



southernradiology

Radiation Safety & Protection Plan HURSTVILLE PRIVATE HOSPITAL



Contents

- 1 Introduction
 - (a) Purpose
 - (b) Who must read this document?
- 2 Hazard Assessment and Radiation Risk
- 3 Dose Limits
- 4 Responsibilities of Southern Radiology
- 5
- 6 Duties of the Radiation Safety Officer
 - (a) Functions
 - (b) Reporting to the possession licensee
- 7 Responsibilities of Users and Employees
- 8 Access Control
- 9 Training
- 10 Safe Work Practices – X-rays
 - (a) Justification/Authorisation of exposure
 - (b) Equipment and premises
 - (c) Patients
 - (d) Users of X-ray equipment
- 11 Safe Work Practices – Brachytherapy
- 12 Safe Work Practices – Laser Apparatus
- 13 Personal Radiation Monitoring
 - (a) Personal monitoring devices
 - (b) Personal monitoring record
- 14 Safety Devices and Personal Protective Equipment
 - (a) Personal protective equipment
 - (b) Protective Devices Laser Apparatus
- 15 Radiation Warning Signs
 - (a) X-ray equipment
 - (b) Portable radiation warning signs
 - (c) Verbal radiation warnings
 - (d) Laser Warning Signs
- 16 Repairs and Maintenance
 - (a) X-ray equipment
 - (b) Modifications

- 17 Quality Control, Film Handling, Storage and Rotation
- 18 Record Management
- 19 Acquisition, Supply, Disposal and Relocation of X-ray Equipment
 - (a) Acquisition
 - (b) Supply
 - (c) Disposal
 - (d) Relocation
- 20 Remediation Procedures
 - (a) Incident notification
- 21 Precautions when caring for Radioactive Patients
 - (a) Use of Radioactive materials in management of patients
- 22 Protective Measures
- 23 Protection against External Radiation Exposure
 - (a) Factors affecting amounts of radiation received by persons concerned with radioactive sources
 - (b) Documenting Activity and Nature of Radioactive Source
- 24 Protection against Internal Radiation Exposure
 - (a) Precautions required minimising ingestion, and inhalation and absorption
- 25 Ward Procedures at Hurstville Private Hospital

Attachments

Attachment 1	X-ray Equipment Details
Attachment 2	Contact Details
Attachment 3	List of Staff Allowed to Use the X-ray Equipment
Attachment 4	Persons Performing Maintenance and Quality Control Checks
Attachment 5	Safety Devices and Personal Protective Equipment/Clothing Testing Results

Appendices

Documentary evidence for requirements of the Radiation Safety and Protection Plan are available upon request from the Southern Radiology Group or Hurstville Private Hospital key contacts outlined in Attachment 2

Appendix 1	Radiation Incident Report Forms (copies also available in soft copy from RSO)
Appendix 2	Training Declaration
Appendix 3	Glossary
Appendix 4	SRG021 Patient Management Identification & verification Policy

Reference Documents

In addition to the radiation safety and protection plan, the following documents must be complied with:

- Radiation Guideline 6 Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging: Part 1 Mammography, EPA NSW 2004
 - Radiation Guideline 6 Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging: Part 2 Fluoroscopy & radiography, EPA NSW 2004
 - Radiation Guideline 6 Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging: Part 5 Computed Tomography and Bone Mineral Densitometry, EPA NSW 2004
 - Radiation Guideline 6 Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging: Part 6 Test protocols for parts 2 - 5, EPA NSW 2004
 - Code of Nursing Practice for staff Exposed to ionizing Radiation (1984), National Health and Medical Research Council
 - The Radiation Control Act No. 13 (1990) amended in August 2002, EPA NSW.
-
- Radiation Control Regulation 2003, EPA NSW
 - ARPANSA Code of Practice – Exposure of Persons to Ionising Radiation for Research Purposes, Radiation Protection Series Publication No 8; May 2005, Australian Radiation Protection and Nuclear Safety Agency
 - ARPANSA Code of Practice – Radiation Protection in the Medical Applications of Ionising Radiation, Radiation Protection Series Publication No 14; May 2008, Australian Radiation Protection and Nuclear Safety Agency
 - ARPANSA Safety Guide – Radiation Protection in Diagnostic and Interventional Radiology, Radiation Protection Series Publication No 14-1; July 2008, Australian Radiation Protection and Nuclear Safety Agency

1. INTRODUCTION & PURPOSE

(a) Purpose

The NSW *Radiation Control Act 1990* and the *Department of Health and Ageing National Diagnostic Imaging Accreditation Scheme* require that a radiation safety and protection plan be developed for every radiation practice. This plan has been formulated for the purpose of ensuring that all diagnostic radiographic, interventional radiology, laser practices and brachytherapy procedures are conducted as safely as possible and in compliance with the *Radiation Control Act 1990* and the *Radiation Control Regulation 2003*.

This plan applies to all of the radiation emitting equipment, radioactive substances and laser equipment utilised in the Radiology Department; Operating Theatres; and hospital wards of the Hurstville Private Hospital. For the information of the reader, details of the applicable equipment are listed in Attachment 1.

The Southern Radiology Group Quality and Compliance Manager and Hurstville Private Hospital Quality Management staff will update this attachment when applicable equipment is acquired, sold, disposed of, or relocated.

Compliance with this radiation safety and protection plan will help ensure that the radiation doses to users and patients are below the prescribed limits and are as low as reasonably achievable (known as the ALARA principle) and that laser related injuries are avoided. It will also help ensure that the number of people exposed to radiation and the likelihood of unexpected exposure to radiation are minimised.

This plan outlines the obligations of the possession licensees and persons who carry out radiological procedures, brachytherapy and laser procedures with the possession licensee's equipment or premise. It offers a practical interpretation of requirements and obligations to the reader.

(b) Who must read this document

All persons who carry out, or who are involved in carrying out radiological procedures / diagnostic radiography/brachytherapy procedures/use laser equipment at the premises under the control of the Southern Radiology Group or Hurstville Private Hospital. All those using equipment listed in Attachment 1 of this plan must be familiar with its content.

All radiological practices/brachytherapy practices/laser practices carried out with the Southern Radiology Group or Hospital radiation giving equipment and facilities must be conducted in accordance with this plan.

2. HAZARD ASSESSMENT AND RADIATION RISK

All sources of ionising radiation are deemed potentially hazardous. Ionising radiation is recognised as having adverse effects at both the cellular level and systemically.

Sources of ionising radiation at Southern Radiology Group Hospital will include the following:

- (i) Diagnostic X-rays associated with medical imaging procedures (X-rays, CT Scans, interventional radiology, fluoroscopy guidance)
- (ii) γ -rays and other radioactive decay products from radiopharmaceuticals used in Brachytherapy procedures
- (iii) Oncology patients who may have had Brachytherapy e.g. Prostate seeds in situ, for cancer treatment

Radiation exposure and dose from ionising radiation sources on site will depend on one or more of the factors below:

- The type of procedure undertaken: Radiographic / Interventional / Brachytherapy
- The type of equipment being used
- The workload and/or procedural length and hence cumulative time of exposure
- The extent of compliance with safe operating practices
- The extent of conformance to preventative quality control and assurance requirements for equipment, safety devices and the premises (as outlined in relevant radiation safety standards made under the *Radiation Control Act 1990*)
- The competency and training of staff
- The operational status of affiliated equipment such as Personal Protective Equipment (PPE); and image processing equipment and film

The risks associated with ionising radiation increase linearly with radiation dose and exposure time. Radiation dose is a cumulative phenomenon.

The risk to individuals is assessed through the use of dose monitoring and long term dose recording for Radiation workers (refer section 12 Dose Monitoring). Dose limits (refer section 3 Dose Limits) are set to assess radiation exposure related risks in persons with occupational radiation exposure. General public dose limits are set as a comparison and are applied as the upper limit for pregnant radiation workers. Dose limits are not applied to patients undergoing medical procedures which involve exposure to radiation. Prescription of radiation for diagnosis or treatment is always predicated on any risk to the patient being outweighed by the benefit to the patient.

(i) Diagnostic X-rays

Effects of large doses of radiation are well-documented and understood from the research of groups including atomic bomb survivors, radiation accident victims, radiation therapy patients, and early radiation researchers. The effects of the very low doses of radiation expected among workers in the hospital setting are not, however, so well understood. When a large dose of radiation is increased to an even larger dose, the adverse effects become greater or more prevalent. This dose vs. effect relationship can be thought of as linear, with confirmed and documented effects beginning at a certain "threshold" level of radiation dose.

But since this "threshold" level is far greater than any allowable occupational dose, how is the risk of occupational radiation exposure assessed? Even though the effects of very low doses of radiation are truly not known, health physicists "extend" what is known about higher doses of radiation down to "zero" dose. In other words, any radiation dose is assumed to have some effect. Most scientists believe that this is a conservative model of the risk. With the amounts of radiation encountered by employees at the Hurstville Private Hospital the risk is very small.

Consider that for very low doses of radiation the effect of most concern is cancer. If every member of a population of 1 million were to receive 0.1 mSv of radiation (average film chest x-ray), it is possible that 5 additional cancer deaths could be observed. Remember however, that out of a population of 1 million, about 200,000 (20%) will die of a cancer related illness, making these few additional cancer deaths statistically impossible to detect. Additionally, according to the Biological Effects of Ionizing Radiation (BEIR) committee, the risk of cancer death is 0.08% per mSv for doses received rapidly (acute) and might be 2 times (0.04% per mSv) less than that for doses received over a long period of time (chronic).

The personal radiation monitoring results of persons involved in basic diagnostic radiography practices in New South Wales indicate that radiation doses typically are of the order of 1mSv per year. By comparison, the annual natural background radiation dose to a person is 2 mSv per year.

Persons involved in diagnostic and interventional fluoroscopy may receive an annual dose more significant and several times background levels. Radiation doses can become significant as a result of the volume and nature of work undertaken or contributed to by poor work practices e.g. if staff repeatedly assist patients without the use of adequate protective clothing, or if the equipment is used incorrectly, or if premises or equipment do not comply with the radiation safety standards.

In light of the normal occupational levels of exposure evidenced by historical measurements made in diagnostic radiography practices, pregnant staff involved in plain diagnostic radiography do not need to alter their duties. However, how their duties are performed should be evaluated to ensure that the doses remain as low as reasonably achievable, and less than 1mSv per annum. Pregnant staff should avoid work that may result in higher radiation doses (e.g. consistent involvement in fluoroscopic procedures).

Radiation doses to patients undergoing diagnostic and interventional procedures are always administered on the basis that the net benefit of the exposure to the individual outweighs any risk i.e. exposures are always justified. Patient doses may become significant in increasing a patient's risk of stochastic effects such as induction or promotion of cancer especially in high dose procedures such as CT scans and fluoroscopy. For this reason appropriate protocols for ensuring the correct clinical indications for any procedure, correct methods for determining patient ID and irradiation site (refer Appendix 4), and appropriate optimization of exposure factors are detailed in this plan in order to minimize any unnecessary administration of ionizing radiation. For interventional procedures and fluoroscopic examinations the possibility of deterministic effects, notably radiation induced skin burns remains a potential patient hazard which must be avoided by ensuring close monitoring of exposure factors and fluoroscopic times, proper training and licensing of staff and co-operation between radiographic, medical and nursing staff in managing complicated procedures during irradiation and after care.

(ii) Patients Having Brachytherapy

Although brachytherapy is performed when the benefit of treatment is deemed to outweigh any risks to the patient, radioactive patients present a source of radiation exposure to other staff, patients and visitors. It is important to note that the prior administration of a radiopharmaceutical to a patient is not of itself a contraindication to performing other procedures and care. The decision to proceed with other tests exposing Southern Radiology and hospital staff should be made based on clinical need. Aftercare should be in line with safe working practice outlined in this plan. A decision about what precautions should be adopted depends upon an assessment of the amount of radiation exposure to others from the patient as a result of the brachytherapy procedure¹. Steps should be taken to reduce radiation exposure to staff to the minimum reasonably achievable level. This plan details policies and procedures to minimise dose to staff and public or avoid inadvertent exposure from radio-pharmaceuticals.

Sources of **non ionising radiation** may be deemed hazardous to personnel and patients. These include laser apparatus used in theatres and as a positioning aid in CT scanning. These hazards are briefly dealt

with herewith; however comprehensive guidance on Laser Safety and associated procedures should be sought from the Operating Theatres Service Manager and/or Urology Specialty Team Leader if required (refer Attachment 2).

