South African Health Products
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GUIDELINE FOR CODE OF PRACTICE FOR USERS OF MEDICAL X-RAY EQUIPMENT

This Code of Practice sets out requirements and recommendations for radiation safety associated with the use of medical diagnostic x-ray equipment. The Hazardous Substances Act, 1973 (Act 15 of 1973) and Regulations (No R1332 of 3 August 1973).

Document History

Final Version	Reason for Amendment	Effective Date
0	First issue and implementation	January 2015
1	- Content structured on the new SAHPRA Guideline Template - A unique document number SAHPGL-RDN-XR-02 allocated to this Guideline - Form RC002 changed to **GLF-RDN-XR-02A**; Form RC001 changed to **GLF-RDN-XR-02B**; Form RC005 changed to **GLF-RDN-XR-02C**; Form RC006-1 changed to **GLF-RDN-XR-02E**, Form RC008 changed to **GLF-RDN-XR-02F**; Form RC-DEALER changed to **GLF-RDN-XR-02G** and Form RC010 also changed to **GLF-RDN-XR-10A**	August 2022

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Contents

Glossary

Abbreviation/ Term	Meaning
ACT	Hazardous Substances Act, 1973 (Act 15 of 1973)
DOH	Department of Health
HPCSA	Health Professions Council of South Africa
IER	Individual Equipment Record
mSv	MilliSievert
TLD	Thermo Luminescent Dosimeter
NTP	Nuclear Technology Products
PRMD	Personal Radiation Monitoring Device
SABS	South African Bureau of Standards
SAHPRA	South African Health Products Regulatory Authority
SANAS	South African National Accreditation System
SDR	Supplementary Diagnostic Radiographer
QA	Quality Assurance
QC	Quality Control
Actinic marking	Permanent transfer of patient data / identification on to the film prior to processing
ALARA	**A**s **L**ow **A**s **R**easonably **A**chievable
Controlled area	A controlled area is a limited access area in which the occupational exposure of personnel to radiation is under the supervision of an individual in charge of radiation protection. This implies that access, occupancy and working conditions are controlled for radiation protection purposes
Diagnostic QC	Requirements for licence holders with respect to Quality Control Test for diagnostic x-ray imaging systems

Inspection Bodies	An organisation approved by SAHPRA Radiation Control
Radiation worker	Any person who is potentially exposed to radiation because of his/her occupation to more than three tenths of the occupational dose limit (20mSv per annum)
Regulations	Regulations relating to the Control of Electronic Products (No R1332 of 3 August 1973)
Supervision	The supervisor accepts and shares with the supervisee responsibility for ensuring that the supervisee's work is professional and ethical, operating within whatever legal requirements and organisational norms apply
Supervision (direct)	The supervisor provides on-site and in-view observation and guidance of a supervisee who performs an assigned activity. The proximity of this supervision is such that immediate intervention is possible if problems occur
X-ray unit	An electronic product that is designed, manufactured, or assembled with the primary purpose of producing x-rays

1. INTRODUCTION

This Code sets out requirements and recommendations for radiation safety associated with the use of medical diagnostic x-ray equipment. The Hazardous Substances Act, 1973 (Act 15 of 1973) and Regulations (No R1332 of 3 August 1973) govern the safe use of medical x-ray equipment in South Africa. Requirements from the Act and Regulations are incorporated in this Code. Further requirements are taken from source material listed in the section of References.

Whenever compliance with a requirement in this Code is mandated, the word must / shall is used. The word should indicate a practice that is recommended but not mandatory at this stage. Where a given technology or practice is not specifically covered by this Code, guidance in matters of radiation protection should be sought from the SAHPRA: Radiation Control. The Licensee shall be responsible for ensuring that corrective action takes place on items of non-compliance with this Code. The Act does not allow any person to use radiation equipment unless he/she holds a licence under the Act for that purpose. This Code does not cover the use of x-rays for dental and veterinary diagnosis. This Code must be read in conjunction with SAHPRA Radiation Control Guideline documents as listed in 4.2 of this Code. All forms and guidelines are available at: https://www.sahpra.org.za/radiation-control-guidelines-and-codes-of-practice/

