in these Guidance Notes (page 3). The manufacturer’s course, XSS-01, may not be sufficient to satisfy all requirements for eligibility for a licence. Additional training external to XSS-01 is likely to be needed, especially with regard to New Zealand regulatory requirements.>>

- All staff whose duties include using x-ray security and inspection systems must have attended the *SafeBags* safety course for x-ray security and inspection systems, XSS-01, before using the equipment. A copy of the course syllabus and the course handout is filed with this *Radiation Safety Plan*.
- On completion of XSS-01, designated staff will apply to the National Radiation Laboratory for a licence to use x-ray security and inspection systems if they do not already hold a licence for that purpose.
- On completion of XSS-01, all other users must receive individual authorisations by the principal licensee (Mr PL) to work under his instructions. Each authorisation must be recorded in this *Radiation Safety Plan*.
- For an initial training period staff (who will become licensees or who will be authorised to act under instructions) may operate the x-ray security and inspection systems under the supervision of, and in the presence of, a licensee.

X-ray equipment register

Equipment used for x-ray security and inspection at Aviation Security Ltd, Ruapai Airport, Ruapai.

1.

Manufacturer and model: *SafeBags XS-III*
Serial no: AB10089
Location: Gate 1
Purchased: 4 September 1989

Verified by: Mr PL, principal licensee
Signed:
Date: 24 March 2001

2.

Manufacturer and model: *SafeBags XS-III*
Serial no: AB10091
Location: Gate 2
Purchased: 4 September 1989

Verified by: Mr PL, principal licensee
Signed:
Date: 24 March 2001

3.

Manufacturer and model: *SafeBags XS-IIIa*
Serial no: BB10223
Location: Gate 3
Purchased: 12 March 1994

Verified by: Mr PL, principal licensee
Signed:
Date: 24 March 2001

ASL Movement log

Unit	Moved from:	Moved to:	Date	Principal licensee
AB10089	Gate 1, Ruapai Airport	MAF Quarantine, cargo imports depot, Ruapai Airport	20/02/00	Mr PL
AB10089	MAF Quarantine, cargo imports depot, Ruapai Airport	Gate 1, Ruapai Airport	25/03/00	Mr PL
BB10223	Gate 3, Ruapai Airport	Gate 9, Telford Airport	03/06/01	Mr XX
BB10223	Gate 9, Telford Airport	Gate 3, Ruapai Airport	05/08/01	Mr PL

ASL Radiation safety audits

- An annual radiation safety audit will be performed by the principal licensee, Mr PL.
- The checklist template below will be used.
- Originals of audit forms are kept in file 37/38/39, Safety audits-Aviation Security Ltd-Radiation Protection, kept in the office of the principal licensee, Mr PL, Administration Building. Copies are filed here.

RADIATION SAFETY AUDIT CHECKLIST

Radiation Safety Plan	Complies	Notes
Authorisations valid:		
Licensees	✓	
Users under instructions	✓	
Training records correct	✓	
X-ray register correct	✓	
X-ray movement register correct	✓	
Local rules for the safe use of x-ray security and inspection systems are current	✓	
Incidents/Accidents records	✓	1
Emergency procedures in place	✓	
SafeBags XS-III: AB10089		
Key operation functioning correctly	✓	
Dose rate < 0.5 µGy/hr @ 5 cm	✓	
Maintenance & Servicing	✓	2
Labelling	✓	
Radiation warning sign	✓	
Warning lights	✓	
Interlocks	✓	
SafeBags XS-III: AB10091		
Key operation functioning correctly	✓	
Dose rate < 0.5 µGy/hr @ 5 cm	✓	
Maintenance & Servicing	✓	2
Labelling	✓	
Radiation warning sign	✓	
Warning lights	✓	
Interlocks	✓	

SafeBags XS-IIIa: BB10223		
Key operation functioning correctly	✓	
Dose rate < 0.5 µGy/hr @ 5 cm	✓	
Maintenance & Servicing	✓	2
Labelling	✓	
Radiation warning sign	✓	
Warning lights	✓	
Interlocks	✓	
Signed by the principal licensee		
Date of audit	24/9/01	

Notes:

1. No incidents recorded.
2. Annual maintenance recorded in ASL's maintenance log.

ASL Maintenance and servicing records

- The original records are to be kept in the Aviation Security Limited's maintenance log. Copies are filed here.