Risks associated non ionising radiation sources on site are related to the possible adverse effects on specific body parts when directly exposed to laser light and the environmental changes brought about by laser apparatus.

The risk of adverse affects will depend on one of more of the below factors:

- The type of equipment being used and hence the class of laser
- The extent of compliance with safe operating procedures
- The extent of conformance to preventive quality control and assurance activities
- The competency and training of staff
- The environment in which the laser apparatus is used

(iii) Surgical Laser

Apparatus that emits energy greater than 1mW poses a possible hazard to the eye. Laser apparatus capable of emitting greater than 500mW poses a serious hazard to skin and can ignite combustible materials. Both engineering and administrative controls are necessary to minimise hazards to patients, health care staff, and others associated with the use of laser apparatus and to prevent the unplanned exposure to laser light.

It is imperative that the wavelength and maximum energy of the laser apparatus is known to ensure that appropriate control measures are used. Typical wavelengths range from 810 to 1060 nm at energy levels of 0.5 to 10 watts.

The primary hazard from laser apparatus is the unintended exposure of the eye and skin to the laser light, either directly or indirectly through scatter. In addition, there are other occupational and patient concerns which include electrical hazards; laser generated airborne contaminants, and fire and explosion hazards. These are described below.

(a) Eye exposure

Exposure to laser light can cause rapid and irreversible damage to the eye, such as irreversible loss of central vision, photokeratitis and conjunctivitis. Injury is dependent on a number of factors, such as the total radiant power incident on the eye, the laser wavelength, the extent of its transmission through the ocular media and the duration of the exposure. Because of the focusing action of the eye, the retina may be exposed to a power density that is several thousand times the power density measured at the cornea of the eye.

Surgical lasers in the visible and near infra-red regions (wavelength between 400-1400 nm) such as Nd-YAG and argon lasers present a serious threat to eyesight following direct, specular or diffuse exposure of the retina to the laser light. A surgical CO₂ laser will vaporise surface tissue and if exposed to the light from this laser apparatus the cornea of the eye will be injured.

In some instances, the harmful effects of exposure may not become apparent for several years. For example, exposure to laser light in the near ultraviolet (UV-A) region of the spectrum (Nitrogen laser or Helium-cadmium laser) may result in lens opacities which may only become clinically significant after many years.

It is also important to note that reflections from reflective surfaces can refocus the laser light causing eye injury. Note some surfaces not normally considered specularly reflective may actually be specularly reflective for the frequency of laser light used.

Laser incident reports have repeatedly shown that ocular hazards exist during beam alignment procedures. Consequently, sufficient personal protective eyewear appropriate for the laser apparatus must be available for all persons to reduce risk of eye injury.

(b) Skin exposure

Exposure of the skin to the laser beam from dental lasers can result in skin thermal interactions. At low intensity, the laser beam directed onto the skin will produce a sensation of warmth or pain. A "pin-prick" sensation may be produced by a pulsed laser beam. Increased intensity onto the skin may cause effects ranging from mild erythema to severe blistering with deep burns. The level of thermally induced damage to the skin is proportional to the skin temperature and duration of exposure. Direct exposure of the skin to the laser is to be avoided.

(c) Fire and explosions

Specific precautions are needed to avoid fires and explosions.

The use of flammable liquids and oxidizing gases can pose significant fire hazards during the use of laser apparatus. The materials used in association with the laser procedures such as plastic parts and tubing, can also increase the risk of fire.

The risk of fire is not limited to areas outside the patient. It must also be realised that fires can be created inside patients due to the laser light interacting with some material (e.g. gas in the digestive system, endotracheal tubes in the upper respiratory system, etc.) during laser surgical procedures.

When a laser apparatus is used with drying agents, certain anesthetic preparation solutions, ointments and plastic resins there is also a potential for fire. Sponges, gauze pads and swabs located near the surgical site must be moistened with saline water when laser apparatus are used.

(d) Airborne contaminants

The use of laser apparatus may result in the vaporization of target tissue which produces noxious airborne contaminants. These contaminants can cause lacrimation, nausea, abdominal cramping and vomiting. At certain concentrations, ocular and upper respiratory tract irritation may also occur. It has been shown that smoke production is a function of increased irradiance levels. The smoke can increase the scatter of the laser light. Laser beam interaction with tooth enamel, fillings, crowns, implants, etc, may generate particulates and metal fumes.

(e) Secondary burns

It should be noted that instruments may become hot if the beam is directed onto an instrument, especially blackened surgical instruments. This may result in secondary burns.

3. DOSE LIMITS

As previously noted dose limits are not applied to patients undergoing medical procedures which involve exposure to radiation. Prescription of radiation for diagnosis or treatment is always predicated on any risk to the patient being outweighed by the benefit to the patient.

All persons working with ionising radiation must not exceed the following dose limits prescribed in the Regulations.

Occupational:

Whole Body:

- 50 mSv in any one year. (50,000 μ Sv)
- 20 mSv per year averaged over any 5-year period. (20,000 μ Sv)

Lens of the Eye:

- 150 mSv per year. (150,000 μ Sv)

Skin:

- 500 mSv (averaged over 1 cm²) per year. (500,000 μ Sv)

Hands and Feet:

- 500 mSv per year. (500,000 μ Sv)

Public:

Whole Body:

- 1 mSv per year averaged over any 5 year period. (1,000 μ Sv)

Lens of the Eye:

- 15 mSv per year. (15,000 μ Sv)

Skin:

- 50 mSv (averaged over 1cm²) per year. (50,000 μ Sv)

Pregnant staff are classified under the Member of the Public dose limits.

- 1 mSv per year averaged over any 5 year period. (1,000 μ Sv)

Employees who declare a pregnancy should seek the advice of the RSO if they are working with radiation. The purpose for seeking this advice is that the Regulations specifically address the issue of exposing the fetus to radiation while in the workplace.

4. RESPONSIBILITIES OF SOUTHERN RADIOLOGY

Southern Radiology holds a license sell and/or possess diagnostic radiation apparatus. (IA2)

Southern Radiology obtained this license after demonstrating that all of the radiation safety criteria set by the *Radiation Safety Act 1999* was satisfied.

Southern Radiology must fulfill ongoing obligations to ensure that the health and safety of all persons are not adversely affected by exposure to radiation due to a misconduct of practice. To achieve this, Southern Radiology must:

- Ensure that the radiation doses arising from the radiation practice are kept below the limits specified in the *Radiation Safety Regulation 1999* and *Radiation Control Regulation 2003* and as low as reasonably achievable
- Hold a license, issued under the *Radiation Safety Act 1999*, with an authority to possess diagnostic X-ray equipment
- Ensure that all users of diagnostic X-ray equipment hold licenses, issued under the *Radiation Safety Act 1999*, allowing them to use such equipment for diagnostic radiography and that all users work within the limits of their licences
- Ensure that all radiation apparatus in use on the premises of the Licensee (see Attachment 1) is appropriately registered by NSW Government Office of Environment and Heritage (EPA) and certified compliant with the mandatory requirements of the relevant EPA Radiation 6 Guideline by an accredited Consulting Radiation Expert (CRE)
- Ensure that administration of radiation to patients only occurs in accordance with a written referral containing clinical indications for the procedure by registered medical practitioners or in the case of emergencies, that the requirement for a written referral confirming a direct verbal instruction from a registered medical practitioner is provided within 12 hours of the procedure being performed
- Provide ongoing Radiation Safety and Protection training to all employees involved in radiation related procedures via the Clinical Educators or the appointed Radiation Safety Officer
- Ensure that all persons assisting with fluoroscopic procedures are provided with instructions on radiation protection measures to ensure that radiation doses to all persons involved in the radiation practice are kept as low as reasonably achievable
- Appoint a radiation safety officer certified under the *Radiation Safety Act 1999*
- Ensure that the radiation safety officer is carrying out the function properly so that the possession licensee is able to be adequately appraised of the radiation safety status of the practice at all times;
- Ensure that adequate resources are provided to implement this radiation safety and protection plan (eg. provision of adequate staff, provision of personal protective equipment, appropriate training in radiation safety);
- Ensure that the records, specified in this radiation safety and protection plan, are maintained
- Provide personal monitoring devices to persons as required by this radiation safety and protection plan, and ensure that:
 - (i) Personal monitoring devices are handled properly
 - (ii) Monitored persons are advised of their personal monitoring assessment results
 - (iii) Copies of the personal monitoring will be reviewed by the group Radiation Safety Officer

(iv) Keep a personal monitoring record for each person monitored

- Ensure that the NSW Govt. Office of Environment & Heritage Radiation Control Section (EPA) is advised in writing of the sale / disposal /modification of any equipment listed in Attachment 1 as required by the department;
- Where an incident / accident occurs, immediately advise the NSW Govt. Office of Environment & Heritage(EPA) Radiation Control Section, in writing and Health Department;
- Provide and maintain protective clothing and apparatus for all personnel involved in Radiographic procedures

5. RESPONSIBILITIES OF HURSTVILLE PRIVATE HOSPITAL

Hurstville Private Hospital holds a license sell and/or possess radioactive substances or items containing radioactive substances. (S2)

Hurstville Private Hospital obtained this license after demonstrating that all of the radiation safety criteria set by the *Radiation Safety Act 1999* was satisfied.

Hurstville Private Hospital must fulfill ongoing obligations to ensure that the health and safety of all persons are not adversely affected by exposure to radiation due to a misconduct of practice. To achieve this, Hurstville Private Hospital commits to abide by this Radiation Protection and Safety Plan and advice given by consultants listed in Attachment 2

6. DUTIES OF THE APPOINTED SOUTHERN RADIOLOGY RADIATION SAFETY OFFICER

(i) Function

The radiation safety officer advises the employees and management of Southern Radiology on radiation safety matters, associated with the practice of ionising radiation. The name and contact details of the radiation safety officer are detailed in Attachment 2.

Continually

The radiation safety officer must:

- Provide, or arrange for the provision of, training regarding radiation hazards and safe working practices as required by this radiation safety and protection plan
- Examine the personal radiation monitoring device assessment results to ensure that radiation doses that a person could receive are within the limits prescribed by the *Radiation Safety Regulation 1999*, and are as low as reasonably achievable;
- Investigate any unusual dose readings (dose alerts and unusually high readings for the individual and/or type of work undertaken)
- If a user declares her pregnancy, the Radiation Safety Officer must ensure that, work practices are governed that the radiation dose is kept as low as reasonably achievable and below 1mSv per annum, the radiation dose limit prescribed by the *Radiation Safety Regulation 1999* during the pregnancy.

Annually

At the commencement of the practice and once a year thereafter, the radiation safety officer must check, and record, that:

- All users conducting radiation practice within Southern Radiology & Hurstville Private Hospital must read, understand, and complying with this radiation safety and protection plan
- Details of the equipment and the uses are accurately detailed in this radiation safety and protection plan (refer Attachment 1)
- Southern Radiology holds the possession of the X-ray equipment and are appropriately licensed under the *Radiation Safety Act 1999*
- All authorised users of the x-ray equipment are appropriately licensed under the *Radiation Safety Act 1999*
- All maintenance and quality control checks as required by this plan are being conducted and recorded, and any relevant problems have been appropriately rectified
- The safety devices and personal protective equipment as required by this plan are accessible, in good condition, and are appropriate for the type of equipment being used
- Compliance certificates for the X-ray equipment have been obtained within the necessary time frame
- Warning signs, as required by Radiation Guideline 6 *Registration requirements & industry best practice for ionizing radiation apparatus used in diagnostic imaging: Part 2 Fluoroscopy &*

Radiography and the current radiation safety and protection plan, are displayed and in good condition;

- All X-ray equipment continues to comply with Radiation Guideline 6 *Registration requirements & industry best practice for ionizing radiation apparatus used in diagnostic imaging. Part 2* Fluoroscopy & Radiography.
- Train the Hurstville Private Hospital clinical/support staff in the Operating Theatre, in Radiation Safety principles to assist with indoctrination of the Radiation Safety Protection Plan to all new employees.