1.1 Purpose

The importance of radiation safety training was reiterated by the World Health Organization (WHO). It has been recognized since early studies on X-rays that exposure to high levels of radiation may cause tissue damage, and that chronic exposure to lower levels of radiation may result in cancer. Electromagnetic radiation from medical procedures constitutes the single largest manmade means by which people encounter radiation exposure. Protection against the medical use of radiation is therefore even more important than protection against any other source of radiation

1.2 Scope

This Code of Practice sets out requirements and recommendations for radiation safety associated with the use of medical diagnostic x-ray equipment for license holders of X-Ray USE license.

2. LEGAL PROVISION

The guideline is implemented in promulgating the Hazardous Substances Act 15, 1973 (Act15 of 1973) the related Regulations R.1332

3. REQUIREMENTS AND RECOMMENDATIONS

3.1 Licensing

3.1.1 Regulations

The Regulations (R.1332) concerning to the Control of Electronic Products require that a joint product and premises licence be obtained for x-ray equipment before it may be installed and commissioned.

(a) Licences are not transferable and are issued:

- To a specific person or institution.
- For specific equipment and its application, and
- For a specific premises.

(b) Licenses are issued subject to the Regulations concerning the Control of Electronic Products and the application of specific conditions.

(c) Licence holders must verify the accuracy of the information displayed on the licence issued and communicate any inaccuracies to SAHPRA Radiation Control.

3.1.2 Application for licenses

It is the responsibility of the prospective user of an x-ray unit to be in possession of a licence from Radiation Control prior to installation of the unit.

- New units (new Form No.: GLF-RDN-XR-02G, replaced old form RC-DEALER)

A GLF-RDN-XR-02G (old RC-DEALER) application form is a combined form to be completed by both the supplier and the end user of a new x-ray unit. As per the import licence conditions of the supplier, a completed RCDEALER form must be submitted by the supplier. The section applicable to the user must be completed and the form returned to the supplier. The supplier is responsible to submit the completed form to Radiation Control for processing before installation.

- Pre-owned units (new Form No.: GLF-RDN-XR-02B, replaced old Form RC001)

New form GLF-RDN-XR-02B (old form RC001) must be completed for a pre-owned x-ray unit. It is the responsibility of the prospective user to submit the completed application form GLF-RDN-XR-02B (old form RC001) to Radiation Control.

A completed and signed GLF-RDN-XR-02A (old RC002) form from the previous owner must be submitted together with this GLF-RDN-XR-02B (old form RC001).

Allow 30 Working days for processing of applications.

3.1.3 Installations

The installation of an x-ray unit may only commence after a licence to install the unit has been issued

"May Install".

3.1.4 Acceptance tests

Only Inspection Bodies approved by SAHPRA Radiation Control and accredited by SANAS may perform acceptance tests on x-ray equipment. A list of approved Inspection Bodies and scope of the licenses are available on the Radiation Control website. (Refer to "Diagnostic QC" document on SAHPRA Radiation Control website - see 4.2 in this Code).

3.1.5 New Units

When a new unit is installed, acceptance tests must be performed by the supplier of the x-ray unit and the results recorded on the prescribed form and filed in the IER of the unit.

3.1.6 Pre-Owned units

- The prospective user must ensure that acceptance tests are performed. Granting of a licence to use a unit is subject to submission of the acceptance results of the tests results to Radiation Control.
- When an existing licensed unit is moved to a new premises (building) or room, prior to use, acceptance tests must be performed on the unit and the results submitted to Radiation Control.

NOTE: Units that have not been previously licensed by the Directorate: Radiation Control will not be licensed for use.

3.1.7 Disposal/modification of X-ray equipment/Sale and Cancellation of licence (new Form No.: GLF-RDN-XR-02A, replaced old form RC002)

The licence holder must apply for and obtain permission from Radiation Control by submitting a completed form GLF-RDN-XR-02A (old form RC002) prior to cancellation, modification, disposal and/or sale of x-ray equipment.