Maintenance record for SafeBags XS-III: AB10089

- 01/03/00: Annual maintenance check as per manual.
- 21/05/00: "HV ON" warning light on panel not operating. Bulb replaced.
- 01/03/01: Annual maintenance check as per manual.

Maintenance record for SafeBags XS-III: AB10091

- 01/03/00: Annual maintenance check as per manual.
- 01/03/01: Annual maintenance check as per manual.

Maintenance record for SafeBags XS-IIIa: BB10223

- 01/03/00: Annual maintenance check as per manual.
- 01/03/01: Annual maintenance check as per manual.

ASL X-ray incident and accident records

(See also file of OSH accident report forms kept in the administration office of Aviation Security Ltd.)

- 01/03/00 No incidents or accidents to date.
- 01/03/01 No incidents or accidents to date.

ASL Local rules for the safe use of x-rays

- The following requirements are a controlled document. The master copy is kept filed with this *Radiation Safety Plan*.
 - Copies of these local rules are to be posted at Gates 1, 2 & 3, and any other temporary location where an x-ray system is to be used.
 - If any changes are required these must be made to the master copy, signed by the principal licensee, Mr PL, and copied to the other places where they are posted (see above) or filed.
1. The keys for operating the x-ray security and inspection systems are to be kept, when not in use, in the office of the principal licensee, Mr PL.
 2. Any use of the x-ray security and inspection systems must be in accordance with the authorisations given in this *Radiation Safety Plan*.
 3. At least one person authorised by this *Radiation Safety Plan* must be in attendance at each x-ray security and inspection system in use.
 4. If for some reason the authorised person operating an x-ray security and inspection system has to leave the unit, then they must turn the unit off and remove the key before leaving the unit if there is no other authorised person present to take over.
 5. All operators must be vigilant in ensuring that no member of the public is able to gain access to any x-ray security and inspection system.
 6. All x-ray security and inspection systems must be operated in accordance with the *SafeBags Users Manuals*.
 7. Any abnormality or suspected abnormality in the functioning of the x-ray security and inspection systems must be reported immediately to the principal licensee, Mr PL.
 8. In the event of any accident or emergency the principal licensee, Mr PL, must be contacted immediately. Ph Ext 3345; Home 456 7865; 021 785 453.

ASL Emergency procedures

- If there is an emergency requiring evacuation of the building while an x-ray security and inspection system is operating, the person operating the equipment shall switch off the machine and remove the key on the way out.

CROSS-REFERENCE INDEX

These *Guidance notes* give practical advice for compliance with radiation protection legislation and the relevant *Code*, *NRL C16*. The references to the legislation in this index are not always directly cited in this document or the *Code*, but do provide the regulatory authority for the *Code's* requirements and the *Guidance notes'* recommendations.

The references are from these *Guidance notes: safe practice for the use of x-ray security and inspection systems* to:

- *Code of safe practice for the use of x-ray security and inspection systems, NRL C16 (NRL, August 2001);*
- *Radiation Protection Regulations 1982;*
- *Radiation Protection Act 1965.*

Guidance notes	NRL C16	Regulations	Act
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2 Notification: responsibilities and procedure			14(2); 26(2)
3 Licences to use irradiating apparatus	1.3; 2.1.1; 2.1.3; 2.2.1; 2.3.1; 2.4.2;; 3.1; 4.1.1; 4.2.1; 5.1	9(3)	15; 16; 17; 18; 20; 21; 22
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9 FACILITIES AND EQUIPMENT	3	21; Second schedule	14
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9 Labelling and warning signs	3.1(d)(e)(f)	Second schedule	
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12 INCIDENTS, ACCIDENTS AND EMERGENCIES	5	19	
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