[Note: Laser Safety Officer responsibilities form an integral part of Radiation safety but are deemed beyond the scope of the Radiation Safety Officer and this plan]

(b) Reporting to the Management of Southern Radiology

The radiation safety officer must report immediately to the Quality and Compliance Manager of the Southern Radiology Group and the following:

- Any radiation incidents / accidents (immediately)
- Any breach of this radiation safety and protection plan and Radiation Control Regulation (immediately)
- Any action required to achieve compliance with this radiation safety and protection plan and Radiation Control Regulation (on an ongoing basis)
- The effectiveness and extent of compliance with this radiation safety and protection plan (on an annual basis)
- Recommendations about amendments to the plan to ensure the continued effectiveness and that the information contained is correct by reviewing this radiation safety and protection plan (on an annual basis)

7. RESPONSIBILITIES OF THE SOUTHERN RADIOLOGY USERS AND EMPLOYEES INVOLVED IN RADIATION RELATED PROCEDURES

All users of diagnostic X-ray equipment are responsible for ensuring that radiation doses received by persons other than the patient are below the radiation dose limits prescribed by the *Radiation Safety Regulation 1999* and are as low as reasonably achievable.

Users must implement steps to ensure that a person's health and safety are not adversely affected by exposure to radiation due to the operator practice.

Users at Southern Radiology must:

- Comply with the Southern Radiology radiation safety and protection plan
- Hold a license, issued under the *Radiation Safety Act 1999*, with an authority to use diagnostic X-ray equipment for diagnostic radiography
- Comply with their license conditions stated in the *Radiation Safety Act 1999* and the *Radiation Control Regulation 2003*
- Ensure that they are authorised by Southern Radiology to use the X-ray equipment
- Be familiar with the equipment utilized to conduct the diagnostic radiographic practice, and the relevant applications
- Undertake and satisfactorily complete the training specified in this radiation safety and protection plan
- Wear a personal monitoring device and personal protective equipment as required by this radiation safety and protection plan
- Report any contravention of the radiation safety and protection plan to management to the radiation safety officer and Quality and Compliance Manager of Southern Radiology
- Advise the Southern Radiology management or radiation safety officer of any X-ray equipment which may be malfunctioning and action necessary steps to place the equipment out of commission
- Report any incident which may adversely affect the health or safety of any person to the Southern Radiology Quality and Compliance Manager and site radiation safety officer
- Female users must report any confirmed pregnancy to the Southern Radiology management
- Ensure that the x-ray apparatus is covered/protected appropriately to prevent any contamination with blood and other fluid/products that may penetrate the equipment and ultimately affect the performance of the x-ray apparatus. i.e plastic covers over the tube and face of the image intensifier whilst in use.

Occupationally exposed employees involved in radiation related procedures at the Hurstville Private Hospital must:

Southern Radiology Group
Title: RSPP_Hurstville Private Hospital
Compiled by: Irene Moros
Approved by: CEO/Managing Partners SRG

Version: 002
Document Identifier: SRG0007
Reviewed by: SRG Quality and Compliance Manager
Date: September 2011

- Comply with the site radiation safety and protection plan
- Undertake and satisfactorily complete the training specified in this radiation safety and protection plan;
- Report any contravention of the radiation safety and protection plan to management at the Southern Radiology Quality and Compliance Manager and site radiation safety officer
- Advise the Southern Radiology Quality and Compliance manager and site radiation safety officer of any X-ray equipment which may be malfunctioning
- Report any incident which may adversely affect the health or safety of any person to the Southern Radiology Quality and Compliance manager and site radiation safety officer
- Female employees must report any confirmed pregnancy to Southern Radiology management.

8. ACCESS CONTROL

Access to equipment emitting x-rays is to be controlled by the use of designated restricted access areas, secured rooms, key operated start up, and password protected software start up.

The specific access control mechanisms outlined below are to be adhered to at all times.

Radiology Department	The Radiology department is a secure premise with access permitted by suite specific or security master key only. The premise is to be locked when Southern Radiology staff or authorised delegates are not in attendance. Premise keys are to be assigned to authorised personnel only. A register of key allocation is to be kept on site.
Fixed General Radiography equipment	To avoid inadvertent use the general radiography equipment is to be switched off at both the console and generator main switch when authorised Southern Radiology staff are not in attendance.
CT Equipment	To avoid inadvertent use the CT equipment is to be shut down and generator main switch turned off when authorised Southern Radiology staff are not in attendance. CT software must be password protected for start up.
Mobile Radiography Equipment	Mobile units are located in general access areas of the hospital. To avoid unauthorised use all mobile equipment is to be key operated. The equipment is to be switched to the off position and the keys retained in the Radiology department when not in use by authorised personnel.
Image Intensifiers (fluoroscopy units)	Image intensifiers are located in general access areas of the hospital. To avoid unauthorised use all image intensifiers are to be key operated. The equipment is to be switched to the off position and the keys retained in the Theatre Managers office when not in use by authorised personnel. When in use image intensifiers are to remain in standby mode where available to avoid accidental exposure. Image intensifiers are authorised for use in Operating theatres only. Use in any other area of the hospital or consulting suites must be authorised by the site Radiation Safety Officer and Hospital Quality Manager prior to use.

Only persons who are directly involved in a radiographic procedure are to remain in controlled access areas when equipment is in use. All non essential persons must be removed from the room or immediate area to avoid inadvertent exposure from scatter radiation

9. TRAINING

Southern Radiology Group
Title: RSPP_Hurstville Private Hospital
Compiled by: Irene Moros
Approved by: CEO/Managing Partners SRG

Version: 002
Document Identifier: SRG0007
Reviewed by: SRG Quality and Compliance Manager
Date: September 2011

In order to assist personnel in minimising risk to themselves and others, Radiation Safety and Protection training is a mandatory requirement for staff of Southern Radiology and the Southern Radiology Group Hospital.

The Radiation Safety Officer must provide, or arrange for the provision of, appropriate training to the Southern Radiology users, employees and other relevant persons in radiation safety matters (including nursing and support staff at Hurstville Private Hospital).

The Radiation Safety Officer and/or hospital educators will provide training and induction of the Radiation Safety and Protection Plan to all users and staff involved in radiation related procedures upon commencement of employment.

Training modules are :

Topic No:	Topic Name	Description
1	Radiation Dose and Risk	Overview of types of radiation, the sources and the relative risks of exposure with an emphasis on medical X-ray
2	Sources of radiation in this Hospital	Delineation of the controlled and uncontrolled areas. Demonstrate how to recognise when the source is active. Permissions and Protocols for entering controlled areas.
3	Basic Radiation Protection	Time, Distance and Shielding. What to do in the event of accidental exposure. Radiation incidents and protocols at this practice for reporting incidents.
4	Radiation Safety and Protection Plan	Contents, purpose, review, location and access, content.
5	Personal Dosimetry	Practice policy on who should be monitored. Protocols for wearing and changing personal dosimeters. Record keeping and staff access to records.
6	Minimising dose to patients in Fluoroscopy	Features of the Fluoroscopic equipment and scan protocols which limit dose to patients. Review of procedures for scan protocols.
7	Minimising dose to staff involved in Brachytherapy	Information on Iodine 125 seeds, decay of isotopes, storage and shielding.

Mandatory training modules are defined by role as outlined below:

Staff Classification	Radiation Safety Training Topics
Administration Officers	1,2,3,4
Wardsman/Porter	1,2,3,4
Nurses	1,2,3,4,5
Radiographers/ Sonographers	3,4,5,6
Medical Officers	3,4,5,6

All staff are required to complete mandatory training modules upon commencement of engagement with either Company as part of their induction and orientation program. Annual revision is required thereafter.

10. SAFE WORK PRACTICES / PROCEDURES FOR SOUTHERN RADIOLOGY (RADIOGRAPHIC PROCEDURES)

The Radiation Protection Principle

Persons and the environment should be protected from unnecessary exposure to radiation through the processes of:

- Justification
- Limitation and
- Optimisation

- (i) Justification involves assessing whether the benefits of a radiation Practice or the use of a radiation source outweigh the detriment
- (ii) Limitation involves setting radiation dose limits, or imposing other measures, so that the health risks to any person are below levels considered unacceptable
- (iii) Optimisation— In relation to the conduct of a radiation Practice, or the use of a radiation source, that may expose a person or the environment to ionising radiation, means keeping:
The magnitude of individual doses of, or the number of people that may be exposed to, ionising radiation; or if the magnitude of individual doses, or the number of people that may be exposed, is uncertain, the likelihood of incurring exposures of ionising radiation as low as reasonably achievable taking into account economic, social and environmental factors.

The three simple rules to minimise personal radiation doses include:

Time: Optimal number of exposures and minimize the time of exposure as practically reasonable.

Distance: Keep as far away as practicable from the X-ray equipment during an exposure (2 meters).

Shielding: Wear personal protective clothing / equipment or stand behind the protective shield (where provided)

To ensure radiation doses to all persons are minimised, the following practices must be adhered to:

(a) Justification/Authorisation of Exposure

X-ray examinations at Southern Radiology may only be performed on the written or electronic request of a person authorised to make such a request under the *Radiation Safety Act 1999*. A list of authorised persons is detailed in Schedule 3A of the *Radiation Safety Regulation 1999*. For the purpose of practical interpretation radiographic procedures must only be performed following receipt of a written or electronic request from a medical practitioner or allied health professional recognised by the Australian Government Department of Human Services as being authorised to do so. Authorisation is evidence by a current valid Medicare Provider number.

All requests for radiographic procedures must be clinically relevant. A service is considered to be clinically relevant if the requesting practitioner deems it a necessary part of the treatment of the patient.

(b) Equipment and Premises

X-ray equipment at Southern Radiology may only be used if it is in compliance with the relevant radiation safety standard made under the *Radiation Safety Act 1999*.

All doors to the X-ray rooms that constitute part of the radiation shielding must be closed during all exposures.

X-ray equipment that has not been used for an extended period of time must be subject to the warm-up procedures as recommended by the manufacturer.

(c) Patients

The patient must be properly prepared for radiological procedures. This may include the removal of necessary clothing or jewellery from the area of interest, instructions on respiration, movement or dietary preparation and in some cases preparatory pathology testing or medication. Patient preparation is to be advised at the time of booking a procedure and in the case of inpatients will be advised in writing to the Clinical Nurse Consultant supervising that patient's care.

Prior to administration of radiation to any patient, the user/operator must ensure that the required preparation has been carried out, the patient is fully informed of the nature of the radiological procedure and the appropriate consent for the procedure is given.

During radiological procedures the operator/user must take reasonable steps to ensure that the patient does not move during the exposures.

If a patient needs to be assisted, held or comforted during radiological procedures, only persons over 18 years old and not pregnant can provide such assistance. The same person must not regularly hold or comfort patients during radiological procedures. The person must wear personal protective clothing.

Patients undergoing X-ray examinations should wear appropriate personal protective clothing (e.g. Gonad shields) unless it interferes with the diagnostic quality of the radiograph.

All female patients of reproductive age should be asked about the possibility of being pregnant. Radiography of an area remote from the fetus may be undertaken with proper collimation and suitable radiation protection. X-ray examinations involving exposure of the fetus must be avoided unless the person authorising the procedure has given a specific direction in relation to the irradiation of the fetus and the patient has been explained the reason for doing so and provided informed written consent.

(d) Users of X-ray equipment

Plain Film Radiographic Procedures (Mobile X-rays)

- The mobile X-ray equipment is only to be used for diagnostic radiography or quality control checks by an appropriately licensed person who is authorised to use the equipment by Southern Radiology.
- When performing radiography, the Radiographer and assistants (Nurses) should, wherever possible, stand at least two meters away from the X-ray tube and the patient, and not in line with the X-ray beam. Protection can be achieved by standing behind a protective shield, if provided. If this is not possible, they must wear personal protective equipment provided, such as lead aprons and thyroid shields.
- When performing radiographic examinations, the user should be in a position to be able to view and communicate with the patient undergoing the radiation procedure.
- All female patients of reproductive age should be asked about the possibility of being pregnant. Radiography of an area remote from the fetus may be undertaken with proper collimation and suitable radiation protection. X-ray examinations involving exposure of the

fetus must be avoided unless the person authorising the procedure has given a specific direction in relation to the irradiation of the fetus and the patient has been explained the reason for doing so and provided written consent.

- The primary beam must not be directed at any persons other than the person undergoing the procedure.
- Only persons who are directly involved in the radiographic procedures are to remain in the X-ray room.