- Particulars regarding the type of disposal, e.g., sale, dismantling, disappearance or storage of a unit, must be furnished to Radiation Control before the cancellation of the licence will be affected.

3.1.8 New/modified premises (New Form No.: GLF-RDN-XR-02A, replaced old form RC002)

The licence holder must apply for and obtain permission prior to:

- Modification of any licensed premises or layout of equipment on such premises, and/or
- Change of licensed premises (building) or equipment moved to other rooms within the same building.

3.1.9 Responsible person

The licence holder must appoint a responsible person that has adequate knowledge and experience in the

field of radiation protection in general. The appointed person is responsible to the licence holder for the safe use of the x-ray equipment (see also section 3.2).

The person appointed must be qualified in either of the following categories and registered with the Health Professions Council of South Africa (HPCSA):

- Radiography
- Radiology
- Medical Physics or
- Chiropractic

The responsible person must be appointed in writing indicating the scope of the actions delegated by the licence holder.

3.1.10 Change of responsible person (new Form No.: GLF-RDN-XR-02C, replaced old form RC005)

The licence holder must notify Radiation Control of a change in responsible person by submitting a completed form GLF-RDN-XR-02C (old form RC005).

3.2 Responsibilities of The Licence Holders / Responsible Persons

3.2.1 The licence holder of a diagnostic x-ray facility is ultimately responsible for:

(a) The entire scope of radiation safety, for the equipment and premises for which he/she holds a licence;

(b) Fulfilment of all related statutory requirements, and

(c) Compliance to the Act, Regulations and Conditions specified in the licence.

3.2.2 The licence holder / responsible person must ensure that:

- The equipment and the facilities, in which such equipment is installed and used, meet all applicable radiation safety standards.
- The equipment is maintained and functions properly.
- The equipment is used and maintained only by competent and appropriately trained persons / personnel.
- Applicable Quality Control (QC) tests are performed at the prescribed frequencies as stipulated in

"Diagnostic QC" document on SAHPRA Radiation Control website - see 4.2 in this Code.

- The required QC equipment is provided.
- Ensure that radiation surveys to monitor safe performance of equipment and to monitor radiation levels in work areas are undertaken.
- Radiation workers (occupationally exposed persons) are identified and issued with personal radiation monitoring devices (PRMD's).
- The appropriate protective clothing, devices and equipment is provided to personnel and properly used.
- Radiation safety rules are communicated to and followed by all personnel.
- Operational procedures are established and maintained to ensure that the radiation exposure to workers, patients and public is kept as low as reasonably achievable (ALARA) without compromising the diagnostic efficiency of the result, and
- Workers are educated in the hazards and risks of ionising radiation.

3.2.3 Keeping of patient records

Records must be kept and available for inspection purposes by Radiation Control.

A record / register must be kept of all patients undergoing x-ray examinations. The record / register must be preserved for 5 years and contain the following information:

- surname, name, date of birth or ID number / age and gender.
- date of examination.
- brief clinical indication of the examination.
- type of examination.
- number of exposures (repeat exposures included) and
- fluoroscopy time, dose results (if available) and the name of the person performing the fluoroscopy procedure
- total dose read-out or Dose Area Product (DAP) reading (if applicable)

- brief statement of the diagnostic information obtained from the examination.

3.2.4 Keeping of equipment records

- IER must be kept and contain all required information as stipulated in "Diagnostic QC" document on SAHPRA Radiation Control website - see 4.2 in this Code.
- Radiation worker record (see par 3.4)

3.2.5 Submission of acceptance tests results to Radiation Control

Acceptance test results of pre-owned x-ray units must be submitted to Radiation Control following installation (see par 3.1.6).