Fluoroscopic Procedures

- The image intensifier as listed in Attachment 3 is to be used only in theatre at Hurstville Private Hospital. Authorisation from Southern Radiology Management is required to perform fluoroscopic procedures in any other section of the Hurstville Private Hospital.
- Fluoroscopic procedures are any procedures during which X-rays are produced constantly for a period. This includes the use of mobile image intensifiers.
- In Theatre where the mobile image intensifier is used to carry out fluoroscopic procedures a person with specialist training and expertise in radiation safety and diagnostic radiography of the type being performed must be present during the procedure, in addition to the medical specialist performing the medical procedure. This person is to be a licensed diagnostic radiographer.
- This person is required to monitor and advise on the radiation safety of persons working in the areas of patient dose, image production and acquisition.

No Fluoroscopic procedures are to proceed without at least the following staff being present:

- (i) Medical specialist who holds an appropriate license to use ionizing radiation;
- (ii) An appropriately trained, licensed diagnostic radiographer;

The following procedure guidelines should be adhered to when fluoroscopic procedures are performed:

- All persons assisting with fluoroscopic procedures to be provided with instructions on radiation protection measures (ALARA – **As Low As Reasonably Achievable**) to ensure that radiation doses to all persons involved in the radiation practice are kept as low as reasonably achievable.
- When fluoroscopy X-ray equipment is not in use, it should be placed in standby mode to avoid accidental activation of the equipment.
- All staff working in close proximity to the primary beam should wear well fitting lead gowns and properly adjusted lead thyroid shields. Where appropriate, staff should use additional protection such as lead glasses.

Note: The personal protective lead gowns should be a minimum of 0.30 mm lead equivalent at the front and 0.30 mm lead equivalent, at the back.

- During exposures, non-essential persons in the theatre should, wherever possible, stand as far away as possible from the X-ray tube and the patient or leave the theatre before the

commencement of the fluoroscopic procedure. If possible, persons not directly involved in the procedure should stand behind a protective shield, if available.

Southern Radiology users/employees must consider the following to optimize the radiation dose to the patient and the operator:

Patient Size:

The instantaneous intensity of radiation used to image a patient is directly related to the patient's size. Therefore the mA setting must be altered to suit the patient. Larger patients involve the use of higher dose rates than do smaller patients (ie a higher mA setting).

Radiographic Factors:

Use the lowest tube current and highest kVp possible while still maintaining a diagnostically acceptable image. In pulsed imaging modes, the lowest frame rate necessary to achieve the diagnostic result should also be used. Users should consult with an appropriately experienced Radiographer / Engineer familiar with the operation of the equipment to ascertain how the automatic exposure control system in the radiation apparatus responds to changes in load.

Source – Skin Distance:

During imaging use the greatest possible source to skin distance to reduce the patient skin entrance exposure. Although the dose area product remains constant (for a fixed source – detector distance) the dose rate will increase the closer the patient is to the source.

Patient – II Distance:

The patient should be positioned as close as possible to the image intensifier (II). This in turn allows maximisation of the source-skin distance and minimises geometric magnification.

Image Magnification:

Any form of geometric or electronic magnification of the image will result in increased skin dose to the patient. Operators should therefore use the least magnification possible to achieve the clinical performance required.

Anti-Scatter Grid:

If possible, the anti-scatter grid may be able to be removed for small patients such as children. This will result in an immediate 40% reduction in radiation dose to the patient and operators, but this must be balanced by the effect it may have on image contrast due to increased levels of scatter in the image.

Collimator Opening:

Collimate down to the minimum field size necessary to reduce radiation exposure to the operators and the patient.

Beam-on Time:

The X-ray beam-on time should be kept to the absolute minimum. Initiate an exposure to provide only a real time dynamic image or when recording images for post acquisition analysis. The use of last image hold is strongly recommended when viewing an essentially static image.

Filtration:

On systems that enable the operator to select the level of beam filtration, the use of additional levels of filtration will lead to a reduction in the exposure of the patient and staff. This must be balanced by the effect the added filtration might have on image quality.

Hands:

The operator should not allow his or her hands to enter the primary beam. Whenever possible, the operator should work on the beam exit side of the patient where the radiation exposures are significantly less.

Projection Differences:

Operators should be aware that the radiographic density and hence radiation exposure is higher in oblique projections due to greater path lengths. Furthermore lateral and oblique projections feature shorter source-skin distances and/or greater patient-II distances.

11. SAFE WORK PRACTICES / PROCEDURES FOR HURSTVILLE PRIVATE HOSPITAL (BRACHYTHERAPY PROCEDURES)

Low Dose Rate brachytherapy to treat prostate cancer using Iodine-125 (I-125) radioactive source, to perform the seeds implant to patient in operation theatre. The implant operation is under guided by medical image system of ultra-sound device and x-ray fluoroscopy system.

The practical work involves urologist, radiation oncologist, medical radiation oncology physicist, and operating nurses.

The protocols for I-125 seed implants is conducted in accordance with the National Code of Practice for Security of Radioactive Sources;

The seeds are transported to the hospital in a self-shielded container however staff may be exposed to radiation from opening and loading I-125 seeds into needles and handling for the implant procedure and utilization of the mobile image intensifier.

This may subject staff involved to primary beam x-ray, scattered radiation; and tube leakage.

The seeds implant operation for low dose rate brachytherapy developed process is as follows:

- Cases are determined by urologist according the diagnostic result;
- Brachytherapy implant decisions are made by both urologist and radiation oncologist according to the ultra-sound image prostate volume study result;
- Treatment plan is designed by medical radiation physicist with number of I-125 seeds determined;
- The treatment plan will be checked and approved by radiation oncologist;
- I-125 seeds purchase order is determined by medical radiation physicist according to the number of seeds required by the implant plan;
- The purchase order will be lodged by the Theatre Manager at least 3 weeks before the implant date;
- The seeds are shipped by the manufacturer 2 weeks before the implant date;
- The authority of purchase is given to the license holder as issued by the NSW EPA and ARPANSA (Australian Radiation Protection and Nuclear Safety Authority);
- When the seeds delivered to Hurstville Private Hospital, the package label must be checked, accepted, and stored by the hospital until the implant day;
- On the day about half hour before the implant operation, medical radiation physicist must pick-up the seeds from the hospital and carry the seeds to the designated operating theatre;
- The License Holder (as detailed in Appendix 1) will open the seeds transfer package in the operating room to check labeled purchase order number, activity and seeds number with patient implant plan;
- The seeds container will be opened by medical radiation physicist / license holder) under the sterilising condition assisted by the operation nurses;

- All staff in the operation room must be wearing the radiation protection lead aprons with thyroid protection when the seed container is opened;
- The seeds activity will be checked by medical radiation physicist using ionization measurement Dosimetry system which should be calibrated by ARPANSA;
- The seeds activity checking measurement reading will be calculated, corrected, recorded and compared with planned activity required;
- Seeds will be loaded into each implant needle by the license holder in accordance with the plan;
- Loaded needles kept in self-shielded needle holder and be ready for the implant;
- Needle implant sequence is controlled by radiation oncologist and the implant is performed by urologist, the needles handed over to urologist by medical radiation physicist, the C-arm x-ray system is controlled by the radiographer.
- After the implant procedure is completed :
 - The patient's body radioactivity is checked by medical radiation physicist using a survey meter as listed in Attachment 6.
 - the total number of seeds implanted and number of seeds remaining will be checked, recorded and re-packed in the shielded container by medical radiation physicist.
 - Any remaining radioactive seeds will be re-packed and return back to the Medical Physics Department at St George Hospital, then disposed of after 2 years (in accordance with EPA regulations)
 - an environment survey will be conducted by the medical radiation physicist using radiation survey meter as listed in Attachment 6.
- The patient will be booked for 4 weeks post-implant dose evaluation;
- Post implant delivery dose evaluated by medical radiation physicist according to the 4 week CT scan images;
- Pre and Post implant planning results will be kept in patient file, and a hard copy of the plan will report to urologist and radiation oncologist;
- The I-125 seeds purchase authority is approved by Australian Radiation Protection and Nuclear Safety Agency (ARPANSA);
- Any unnecessary irradiation to any person(s) during the implant procedure is to be treated as a radiation incident. The effective dose to the person is to be evaluated, determined and a report to be generated by the medical radiation physicist and a verbal report of the radiation accident to NSW Government Department of Environment & Heritage to be made within 24 hours supported by the written report within 48 hours;
- Any seeds that are lost are to be reported with details of number, activity, effective dose to the environment to the Hurstville Private Hospital management, the Radiation Safety officer and the NSW Government Department of Environment & Heritage.

12. SAFE WORK PRACTICES / PROCEDURES FOR HURSTVILLE PRIVATE HOSPITAL (LASER APPARATUS)

To ensure exposure to laser light is minimised, the following practices must be followed.

(i) Administrative requirements

- The laser apparatus is only to be used by an appropriately licensed person who is permitted to use the apparatus by the possession licensee.
- Laser apparatus must only be performed on the request of a person authorised to make such a request under the *Radiation Safety Act 1999*.
- Laser apparatus must only be used if it is in compliance with radiation safety standard HR006:1999 *Standard for Class 4 lasers used to carry out cosmetic or health related procedures on human beings*.
- Laser apparatus must only be used in premises that are in compliance with radiation safety standard PR008:1999 *Standard for premises in which Class 4 lasers are used to carry out cosmetic or health related procedures*.
- Laser apparatus and its installation must be electrically and mechanically safe.

(ii) Use of the laser apparatus

- Laser apparatus should be switched to a "standby" mode of operation except when the use licensee has ordered the laser to be readied to immediate use. The laser should be returned to "standby" mode when the use licensee performing the procedure indicates a break in laser use.
- The laser system should be placed in standby mode when delivery optics are moved away from the target, or when the laser apparatus is not aimed at a target.
- The laser apparatus should not be fired unless it is aimed at the selected tissue site, the power metre, or at a suitable external beam stop.
- The use licensee operating the laser apparatus should warn the assisting staff verbally before firing the laser or running a series of exposures.
- Any articulated arm, which is not shuttered, should be capped when not connected to the hand piece or micromanipulator (operating microscope, endoscope, etc.).
- Reflective materials must not be placed in or near the path of the laser light. Polished instruments should be avoided. (Note: Instruments which may not be specularly reflective to visible light may do so with laser light in the far infra-red region.)
- The use of brushed anodized instruments should be used to reduce reflected laser intensity from visible or near infra-red lasers.
- Lenses and mirrors should not be touched as grease from the hands may result in damage.
- The quality of the aiming beam at the distal end of the delivery system should be examined prior to inserting into the body and periodically during use.
- Doors must remain closed during the use of the laser apparatus.

(iii) Personal protective equipment

- All occupants in the premises where the laser apparatus is energised must wear protective eye wear compatible with the wavelength of the laser light whenever the laser apparatus is to be used. The eye protection should include side guards of a 5+ rating for each staff member.
- Where appropriate, the patient's eyes should be protected using appropriate personal protective equipment (e.g. protective eyewear, corneal shields, wet eye pads etc). Prior to use, the operator and ancillary personnel are required to select and examine
- eyewear for comfort, proper fit, and presence of labels describing both wavelength and proper optical density.
- If eyewear is damaged, it must not be worn, and the radiation safety officer must be advised.
- If the operating field is in or near the respiratory passage, adequate ventilation should be provided for patient protection.

- All persons in the dental surgery must use protective facemasks.
- Persons who may be exposed to laser light, particularly in the UV region should wear protective clothing.
- Surgical gowns, drapes etc should be made of fire retardant material.

(iv) Alignment of the laser light

- The manufacturer's written standard procedures for beam and mode alignment should be followed.
- Alignment of laser optical systems (eg. mirrors, lenses, beam deflectors), should be performed in such a manner that the primary beam or a specular or diffuse reflection of a beam does not expose the eye to laser light to a level above maximum permissible exposure.
- Laser apparatus must not be used if there is a faulty aiming system from a misaligned beam, or if infrared lasers such as CO₂ and Nd: YAG are not equipped with an aiming beam.
- The use of low power (Class 1 or Class 2) visible lasers for path simulation of higher power lasers must be used for aiming of higher power visible or invisible laser light.
- Appropriate eyewear must be worn during alignment procedures.
- For laser apparatus using an articulated arm, the coincidence of aiming and treatment beams should be tested during use, especially if it is suspected that the alignment may have been disturbed.
- Laser apparatus should not be operated if any target indicating or aiming device is not observed.

(v) Laser fibre delivery systems

- The fibre should be examined for breaks or damage of the distal tip, the proximal connector and the catheter sheath. If deficiencies or damage are noted, the fibre must be replaced.
- Clamps or other instruments should not be used to secure fibre in the operating field (site where the laser light is being directed).
- The fibre must be calibrated according to the manufacturer's instruction and the results recorded in an appropriate logbook.
- During the procedure, the fibre should be monitored for distortion of the beam, decreased power transmission, and accumulation of debris on the tip.
- The manufacturer's instructions must be followed if a disposable fibre is to be re-used. (Note: All reusable fibres must be thoroughly cleaned, disinfected and sterilised prior to re-use.)

(vi) Non-Beam Hazards

- To minimise non-beam hazards, the following practices should be followed:
 - (i) alcohol must not be used in the operating field
 - (ii) a hot fibre must not be placed directly on paper drapes
 - (iii) fire-retardant drapes, damp packs or pads must be used
 - (iv) high levels of oxygen must be avoided in the operating field
 - (v) non-combustible instrumentation, venturi ventilation techniques, shielding with wet substrates and use of low-combustion gas mixtures should be used
- Black surgical instruments should not be used as they may heat to excessive levels.
- Rooms where laser surgical procedures are performed should be equipped with at least one operational and prominently located portable fire extinguisher.
- Anesthesia personnel should use non-flammable, specially wrapped or chemically treated (silicone) laser resistant tubes.
- Combustible instruments and materials must not be placed in or near the path of the laser light.
- Sponges, gauze pads and swabs located near the operating field must be moistened with saline or sterile water. A basin of water should be poured and positioned within the laser operator's reach.
- Surgical drapes should be made of flame-retardant materials and the region of the drape near the operating field should be moistened with saline or sterile water, unless it has a flame resistance or quenching ability equivalent to the effect of moistening.
- Irrigation or other appropriate surgical means must control carbon sparking resulting from

overheating of tissue.

General room and/or local exhaust ventilation and respiratory protection should be used to control airborne contamination. Biohazards disposal procedures should be followed for all materials involved in the collection and handling of airborne contaminants.

- During surgery in or near respiratory passages, adequate exhaust ventilation must be provided for patient protection.
- Wet cloth towels must be used to drape the tissues immediately adjacent to the operating field, which may be exposed to direct or diffuse laser light.
- All new antiseptic agents or other solutions must be checked for flammability before use.

(vii) Service

- During servicing procedures where removal of panels or protective housings or over-riding of protective housing interlock, and the accessible laser light exceeds the applicable maximum permissible exposure, a temporary laser controlled area must be devised. A warning sign must be posted outside this area to warn of the laser light hazard.

13. PERSONAL RADIATION MONITORING AT SOUTHERN RADIOLOGY

(a) Personal Monitoring Devices

(also known as OSL Badges / TLD Badges)

Radiographers and medical practitioners at Southern Radiology and Hurstville Private Hospital who are involved with procedures utilising fluoroscopy, CT, general and mobile x-ray equipment will be provided with a personal monitoring device.

All other persons who may work in the hospital theatres or general wards where procedures are being undertaken must consult with the radiation safety officer to determine if they should wear a personal monitoring device. As a guide, nurses who spend a substantial amount of time in theatres and are directly involved with Fluoroscopic and Brachytherapy procedures should be monitored.

The radiation safety officer at Southern Radiology must ensure that the radiation dose to all persons will be within the dose limits prescribed under the *Radiation Safety Regulation 1999* and as low as reasonably achievable.

The following personal monitoring program must be followed:

- Personal monitoring devices are to be obtained by Southern Radiology for staff determined and assessed by a personal radiation monitoring service that uses reference sources directly traceable to the Australian National Standards as required by the *National Measurement Act 1960*; Refer Attachment 4.
- The personal monitoring device wearing period is as recommended by the PMD provider specified in Attachment 4. (3 months for Radiography ; monthly for radioisotopes including Brachytherapy)
- Users must wear the personal monitoring device provided by the Southern Radiology Group, as a condition of their license;
- During radiographic procedures, a personal monitoring device is to be worn at chest or waist height;
- If a protective apron is worn, the personal monitoring device must be worn **underneath** the apron;
- Personal monitoring devices must not be tampered with or misused;
- At the end of each working day the devices must be stored in a place away from X-ray sources and radioactive substances;
- The control device² must be stored away from X-ray sources and radioactive substances;
- After the assessment of a personal monitoring device, Southern Radiology must advise the monitored persons of their radiation assessment results by posting copy of the results in an appropriate place such that all employees monitored have access to the results (staff common areas – see your Chief Radiographer for more details)

Additional requirements for persons working in Theatre or General Wards where ionising

² The control device is the dosimeter used to detect background radiation and any radiation received during mailing. This dosimeter must be stored away from sources of radiation and extremes in environment at all times.

radiation is utilised at Hurstville Private Hospital:

Persons who do not work routinely in theatre where radiographic procedures are being undertaken (e.g. some nurses) should consult with the RSO if they are ensure whether the radiation dose is within the dose limits prescribed, under the Radiation Safety Regulation 1999 and as low as reasonably achievable.

(b) **Personal Monitoring Record**

- The radiation safety officer at Hurstville Private Hospital/Southern Radiology is required to update the personal monitoring record for each monitored person at HPH;
- Personal monitoring records are to be kept for the duration of the wearer's working life and for not less than 30 years after the last exposure assessment, and at least until the person has reached the age of 75 years.
- This service will be provided by Landauer Australasia or as nominated by Southern Radiology.
- The personal monitoring records are to be checked by the radiation safety officer at Hurstville Private Hospital/ Southern Radiology to ensure the radiation doses are below the prescribed limits in the *Radiation Safety Regulation 1999* and are as low as reasonably achievable. If doses in excess of the 'norm' but not necessarily in excess of the prescribed limits, the work practices of the wearer are to be investigated by the RSO and, if necessary, remedial action taken;
- The personal monitoring record for each monitored person at Hurstville Private Hospital must contain the information as detailed in Attachment 4 inclusive of ;
 - a. The results of all the assessments;
 - b. The name, gender and date of birth of the monitored person;
 - c. The name and postal address of the Hurstville Private Hospital;
 - d. The date the monitored person started to be monitored for any radiation doses received in relation to the carrying out of the practice;
 - e. The date the monitored person ceased to be monitored for any radiation doses received in relation to the carrying out of the practice;
 - f. Details of the basis for the monitored person being required to wear a personal monitoring device;
 - g. The type of radiation to which the monitored person has been exposed;
 - h. The period the assessment of a personal monitoring device worn by the monitored person, in relation to the carrying out of the practice, relates to;
 - i. The estimated total effective dose, determined as a result of the assessment, for the monitored person for the period;
 - j. Details of the methodology used in the assessment.

14. SAFETY DEVICES AND PERSONAL PROTECTIVE EQUIPMENT WITHIN SOUTHERN RADIOLOGY PRACTICES

(a) Personal Protective Equipment & Safety Devices

Attachment 6 details the list of personal protective equipment and safety devices that are provided by the Hurstville Private Hospital / Southern Radiology for users of diagnostic radiographic equipment, comforters/radiographic assistants and patients to minimise their radiation dose.

Personal protective equipment must be appropriately stored to help prevent the formation of cracks (eg. lead aprons must be stored unfolded) and **tested annually by an authorized person** to ensure lead integrity.

Details of testing results are to be recorded in Appendix 6 and updated as required and in the event of non compliance of lead integrity the item is to be replaced by Southern Radiology.

15. RADIATION WARNING & SIGNS

(a) X-ray Equipment

A radiation warning sign must be obviously placed on the control panel of each radiation apparatus to warn users and other persons of the radiation hazard associated with the use of the equipment.

The warning sign consists of a trefoil symbol and words to the effect of:

"WARNING: RADIATION - This apparatus produces radiation when energised"

The trefoil symbol, lettering and border are black on a yellow background.

(b) Portable Radiation Warning Signs

When mobile X-ray equipment with image intensifiers are used, a portable radiation warning sign must be displayed in an obvious location where the equipment is in use to advise persons of the potential radiation hazard (eg. on the door of the room where the equipment is to be used).

The warning sign consists of a trefoil symbol and words to the effect of:

"WARNING: X-RAYS ON".



The symbol and lettering are black on a yellow background.

This sign can be located at all entrances to theatres utilizing x-ray apparatus.

(c) Verbal Radiation Warnings

The Radiographer **must provide a Verbal Radiation Warning** to all patients and personnel in the vicinity of any Radiographic procedure / examination (PARTICULARY RELEVANT TO MOBILE EXAMINATIONS AT HPH).

(d) Laser Warning Signs

The following warning signs must be displayed at the entrance to rooms in which laser apparatus is being used. Illuminating laser warning signs may be required.



16. REPAIRS AND MAINTENANCE OF IMAGING EQUIPMENT

The following is associated with the repair and maintenance of X-ray equipment and associated devices at Southern Radiology. Records of all maintenance procedures are to be kept in the equipment logbook provided in each Southern Radiology practice, maintained by the Chief Radiographers.

(a) X-ray Equipment

All maintenance and repair work must be conducted by a person qualified to perform the work. Typically, the person will hold a license to use radiation apparatus during maintenance, repair or commissioning. If the equipment is to be used during its repair or maintenance, the license of the person engaged to perform this work is to be checked by the Southern Radiology RSO prior to commencement of work.

Reports for any maintenance and repair work are available upon request from Southern Radiology RSO or management.

The persons mentioned in Attachment 5 will perform the following preventative maintenance and Repairs at Southern Radiology. Attachment 5 will be updated as required to reflect the current arrangement.

(b) Modifications

Modifications to the diagnostic radiation apparatus require certification by an accredited person ensuring compliance with Radiation Guideline 6 *Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging*. Part 2 Fluoroscopy & radiography, EPA NSW.

The persons mentioned in Attachment 5 will perform the following quality control checks at Southern Radiology. Attachment 5 will be updated as required to reflect the current arrangement.

17. QUALITY CONTROL PROCEDURES FILM HANDLING, STORAGE AND ROTATION PROCEDURES

Optimum quality information is to be achieved at Southern Radiology, taking the radiation doses into consideration. The anticipated benefits of a quality assurance program include:

- Continued production of images with optimal diagnostic quality;
- More effective and efficient use of the radiation delivered to the patient;
- Reduction of radiation doses;
- Capacity for higher patient throughput;
- Lower consumption of radiographic films and other consumable items;
- Extended life of the X-ray tube.

Radiographic cassettes are stored and handled by the Southern Radiology staff.

CR System Processing

All CR systems located within Southern Radiology have service and user manuals provided by the manufacturer and procedures for all starting up, closing down and maintenance are adhered.

The daily, weekly and monthly maintenance procedures are maintained and coordinated by the Chief Radiographers at each Southern Radiology site.

A copy of Southern Radiology's CR Quality Control procedures are available upon request from the RSO or management.

18. RECORDS AVAILABLE AT HURSTVILLE PRIVATE HOSPITAL

The following records are to be maintained by the Southern Radiology.

The radiation safety and protection plan including:

- Southern Radiology and Hurstville Private Hospital's possession licenses issued under the *Radiation Safety Act 1999*
- Inventory and location of X-ray equipment or Radioactive Isotopes held at Southern Radiology / Hurstville Private Hospital
- X-ray equipment registration, compliance certificate and compliance reports
- User licenses
- Personal monitoring records and explanations of unusual dose readings of Southern Radiology Staff
- Safety Devices, Personal Protective Clothing Log and Test Results
- Preventative Maintenance and Repair Reports
- Reports by the radiation safety officer
- Radiation safety audit reports
- Incident / Accident reports
- Southern Radiology Protocols / Procedures pertaining to CR Quality Assurance

All documents are available from the Southern Radiology Quality and Compliance Manager upon request .

19. ACQUISITION, SUPPLY, DISPOSAL AND RELOCATION OF X-RAY EQUIPMENT GUIDELINES

This section outlines the legislative requirements associated with the acquisition, supply, disposal and relocation of X-ray equipment within Southern Radiology.

(a) Acquisition

The equipment is to be registered with the NSW EPA. Use of the apparatus cannot take place until Compliance Certification and Registration Applications are lodged with the EPA. Registration Application forms are provided in the Appendix 5;

(b) Supply

If the X-ray equipment is to be sold to another person, the sale must not take place unless the Southern Radiology has ensured that the proposed new owner has:

- A license to possess the type of X-ray equipment to be purchased.