3.2.6 Appointment of Medical Physicist for Interventional Radiology Procedures (new Form No.: GLF-RDN-XR-02E, replaced old form RC006-1)

A medical physicist must be appointed in writing to establish and implement an optimization program for interventional Radiology procedures as stipulated in "Diagnostic QC" document on SAHPRA Radiation Control website - see 4.2 in this Code

3.3 Operators

3.3.1 Registered Professionals

Only the following persons who are appropriately trained and registered with the HPCSA in Radiography and/or Radiology, may operate x-ray equipment and perform examinations within their appropriate scope of practice:

- Radiographer
- Supplementary Diagnostic Radiographer (SDR):
    - May only work in a government hospital or an institution operated or subsidised by government or provincial authority or by the South African Chamber of Mines
    - (Refer to Medical, Dental and Supplementary Health Services Professions Act, 1974 (Act no 56 of 1974) Annexure 7)
    - Supplementary diagnosti radiographers must be supervised, at least once a week, by a qualified registered radiographer
    - The supervisor is not required to be present at all times. However, the supervisor shall meet with the supervisee on a continuous and regular basis and review the assigned duties as appropriate

to the tasks to be performed.

- Chiropractor
- Radiologist

3.3.2 Operators of mammography units

With effect from 1 July 2009 mammography examinations shall only be performed by qualified radiographers in possession of a recognised additional qualification (postgraduate) in mammography.

- Details of accredited courses can be obtained from the Professional Board for Radiography and Clinical Technology at the HPCSA.

3.3.3 Operators of C-arm units

The operator MUST BE a Radiographer or Radiologist.

3.4 Radiation Workers

3.4.1 Dose limits for radiation workers and public

Application	Occupational	Public
Effective dose	20 mSv per annum, not more than 100 mSv over a period of 5 years (not more than 50 mSv in any one year)	1 mSv per annum
Annual equivalent dose to the		
lens of the eye	20 mSv	1 mSv
skin	500 mSv	50 mSv
hands and feet	500 mSv	--------

i. A radiation worker must be older than 18 years. However, if a radiation worker in training is younger than 18, but older than 16, such worker must work under direct supervision.

ii. The holder of the licence must keep record of the following for a period of 10 years for each radiation worker:

(a) The monthly dose reports furnished by the monitoring service provider (SABS) and

(b) Results of medical examinations.

iii. Pregnant radiation workers

When pregnancy has been diagnosed the women shall not be allowed to work under working conditions where the maximum equivalent dose limit of 2 mSv to the women's abdomen (lower trunk) for the remainder of the pregnancy could be exceeded. Pregnant radiographers shall continue to be monitored in the prescribed manner. Taking into account the specific working conditions, pregnant radiographers must be issued with a direct reading pocket alarm dosimeter, and in so doing prevent that such women are unwittingly exposed to radiation.

- The employer should provide continuous education as to the risks to the foetus and actual dose levels in the various working environments.
- Radiation workers, especially young females, must always and not only when pregnant, be well versed in the uses of ionisation radiation.

(Refer to Guideline document on Radiation Control website - see 4.2 in this Code)

iv. Appointment of radiation workers

NOTE: Licence holders are no longer required to submit form GLF-RDN-XR-02F (old form RC008) or inform Radiation Control of any change in the register as stipulated in Regulation III.4 (b) & (c).

v. Medical examinations of radiation workers

(a) Before any person is appointed / classified as a radiation worker, he/she must undergo a medical examination.

(b) Medical examinations for radiation workers should follow general pre-employment occupational medical practice for determining fitness for work.

(c) In addition to the pre-employment medical examination a radiation worker may be required to undergo a medical examination in the event of the following:

- When a radiation occurrence / incident resulting in an abnormally high dose is suspected to have taken place or has been confirmed.
- When a medical practitioner deems it necessary.

- When such an examination is considered necessary either by the regulatory authority or the holder of the licence and
- When the radiation worker suspects that his/her health has been or will be adversely affected by occupational factors.