Southern Radiology must advise in writing the NSW EPA details of the sale of the equipment.

(c) Disposal

To dispose of X-ray equipment, the X-ray tube must be rendered incapable of producing X-rays. Following this, Southern Radiology must give written notification of the disposal within seven (7) days of the disposal. Failure to do this will result in Southern Radiology breaching the Act.

(d) Relocation

Upon commencement of equipment relocation, certification of equipment is required ensuring compliance with Radiation Guideline 6 *Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging*. Part 2 Fluoroscopy & radiography, EPA NSW. Failure to do this promptly will result in Southern Radiology breaching the Act.

20. REMEDIATION PROCEDURES AT SOUTHERN RADIOLOGY

A radiation incident is an incident adversely affecting, or likely to adversely affect, the health or safety of any person because of the emission of radiation.

The following procedures must be observed at Southern Radiology in the event of actual or suspected malfunction of the X-ray equipment causing, or suspected of causing, unexpected exposures:

- The user is to switch off the X-ray equipment at the main supply.
- The user is to take precautions to prevent the unauthorized or inadvertent energising of the malfunctioning X-ray equipment by:
 - (i) Posting a sign, which states that, the X-ray equipment is not to be used;
 - (ii) Remove the key to the operation controls or taking other appropriate actions if there is no provision for locking the controls.
- The X-ray equipment should not to be used until the unit is repaired and the Southern Radiology Radiation Safety Officer authorises its use.
- The Radiation Safety Officer must assess the radiation dose to all persons involved in any incident and, if necessary, return personal monitoring devices to the radiation monitoring service provider for immediate processing and assessment.

(a) Incident Notification

A written incident report is to be produced by the Southern Radiology RSO. This report should include:

- (i) Incident description including details of the X-ray equipment involved and its location;
- (ii) Estimates of radiation exposure to individuals (if applicable);
- (iii) Action taken;
- (iv) Proposals to prevent a recurrence.

An incident report form is located in Appendix 1 of this document.

All incidents are to be summarised and kept in the incident register.

21. PROTECTION AGAINST EXTERNAL RADIATION FROM RADIOACTIVE SOURCES

(a) Factors Affecting Amounts of Radiation received by Persons Concerned with Radioactive Sources

The exposure received by users and auxiliary employees working with radioactive sources is dependent on:

1. The activity of the radioactive source.
2. The distance between the source and the person exposed.
3. The total time of exposure to the radiation.
4. The nature and thickness of material surrounding the source or interposed between the sources and the person exposed.

(b) Documenting the Activity and Nature of Radioactive Sources

When a patient has been administered a radioactive substance at the following details to be noted on all documents relevant to the nursing/continued care of the patient as well as centralized records in our NM Department, including:

1. The name of the radionuclide;
2. The activity administered;
3. The time of administration.

22. PROTECTION AGAINST INTERNAL IRRADIATION

(a) Precautions Required to Minimize Ingestion, Inhalation and Absorption

Adequate protection against internal irradiation can be achieved by preventing the ingress of Radioactive material into the body. At Southern Radiology / Hurstville Private Hospital the methods in place include:

- Maintain a high standard of personal cleanliness
- Use protective clothing (including disposable rubber or plastic gloves)
- Ensure adequate ventilation is present
- Controlled storage and disposal of unused I-125 seeds

23. RADIATION SAFETY – WARD (MOBILE) PROCEDURES AT HURSTVILLE PRIVATE HOSPITAL

The following general procedures should be adopted at Hurstville Private Hospital where there is a potential radiation exposure:

- Single rooms should be used to minimize exposure of other patients and staff.
- If a single room is not available, the bed occupied by a patient being treated with Radioactive source should be located in a less-frequented part of the ward, with solid walls.
- The patient's bed should be marked with a warning sign indicating the presence of radioactivity.
- Staff should not remain longer than necessary in the vicinity of a radioactive patient.
- All waste products must be disposed of in the designated patient toilet and the toilet unit flushed twice.
- When prolonged nursing procedures are necessary the nursing care of the patient should be divided among the ward staff in order that the radiation received by each individual is kept to a minimum.
- Attention should be given to restricting the time visitors spend in the vicinity of a radioactive patient.
- Women of reproductive capacity and children should not be permitted to visit radioactive patients but, where permitted, adherence to time and distance constraints should be mandatory.
- Immediately once the patient is admitted to the ward information in writing should be given to the **Registered nurse in charge of the ward stating any expected care** considerations.
- All items known or suspected to be contaminated should be stored in appropriate plastic bags which can be disposed of under the direction of the Radiation Safety Officer.
- All items of a non-disposable nature should be tested under the direction of the Radiation Safety Officer to determine the level of possible contamination before and after being cleaned, and returned to general use when declared to be satisfactory.
- Nursing staff carrying out procedures likely to result in contamination of skin and/or clothing must wear suitable gloves and gowns.
- Nursing staff that have or are suspected to have contamination the skin should be monitored and if necessary decontamination should be undertaken without delay under the direction of the Radiation Safety Officer.
- Where the patient is, or is likely to be, incontinent or otherwise incapacitated, catheterisation should be considered.

ATTACHMENT 1

SOUTHERN RADIOLOGY IONISING IMAGING EQUIPMENT

Practice	Location	LSPN	Modality	LSPN equipment Type	EPA /Compliance name or Part Details	Manufacturer	Model Number	Serial Number	EPA Registration#	Expiry Date	EPA certificate on file
Hurstville PH	Radiology Department	4511	X-Ray/General Room	X-Ray	Console/generator	Shimadzu	D 150LC	0264748507	RR20555	30/04/2014	✓
Hurstville PH	as above	4511	X-Ray/General Room	N/A Not listed under LSPN	Tube Housing	Circlex	P180L	32651	RR20555	30/04/2014	✓
Hurstville PH	Theatres	4511	Image Intensifier	Fluoroscopy	Console/generator	Philips	BY300	4334620/000325	RR20444	07/03/2012	✓
Hurstville PH	as above	4511	Image Intensifier	N/A Not listed under LSPN	Tube Housing	Philips	10263300	018047005	RR20444	07/03/2012	✓
Hurstville PH	as above	4511	Image Intensifier	N/A Not listed under LSPN	Tube Insert	Philips	A145	14084	RR20444	07/03/2012	✓
Hurstville PH	Theatres	4511	Image Intensifier	Fluoroscopy	Console/generator	Philips	S80CIC00134	1803758	RR3758	31/10/2013	✓
Hurstville PH	as above	4511	Image Intensifier	N/A Not listed under LSPN	Tube Housing	Philips	24816200695	RR3758	RR3758	31/10/2013	✓
Hurstville PH	as above	4511	Image Intensifier	N/A Not listed under LSPN	Tube Insert	Philips	24816200695	RR3758	RR3758	31/10/2013	✓
Hurstville PH	Variable /hospital	4511	Mobile x-ray	X-Ray	Console/generator	Shimadzu	0262P71103	0262P71103	RR8812	01/10/2013	✓
Hurstville PH	as above	4511	Mobile x-ray	N/A Not listed under LSPN	Tube Housing	Shimadzu	23956	23956	RR8812	01/10/2013	✓
Hurstville PH	as above	4511	Mobile x-ray	N/A Not listed under LSPN	Tube Insert	Circlex	23956	23956	RR8812	01/10/2013	✓
Hurstville PH	CT	4511	CT	CT Gantry	Tube Housing	Dunlee	DU6308	33169	RR12968	19/02/2012	✓
Hurstville PH	Radiology Department	4511	CT	N/A Not listed under LSPN	Console/generator	GE	Lightspeed Ultra	2281177	RR12968	19/02/2012	✓
Hurstville PH	as above	4511	CT	N/A Not listed under LSPN	Tube Insert	Dunlee	DA200	555314K	RR12968	19/02/2012	✓
Hurstville PH	as above	4511	CT	N/A Not listed under LSPN	Tube Insert	Dunlee	DA200	555314K	RR12968	19/02/2012	✓

ATTACHMENT 2

KEY CONTACTS

SR MANAGEMENT/GROUP RADIATION SAFETY OFFICER

Loma Avery
Quality and Compliance Manager
Southern Radiology

Mobile: 0401 615 071

Email: lavery@southernradiology.com.au

HURSTVILLE PRIVATE HOSPITAL RADIATION SAFETY OFFICER

Errol Zizovski
Chief Radiographer
Southern Radiology – HPH

Telephone: 9585 1922

Email: ezizovski@southernradiology.com.au

HURSTVILLE PRIVATE HOSPITAL OPERATING THEATRES SERVICES MANAGER

Carly Salakas
Telephone: 9579 7702 or internal extension 702

UROLOGY SPECIALY TEAM LEADER

Alanna Dunn
Telephone: 9579 7720 or internal ext 702

EXTERNAL RADIATION SAFETY ADVISOR CONTACT DETAILS

David Leslie / Vivien Munoz-Ferrada
Gammasonic Radiological Services
90 Queens Road
FIVE DOCK NSW 2046

Phone: 02 9713 1122

Mobile : 0412 791 647 / 0419 811 151

Esse Komiti (Physicist/Brachytherapy RSO)

Email: ese.enario@sesiahs.health.nsw.gov.au

Please see SR Management for mobile contact

NSW GOVT OFFICE OF ENVIRONMENT & HERITAGE (formerly known as Environment Protection Authority)

NSW Government Office of Environment & Heritage
Hazardous Materials, Chemicals and Radiation Section

59 – 61 Goulburn Street
SYDNEY NSW 2000
PO BOX A290
SYDNEY SOUTH NSW 1232

Telephone: 131 555
Fax: 02 999 6603
Email: radiation@environment.nsw.gov.au

PERSONAL DETAILS			SCOPE OF WORK								QUALIFICATIONS				LICENCE DETAILS		
Surname	First Name	Title /Position (PD)	Additional Roles (RDs)	IV Cannulation	Radiography	CT	Mammography	Ultrasound	MRI	Nuclear Medicine	Diagnostic Radiography	Nuclear Medicine	Medical Ultrasound	Radiation Licence	Radiation Licence Type	Expiry Date	Copy on file
CHAN	Kinna	Chief Radiographer	RSO,Fire Warden	✓	✓	✓			✓		✓			RL18507	G1,IA14	15-Dec-13	✓
FLANAGAN	Lucinda	Chief Radiographer	RSO,Fire Warden	✓	✓	✓	✓				✓			RL30801	IA14,G1	11-Feb-12	✓
SCHWARTZ	Lavy	Chief Radiographer	RSO,Fire Warden	✓	✓	✓					✓			RL24545	IA14	30-Jun-14	✓
SHNIER	Marion	Chief Radiographer	RSO,Fire Warden	✓	✓	✓	✓				✓			RL23233	IA14,IA27,G1	31-Jan-12	✓
ZITOVSKI	Enol	Chief Radiographer / Sonographer	RSO,Fire Warden					✓			✓		✓	RL22554	G1,IA14	15-Jan-14	✓
ROBERTS	Carl	Clinical Lead Radiographer	RSO	✓	✓	✓	✓				✓			RL42334	IA14,G1	21-Jul-13	✓
KERWAND	Julia	Operations Manager	MSO	✓	✓	✓			✓		✓			RL25234	IA14,G1	31-Dec-13	✓
GAMBIHR	Neha	Radiographer			✓						✓			RL43608	IA14,G1	29-May-14	✓
POWELL	Kyla	Radiographer			✓						✓			RL33919	IA14,G1	28-Mar-12	✓
TOMPKINS	Aoife	Radiographer			✓						✓			RL34945	IA14,G1	14-Jun-12	✓
KIL	Min	Radiographer			✓		✓				✓			RL41580	IA14,G1	04-Jan-14	✓
ZHANG	Simon(Xi)	Radiographer			✓						✓			RL41558	IA14,G1	29-Dec-13	✓
BYRNE	Sarah	Radiographer - General/CT		✓	✓		✓		✓		✓			RL33628	IA14Y	01-Feb-14	✓
DA DEPPO	Claire	Radiographer - General/CT		✓	✓		✓				✓			RL30606	IA14,G1	23-Jan-12	✓
DE LA MOTTE	Elizabeth	Radiographer - General/CT		✓	✓						✓			RL33585	IA14,G1	01-Feb-12	✓
DHILLON	Shinder	Radiographer - General/CT	Fire Warden	✓	✓		✓				✓			RL28293	IA14,G1	10-Apr-12	✓
FAGAN	Merrill	Radiographer - General/CT			✓		✓				✓			RL11630	IA14,G1	09-Oct-11	✓
MACHUIS(SANDLER)	Raelene	Radiographer - General/CT		✓	✓						✓			RL34050	IA14,G1	01-May-12	✓
MCGREE	Gillian	Radiographer - General/CT			✓						✓			RL41498	IA14,G1	07-Dec-13	✓
MCGREGOR-TOMPKINS	Aoife	Radiographer - General/CT			✓						✓			RL34945	IA14,G1	14-Jun-12	✓
YAN	Ying Jie (Katie)	Radiographer - General/CT		✓	✓		✓				✓			RL35133	IA14Y	12-Mar-12	✓
BAUM	Lucy	Radiographer - PDY			✓		✓				✓			RL23908	IA14,G1,IA27	31-Oct-11	✓
HEUNG	Joyce	Radiographer - PDY			✓						✓			RL42969	IA14,G1	23-Jan-12	✓
KOO	Taewoong	Radiographer - PDY			✓						✓			RL43638	IA14Y	08-Jun-12	✓
SCURR	Kelly	Radiographer General/CT		✓	✓						✓			RL43385	IA14,G1	07-May-14	✓
BARTON	Sally	Radiographer/ General			✓		✓				✓			RL17921	IA14,G1	30-Apr-14	✓
CHAPLIN	Meredyth	Radiographer/ General			✓		✓				✓			RL41636	IA14Y	12-Feb-14	✓
HANNA	Maria	Radiographer/ General			✓		✓				✓			RL40624	IA14Y	25-Feb-13	✓
KIM	Peter	Radiographer/ General			✓		✓				✓			RL41853	IA14Y	21-Feb-14	✓
LAU	John	Radiographer/ General			✓		✓				✓			RL16186	IA14,G1	31-Dec-13	✓
PATEL	Rohini	Radiographer/ General			✓		✓				✓			RL42107	IA14,G1	28-May-11	✓
SEO	Sarah (Eun- Young)	Radiographer/ General			✓		✓				✓			RL40614	IA14Y	24-Feb-12	✓
PETISOGLU	Alex	Senior MRI Radiologist		✓	✓		✓		✓		✓			RL18505	G1,IA14	11-Mar-12	✓
SAUNDERS(LINES)	Debbie	Senior MRI Radiologist		✓	✓		✓		✓		✓			RL32055	G1,IA14	13-Dec-11	✓
STREETER	Nicole	Senior MRI Radiologist		✓	✓		✓		✓		✓			RL24365	G1,IA14	08-Jun-14	✓
TIMPANO	Jessica	Senior MRI Radiologist		✓	✓		✓		✓		✓			RL26532	G1,IA14	31-Jan-12	✓
HAHAL	Mira	Sonographer						✓					✓				
BAUJ(CHAUHAN)	Nirasha	Trainee Sonographer		✓	✓		✓	✓			✓			RL42039	IA14,G1	11-Apr-13	✓
LIM	Su-Ping	Trainee Sonographer		✓	✓		✓				✓			RL32463	IA14,G1	28-Feb-12	✓
ZHANG	ling ling	Trainee Sonographer		✓	✓		✓				✓			RL34194	IA14,G1	04-Jun-14	✓
SONNENBERG	Kathryn	Radiographer			✓						✓			RL43533	IA14Y	15-May-12	✓
THRELFALL	Rebecca	Sonographer			✓						✓			RL25932	IA14,G1	31-Jul-13	✓

ATTACHMENT 3

LIST OF SOUTHERN RADIOLOGY STAFF LICENSED TO USE THE X-RAY EQUIPMENT

Southern Radiology Group
Title: RSPP_Hurstville Private Hospital
Compiled by: Irene Moros
Approved by: CEO/Managing Partners SRG

Version: 002
Document Identifier: SRG0007
Reviewed by: SRG Quality and Compliance Manager
Date: September 2011

ATTACHMENT4

Persons Performing Maintenance and Quality Control checks

CONTRACTORS AND SUPPLIERS REGISTER _ HPH RPSP EXTRACT

Film

Provider-	Carestream
Phone -	1300 651 786
Fax -	1800 805 290
Fax -	8845 4936



Dosimeter Records/Dose Alerts

Provider-	Landauer Australasia
Phone-	1300 761 696
Fax-	(02) 9712 4730
Email	enquiry@landaueraustralasia.com

Imaging Equipment

*CONTACTS FOR COMPUTERISED IMAGING SERVICES

All services provided by CIS must be contacted in the following order:

Primary Contact- Isaac Solomon
Phone- 0413388078

If no answer



Second Contact- Juliana
Phone- 9369 3055

If no contact with the two above contacts, call the appropriate engineer below

CONTRACTORS AND SUPPLIERS REGISTER _ HPH RPSP EXTRACT

CT Scanners

Provider- CIS
Contact -
Contact- John
Phone- 0423 707 987 or
Contact- Rohit
Phone- 0413388058



X Ray /Image Intensifiers

Contact- George
Phone- 0412366864 or
Contact- Mark
Phone- 0413389902 or
Contact- Paul
Phone- 0412366828



ATTACHMENT 5

SAFETY DEVICES AND PERSONAL PROTECTIVE EQUIPMENT

Personal Safety Protection Clothing

The following tables list the protective clothing for users of diagnostic equipment and patients to minimise radiation dose.

When the patient's thyroid, gonads, and eyes are not required to be imaged, protective shielding will be used for these areas if these areas may be exposed to radiation.

The following personal protective items are available in all general / CT departments within the practice:

Description	Used For
Lead Aprons	Personal Radiation Protection
Lead Vest	Personal Radiation Protection
Lead Skirt	Personal Radiation Protection
Thyroid Shield	Personal Radiation Protection

The above listed protective clothing is to be worn / utilized by staff and patients/members of the public (where appropriate) for:

Procedures Involving Fluoroscopy

Description	Lead Equivalence	When/Where Worn	Storage Location
Lead aprons	≥0.3 mm	All persons who operate the X-ray equipment and who assist the patient during a radiographic procedure	Within the Operating theatres
Lead Skirt & Vest Sets	≥0.3 mm	All persons who operate the X-ray equipment and who assist the patient during a radiographic procedure	Within the Operating theatres
Lead Thyroid Shields	≥0.3 mm	All persons who operate the X-ray equipment and who assist the patient during a radiographic procedure	Within the Operating theatres

		procedure	
--	--	-----------	--

Plain Film Diagnostic X-ray Examinations

Description	Lead Equivalence	When/Where Worn	Storage Location
Lead aprons	30.3 mm	All persons who operate the X-ray equipment	General Imaging Rooms /mobile x ray unit
Lead Skirt/Vest Sets	30.3 mm	All persons who assist the patient during a radiographic procedure	General Imaging Rooms /mobile x ray unit
Lead Thyroid Shields	30.3 mm	All persons who operate the X-ray equipment and who assist the patient during a radiographic procedure	General Imaging Rooms /mobile x ray unit

**PERSONAL PROTECTICE CLOTHING AND SAFETY EQUIPMENT
INVENTORY & QUALITY ASURANCE INSPECTION RECORD**

As at 24/09/2011

ID No	Description/Manufacturer	Location	Date of Purchase	Lead Equivalence	Date Checked	Checked by	Pass/Fail*
001	Full gown/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P+
002	Full gown/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P+
003	Full gown/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P
004	Full gown/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P
005	Full gown/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P+
006	Full gown/Roland	MU	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P+
007	Skirt/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P
008	Skirt/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P
009	Skirt/Roland	OT	TBA	0.5 mm F / 0.3 mm B	24/09/11	RSO/EZ	P
010	Vest/Roland	OT	TBA	0.5 mm	24/09/11	RSO/EZ	P
011	Vest/Roland	OT	TBA	0.3 mm	24/09/11	RSO/EZ	P
012	Vest/Roland	OT	TBA	0.3 mm	24/09/11	RSO/EZ	P+
013	Thyroid Shield/Roland	OT	TBA	0.3 mm	24/09/11	RSO/EZ	P
014	Thyroid Shield/Roland	OT	TBA	0.3 mm	24/09/11	RSO/EZ	P
015	Thyroid Shield/Roland	OT	TBA	0.3 mm	24/09/11	RSO/EZ	P
016	Thyroid Shield/Roland	MU	TBA	0.3 mm	24/09/11	RSO/EZ	P

*P = PASS no cracks detected/safe for use

F = FAIL decommissioned

P+ = PASS no cracks detected/ safe for use + see comments table below for action required or notations

001	NEEDS STITCHING - SEND FOR REPAIR
002	NEEDS STITCHING - SEND FOR REPAIR
005	NEEDS STITCHING - SEND FOR REPAIR
006	NEEDS STITCHING - SEND FOR REPAIR
012	CHECK VELCRO FASTENERS - MAY NEED REPAIR

Next Due Date for Checking: 24th September 2012

Or post repair for P+ status garments

APPENDIX 1

RADIATION INCIDENT REPORT FORM

Site / Location: Practice: MIR HU HPH DEN BJ ME FD BUR

(Circle)

General ☐

Screening ☐

CT ☐

Theatre/Mobile ☐

Other

Person(s) Affected:

Name:

Address:

Contact:

Role:

(Employee/Patient/Other)

Date of Birth :/...../.....

MRN :(if applicable – not for employees)

Name:

Address:

Contact:

Role:

(Employee/Patient/Other)

Date of Birth :/...../.....

MRN :(if applicable – not for employees)

Name:

Address:

Contact:

Role:

(Employee/Patient/Other)

Date of Birth :/...../..... MRN:.....(if applicable – not for employees)

RADIATION INCIDENT REPORT FORM

Details of Event:

Date: ____/____/____

(Please be **STRICTLY** Factual – attach the request form for the examination being performed if applicable)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Corrective Action Taken/Required:

.....

.....

Has the Radiation Safety Officer and the Management of Southern Radiology been notified?

YES / NO

Signed By:

Name (please print):

Position:

Witnessed By:

Names (please print):

Position:

PLEASE EMAIL COMPLETED FORMS TO lavery@southernradiology.com.au WITHIN 24HRS OF THE INCIDENT

APPENDIX 2

EMPLOYEE ACKNOWLEDGEMENT OF THE HURSTVILLE PRIVATE HOSPITAL RADIATION SAFETY AND PROTECTION PLAN

I hereby confirm that I have read and understood with the contents of this Radiation Safety and Protection Plan.

I undertake to abide by with the responsibilities and requirements as detailed in the Radiation Safety and Protection Plan at all times.

I also understand that if I have any additional queries in the future concerning Radiation Safety or Protection I will contact the Radiation Safety Officer or the Director of Nursing /Operating Theatre Manager.

Name : _____

Position : _____

Signature : _____

Date : _____

APPENDIX 3

DEFINITIONS

As Low As Reasonably Achievable (ALARA)

indicates that every reasonable effort must be made to maintain exposures as far below the applicable limits as practical.

Becquerel (Bq)

a unit used to measure radioactivity. One Becquerel is the amount of a radioactive material that will undergo one transformation in one second.

Often radioactivity is expressed in larger units like: thousands (kBq), or millions (MBq) of becquerels.

As a result of having one Becquerel being equal to one transformation per second, there are 3.7×10^{10} (37 billion) Bq in one curie.

Contamination

the deposition of unwanted radioactive material on the surfaces of structures, areas, objects, or people. It may also be airborne, external, or internal (inside components or people).

Cumulative dose

the total dose resulting from repeated exposures of ionizing radiation to an occupationally exposed worker to the same portion of the body, or to the whole body, over a period of time.

Decay, radioactive

the decrease in the amount of any radioactive isotope with the passage of time due to the spontaneous emission of radiation from the atomic nuclei (either alpha or beta particles, often accompanied by gamma radiation), and consequent transformation to a different chemical form.

Decommission

the process of removing a nuclear facility from service by reducing residual radioactivity in buildings or at the site to a level that permits the release of the property for unrestricted use or maintenance under protection for reasons of public health and safety.

Decontamination

the reduction or removal of contaminated radioactive material from a structure, object or person.