NOTE: Annual medical examinations and those pertaining to de-registration are no longer required by SAHPRA Radiation Control, but it remains the prerogative of the licence holder should he/she deems it necessary.

vi. Monitoring of radiation workers

(a) The licence holder must ensure that all radiation workers, which include permanently allocated nursing staff involved with radiation procedures in the x-ray department, are issued with a personal radiation monitoring device (PRMD)

- For correct positioning of the PRMD refer to guideline document on Radiation Control website - see 4.2 (3) in this Code

(b) Application forms for a PRMD can be obtained directly from the following current monitoring services provider:

- SABS Holdings (Pty) Ltd; Radiation Protection Services, rps@sabs.co.za
- Dosimeter Services (Pty) Ltd, nds@netcare.co.za

(c) The service provider will forward the radiation dose records to the licence holder on a monthly basis or after a radiation occurrence. The dose records must be kept for 10 years.

(d) The licence holder must ensure that the service provider replaces PRMD's at regular intervals not exceeding 32 days.

vii. Termination of employment as a radiation worker

- When a radiation worker ceases to be employed by the licence holder, the holder must provide that worker with a copy of his/her complete dose record. Such complete records can be obtained from the SABS/Dosimeter Services on request.

Note: Licence holders are no longer required to inform Radiation Control of any change in the register as stipulated in Regulation III.4 (c).

viii. Appointment of radiation workers by a new employer

- The licence holder must obtain from the SABS/Dosimeter Services the previous dose records of the newly appointed radiation worker.

ix. Radiation occurrences (new Form No.: GLF-RDN-XR-10A, replaced old form RC010)

- Details of any radiation occurrence or suspected radiation occurrence must immediately be reported to the Director: Radiation Control on form GLF-RDN-XR-10A (old form RC010).

3.5 Radiation Protection

Basic radiation protection principles are based on:

- The justification of the practice- No radiation examination shall be adopted unless the benefit outweighs the associated risk.
- The optimisation of protection- Radiation doses from medical exposures and those received by the public and occupationally exposed persons must be kept as low as reasonable achievable (ALARA), economic and social factors taken into account.
- Limitation of individual dose and risk- All medical applications of ionising radiation must be managed in such a way that radiation doses to occupationally exposed person and members of the public do not exceed the specified dose limits (see par 3.4.1).

3.5.1 Protection of patients

(a) All medical exposures shall be subject to the principles of justification and optimisation.

(b) X-ray examinations shall not be performed unless there are valid clinical indications.

(c) Examinations on children shall require a higher justification since such patients may be more sensitive to radiation.

(d) Obtain previous x-ray images to minimise the taking of repeat films.

(e) CT Screening programmes of asymptomatic persons shall not be instituted unless approved by SAHPRA. Screening programmes prescribed by other Governmental Acts are acceptable.

(f) Licence holders shall be aware of the approximate patient radiation doses. Reference dose levels should be introduced for applications in diagnostic x-ray examinations as performed in their facilities.

- Diagnostic reference levels (DRLs) refer to dose levels in medical diagnostic practices for typical x-ray examinations for groups of standard size patients or standard phantoms for broadly defined types of equipment. These levels are expected not be exceeded for standard procedures when good and normal practice regarding diagnostic and technical performance is applied.

- The objective of a DRL is to help avoid unnecessary radiation dose to the patient that does not contribute to useful diagnostic information and does not produce the expected medical benefit to the patient.

- The specific purpose of the DRL is to provide a benchmark for comparison, not to define a maximum of minimum exposure limit.

(Refer to the Guideline document on Radiation Control website - see 4.2 (9) in this Code)

(a) When appropriate, consider other modalities such as MRI or ultrasound which do not use ionising radiation.

(b) Examinations with potential high patient doses such as CT examinations should only be carried out after a proper clinical justification by the radiologist.

(c) For each projection select the highest kilovoltage (KV) and fastest film-screen combination compatible with the image quality requirements of the examination.

(d) The primary beam shall be collimated at all times.

(e) Means to permanently transfer patient identification, prior to processing of the images, must be provided.

(f) Radiation examinations may only be requested by:

- A medical practitioner or

- Any appropriately trained and registered health professional.

(Refer to the to Annexure B in this Code)

(a) Pulsed fluoroscopy should be routinely used. During fluoroscopy, radiation time is minimise by pulsing the beam.