Dose (radiation)

denotes the quantity of radiation or energy absorbed. Dose may refer to the following:

--absorbed dose, the amount of energy deposited per unit mass

--equivalent dose, the absorbed dose adjusted for the relative biological effect of the type of radiation being measured

--committed dose, a dose that accounts for continuing exposures over long periods of time (such as 30, 50, or 70 years)

Dose rate

the radiation dose delivered per unit time

Dosimeter

a small portable instrument (such as a film badge, thermoluminescent, or pocket dosimeter) for measuring and recording the total accumulated personal dose of ionising radiation or dosimetry, monitoring of individuals to accurately determine their radiation dose equivalent

Exposure (radiation)

a term relating to the amount of ionising radiation that strikes a living or inanimate material. (This is a general definition. In health physics, exposure is specifically defined as a measure of ionisation in air caused by x-ray or gamma radiation only.)

Gamma rays

high-energy electromagnetic radiation emitted by certain radionuclides when their nuclei transition from a higher to a lower energy state. These rays have high energy and a short wave length. All gamma rays emitted from a given isotope have the same energy, a characteristic that enables scientists to identify which gamma emitters are present in a sample. Gamma rays are very similar to x-rays.

Geiger counter

A radiation detection and measuring instrument. It consists of a gas-filled tube containing electrodes, between which there is an electrical voltage, but no current flowing. When ionizing radiation passes through the tube, a short, intense pulse of current passes from the negative electrode to the positive electrode and is measured or counted. The number of pulses per second measures the intensity of the radiation field. It is the most commonly used portable radiation detection instrument.

Gray (gy)

a unit of measurement for absorbed dose. It relates to the amount of energy actually absorbed in a material, and is used for any type of radiation and any material. One gray is equal to one joule of energy deposited in one kg of a material. The unit gray can be used for any type of radiation, but it does not describe the biological effects of the different radiations. Absorbed dose is often expressed in terms of hundredths of a gray, or centi-grays. One gray is equivalent to 100 rads.

Half-life

the time in which one half of the atoms of a radioactive isotope disintegrates into another nuclear form. Half-lives vary from billionths of a billionth of a second to billions of years. Also called physical or radiological half-life.

biological half-life - the time an organism takes to eliminate one half the amount of a compound or chemical on a strictly biological basis

effective half life - incorporates both the radioactive and biological half-lives. It is used in calculating the dose received from an internal radiation source.

Ionization

the process of adding one or more electrons to, or removing one or more electrons from, atoms or molecules, thereby creating ions. High temperatures, electrical discharges, or nuclear radiation can cause ionization.

Ionizing radiation

any radiation capable of displacing electrons from atoms or molecules, thereby producing ions. Some examples are alpha, beta, gamma, and X-rays. High doses of ionizing radiation may produce severe skin or tissue damage.

Irradiation

exposure to radiation.

Isotope

A nuclide of an element having the same number of protons but a different number of neutrons.

Monitoring

the use of sampling and detection equipment to determine the levels of radiation or other toxic materials in land, air, or water.

Neutron radiation

Neutron radiation is energy released from an atom in the form of neutral particles called neutrons. Neutrons are part of the basic building blocks of atoms. They have no charge and are about the same mass as a proton. Due to ion-producing collisions with matter and absorption/decay processes, neutrons are a type of ionizing radiation.

Non-ionizing radiation

Radiation that has lower energy levels and longer wavelengths than ionizing radiation. It is not strong enough to affect the structure of atoms it contacts, but is strong enough to heat tissue and can cause harmful biological effects. Examples include radio waves, microwaves, visible light, and infrared from a heat lamp.

Non-stochastic effect

Effects that can be related directly to the dose received. The effect is more severe with a higher dose, i.e., the burn gets worse as dose increases. It typically has a threshold, below which the effect will not occur. A skin burn from radiation is a non-stochastic effect.

Nuclide

a general term applicable to all atomic forms of an element. Nuclides are characterized by the number of protons and neutrons in the nucleus, as well as by the amount of energy contained within the atom.

Photon

a discrete "packet" of pure electromagnetic energy. Photons have no mass and travel at the speed of light. The term "photon" was developed to describe energy when it acts like a particle (causing interactions at the molecular or atomic level), rather than a wave. Gamma and X-rays are photons.

Radiation warning symbol

an officially prescribed symbol (a black trefoil) on a yellow background. It must be displayed where certain quantities of radioactive materials are present or where certain doses of radiation could be received.

Radioactive contamination

a deposit of radioactive material in any place where it may harm persons, equipment, or the environment.

Radioactive decay

The process in which an unstable (radioactive) nucleus emits radiation and changes to a more stable isotope or element. A number of different particles can be emitted by decay. The most typical are alpha or beta particles.

Radioactivity

spontaneous transformation of the nucleus of an atom; this resulting in a new element, generally with the emission of alpha or beta particles often accompanied by gamma rays

Radiography

using radiation sources to "photograph" internal structures, such as turbine blades in jet engines.

A sealed radiation source, usually iridium-192 or cobalt-60, beams gamma rays at the object to be checked. Gamma rays passing through flaws in the metal or incomplete welds strike special photographic film (radiographic film) on the opposite side. The process is very similar to taking an x-ray to check for broken bones.

Radioisotope

Isotopes of an element that have an unstable nucleus. Radioactive isotopes are commonly used in science, industry, and medicine. The nucleus eventually reaches a more stable number of protons and neutrons through one or more radioactive decays. Approximately 3,700 natural and artificial radioisotopes have been identified.

Radionuclide

an unstable form of a nuclide

Risk

the probability of injury, disease, or death under specific circumstances. Risk can be expressed as a value that ranges from zero (no injury or harm will occur) to one hundred percent (harm or injury will definitely occur). Risk-based standards limit the risk that releasing a contaminant to the environment may pose rather than limiting the quantity that may be released.

absolute risk, the excess risk attributed to irradiation and usually expressed as the numeric difference between irradiated and non-irradiated populations (e.g., 1 case of cancer per million people irradiated annually for each rad). Absolute risk may be given on an annual basis or lifetime basis.

relative risk, the ratio between the number of cancer cases in the irradiated population to the number of cases expected in the unexposed population. A relative risk of 1.1 indicates a 10 percent increase in cancer due to radiation, compared to the "normal" incidence.

Roentgen (r)

a unit of exposure to ionizing radiation. It is an indication of the strength of the ionizing radiation.

One Roentgen is the amount of gamma or x-rays needed to produce ions carrying 1 electrostatic unit of electrical charge in 1 cubic centimeter of dry air under standard conditions.

Roentgen absorbed dose (rad)

a basic unit of absorbed radiation dose. It is being replaced by the 'gray' which is equivalent to 100 rad.

One rad equals the dose delivered to an object of 100 ergs of energy, per gram of material.

Sievert (Sv)

a unit used to derive a quantity called equivalent dose. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Not all radiation has the same biological effect, even for the same amount of absorbed dose. Equivalent dose is often expressed in terms of millionths of a Sievert, or micro-Sievert. One Sievert is equivalent to 100 rem.

Source or sealed source

small, sealed metal cases containing radioactive materials used as references in research and industrial processes. They are often part of specialized industrial devices that measure quantities as the moisture content of soil or the density or thickness of materials. The sources are usually enclosed in a housing that prevents the escape of the radiation. Often referred to as "radioactive sources" or "sealed sources."

Stochastic effects

effect that occur on a random basis with its effect being independent of the size of dose. The effect typically has no threshold and is based on probabilities, with the chances of seeing the effect increasing with dose. Cancer is a stochastic effect.

Whole body exposure

An exposure of the body to radiation, in which the entire body, rather than an isolated part, is irradiated.

X-rays

high-energy electromagnetic radiation emitted by atoms when electrons fall from a higher energy shell to a lower energy shell. These rays have high energy and a short wave length. X-rays are very similar to gamma rays.

PATIENT MANAGEMENT: IDENTIFICATION & VERIFICATION

Purpose

To ensure that the correct procedure is undertaken on the correct patient, and correct site.

To facilitate the safe provision of high quality medical imaging services to all patients by ensuring the prevention of radiation accidents, near misses and other incidents associated with incorrect patient, incorrect procedure and incorrect site.

To comply with relevant national and state legislative and governing body requirements.

Scope

All medical and non medical professionals employed by, contracted to, or working on behalf of the Companies for the purpose of delivering medical imaging services are to adhere to this policy and associated procedural steps.

This policy and associated guidelines are applicable to all episodes of interaction with patients for the purpose of medical imaging.

Policy

- Patient identification checks are to be adopted universally. This includes patients from other healthcare institutions; patients previously known to personnel and; people of notoriety. For example personnel should not rely on third party identifiers when verifying patient and examination details e.g. hospital identification bands.
- For compositis patient's identification and verification processes must be followed. For patients that are unable to satisfactorily fulfil process requirements verification should be completed with a legal guardian or the person in charge of the patient's care.
- All personnel interacting with a patient are responsible for identifying and verifying the correct patient, procedure and site. However, the ultimate responsibility rests with the person conducting the examination.
- At all times identification and verification procedural steps are to be conducted such that patient's privacy is maintained.
- Identification and verification processes apply to both the patient identification and any pre or post procedural documentation.

Identification & Verification / Time out Process

Verification of correct patient, correct procedure and correct site is to occur :

1. At the time of arrival to the department
2. Directly prior to the commencement of the examination
3. At every patient handover(point at which there is a transfer of patient care)

For interventional or invasive procedures an additional "time out" is required prior to commencement of the procedure. AT this point all staff must stop and conduct a final verbal verification of patient procedure and site

Patient Identification

- o In patient identification and verification open questions are to be used, that is, staff must not pre-empt answers by asking for affirmation of details on requests/referrals. The patient or responsible party must state :
 - Patient name: if the surname name is used to address the patient then the patient or responsible party may affirm surname but they must also state their full name
 - Date of birth
 - Details of the examination they are to have (if possible and to their level of understanding)
- o All patients attending the Companies' sites are to be registered in the Radiology Information System (RIS) and as such allocated a numerical unique identifier. Unique identifiers are automatically generated by the RIS upon a patient's initial registration at any of the Companies' sites. RIS registration of a patient must not be commenced until a system search for the patient has been conducted and results show there has been no previous visitation and therefore no prior allocation of unique patient identifier.
- o All patient data linked to RIS unique identifiers and hence patient records are to be kept 'adequate and contemporaneous'. For patients already in the RIS all patient data linked to their identifier must be checked and updated at all subsequent visits.
- o RIS patient files must at a minimum contain:
 - Patient Name – fore and surnames as registered with Medicare Australia
 - Date of birth
 - Current address - as registered with Medicare Australia
 - Contact phone number
 - Medicare card number and expiry date

Documentation Verification

- o Identification and verification processes are applicable to all pre and post procedural documentation.

- o Past RIS registration the identification and verification process must include checking the correct RIS patient file /unique identifier has been assigned and the correct examination details have been entered into the RIS .
- o All requests must have the following **patient details** attained and verified prior to patient registration:
 - Patient Name – fore and surnames as registered with Medicare Australia
 - Date of birth
 - Current address - as registered with Medicare Australia
 - Sex
 - Medicare Number +/- Health Fund number/DVA number/Concession card numbers as applicable (cards to be sites and validated where possible)
 - Third party unique identifier (e.g. hospital MRN/URN) if applicable
- o The patient registration process should not commence until all of the above details have been attained and cross checked with the patient.
- o All requests must have the following **procedure details** attained and verified:
 - Site : area under investigation/examination inclusive of body side where applicable
 - Modality
 - Examination type

*Note: clinical indicators are required on all requests. However, verification of these details is at the discretion of the attending non medical and medical personnel in attendance.

- o Any documentation generated as part of an examination/procedure:
 - Must have the Companies' RIS generated unique identifier affixed to hard copies or be scanned into the RIS immediately after collection from the patient or responsible party
 - Be identifiable by patient details (at a minimum name and date of birth) being handwritten by the patient or their responsible party.

Discrepancies and Incidents

- o Where a discrepancy in details is noted after registration into the Companies' RIS it is to be dealt with as an incident and recorded and investigated accordingly.
- o In the event of misidentification or incorrect examination where all or part of the examination has been performed the event must immediately be disclosed to the Supervising radiologist, Radiation Safety Officer and Quality and Compliance manager. It is to be dealt with as an adverse incident and recorded and investigated accordingly.

Related Policies & Guidelines

Related Department of Health and Ageing Accreditation Standards