At low-pulsed frequencies, major dose savings are made while ensuring diagnostic images.

(b) A film screen speed of not less than 300 is recommended for general radiography.

3.5.2 Protection of pregnant patients

(a) X-ray examinations must be justified, and only essential views performed.

(b) Alternative imaging modalities, especially ultrasound for obstetric procedures, shall be used where appropriate. An x-ray examination shall not be performed to assess foetal development where ultrasound facilities are available.

(c) X-ray pelvimetry shall not be performed on a routine basis.

(d) For examinations where the primary beam unavoidably irradiates the foetus, the methods of minimising dose shall be used as appropriate and particular attention shall be given to:

- Minimising the number of views.
- Strict beam collimation.
- Using higher kVp settings.
- Using fast image recording media.
- Where practicable, using PA projections in preference to AP projections.

3.5.3 Protection of women of reproductive capacity

(a) X-ray examinations involving the exposure of the abdomen of women likely to be pregnant shall be avoided unless there are strong clinical indications for the examination.

(b) In order to minimise the possibility of unintentional exposure to the embryo / foetus, notices must be posted at several places within the radiology facility.

(c) The notices shall contain wording similar to or having the same meaning as the following:

"If you might be pregnant notify the radiographer before your x-ray examination."

3.5.4 Protection of pediatric patients

The longer life expectancy of children results in greater potential for the manifestation of possible harmful effects of radiation. In addition to the requirements in this Code for patients in general (see par 3.5 (1.1), the following requirements for paediatric x-ray examinations shall be observed:

(a) For a given procedure each view shall be examined, where practical, before deciding whether to

take a further view;

(b) Fluoroscopy shall be used only when general radiography will not provide the information required and

(c) There shall be strong justification for x-ray procedures involving high doses such as CT (Refer to Guideline document on Radiation Control website - see 4.2 (5) in this Code).

3.5.5 Protection of non-radiation personnel and members of the public

(a) Members of the public are not allowed to enter controlled areas unsupervised.

(b) Non-radiation personnel or members of the public shall not remain in the x-ray room during any x-ray procedure unless they are required to be in attendance.

(c) The occasional use of non-radiation personnel to give assistance, particularly in ward or theatre radiography, is acceptable but shall involve the full use of protective clothing, devices, and techniques to minimise personnel dose. Care shall be taken to ensure that the same non-radiation personnel are not always involved. Women who are pregnant shall not be used in this role.

3.5.6 Protection of persons holding patients or image receptors

(a) No person shall hold a patient, x-ray film cassette, or other imaging equipment or x-ray tube head in position during exposures unless it is otherwise impossible to obtain a diagnostically useful image and not merely that it is a matter of convenience.

(b) Holding of patients or x-ray film cassettes during exposure shall be done by persons accompanying the patient in preference to non-radiation personnel, and by non-radiation personnel in preference to radiation workers. Non-radiation personnel should be chosen based on a roster, i.e., it shall not be the same person who does the holding. No pregnant women or young persons (under the age of 18) shall do any holding.

(c) Any persons holding patients or film cassettes in position during an x-ray examination shall wear a lead rubber apron and wherever practicable, lead rubber gloves. No part of the holder's body shall be in the primary beam, even if covered with protective clothing.

*Refer to **Annexure A** of this code.*

3.5.7 Protective clothing

(a) Any person who cannot remain in the protected area during x-ray examinations shall wear a

protective apron of at least 0,25 mm lead equivalence.

(b) Any person standing within 1 metre of the x-ray tube or patient during fluoroscopy examinations shall wear eye protection (leaded glasses), thyroid protection and a protective apron of at least 0.35 mm lead equivalent.

(c) Protective gloves shall be at least 0.35 mm lead equivalence. (d) Gonad shields shall be at least 0.5mm lead equivalence.

(Refer to the Guideline documents on Radiation Control website – see 4.2 (3), 4.2 (8) & 4.2 (10) in this Code)

3.5.8 Record and Report Radiation Injuries

The licence holder shall ensure that all suspected radiation occurrences are immediately reported to the Director: Radiation Control. A "radiation occurrence" means a single event or series of events occurring during the use of a listed electronic product which has resulted in injurious or potentially injurious exposure of any person to ionising radiation as a direct result of the use of that product. The licence holder must investigate the circumstances of the exposure, the possible effects on a person(s) concerned and decide on the action to be taken.

The outcome of this investigation must be documented.

3.6 Premises Requirements

Refer to guideline document on Radiation Control website: *General Guidelines with regard to the design of x-ray rooms (see Annexure 4.2 in this Code).*

3.7 Radiation Warning Signs, Notices and Lights at entrances to X-ray rooms

Appropriate radiation warning signs and notices must be displayed and required warning lights in working order:

(a) Fixed units:

A radiation warning sign and warning notice, "X-RAYS NO UNAUTHORISED ENTRY" must be displayed at all entrances leading to the rooms where x-ray units are installed.

(b) Mobile units:

A radiation warning sign and warning notice, "X-RAYS NO UNAUTHORISED USE" must be displayed on the control panel of the x-ray units.

(c) Warning lights for CT & Fluoroscopy units (excluding theatres):

A red warning light, which is only activated when the beam is on and when fluoroscopy is in progress, must be mounted in a conspicuous place outside the entrance to the x-ray rooms.

(Refer to Guideline document on Radiation Control website - 4.2 (8) in this Code)

4. REFERENCES

4.1 Related Articles

4.1.1 Australian Government. Australian Radiation Protection and Nuclear Safety Agency, 2008. Radiation Protection in Medical Applications of Ionizing Radiation. Publication No. 14. http://www.arpansa.gov.au

4.1.2 International Commission on Radiological Protection, 1991.1990 Recommendations of the International Commission on Radiological Protection. ICRP Publication 60 Vol 21/1-3. Pergamon Press. http://www.icrp.org

4.1.3 International Commission on Radiological Protection, 2000. Pregnancy and Medical Radiation. ICRP Publication 84 vol 30/1. Pergamon Press. http://www.icrp.org

4.1.4 New Zealand Ministry of Health, National Radiation Laboratory, 1994. Code of Safe Practice for the use of x-rays in Medical Diagnosis. NRL C5. http://nrl.moh.govt.nz

4.1.5 South Africa, 1973. Hazardous Substances Act, 1973 (Act of 15 of 1973). https://www.sahpra.org.za/radiation-control-acts-and-regulations/

4.1.6 South Africa, 1973. Regulations Concerning the Control of Electronic Products. Regulation Gazette No 3991. https://www.sahpra.org.za/radiation-control-acts-and-regulations/

4.1.7 International Commission on Radiological Protection, 73. Radiological Protection and Safety in Medicine. Annals of the ICRP Volume 26/2. Elsevier B.V. http://www.icrp.org

4.1.8 ICRP, Statement on tissue Reactions. ref 4825-3093-1464 (21 April 2011). http://www.icrp.org

4.2 Related Guidelines

4.2.1 Code: Diagnostic QC – Requirements for licence holders with respect to Quality Control tests for diagnostic x-ray imaging systems.

4.2.2 Management of pregnant radiographers and other staff members.

4.2.3 Personal monitoring when a lead rubber apron is worn – medical and veterinary use of x-ray equipment.

4.2.4 Request for medical examinations.

4.2.5 FDA Public Health Notification: Reducing radiation risk from computed tomography for pediatric and small adult patients – 2 November 2001.

4.2.6 General guidelines with regard to the design of x-ray rooms.

4.2.7 Display and format of radiation warning signs at entrances to rooms containing x-ray units.

4.2.8 Guidelines – Protective Clothing.

4.2.9 Patient dose measurements in Diagnostic Radiography.

4.2.10 Radiation Protection of personnel in theatre

5. VALIDITY

This guideline is valid for a period of 5 years from the effective date of revision and replaces old Code of Practice for Users of Medical X-Ray Equipment. It will be reviewed on this timeframe or as and when required.

6. ANNEXURES

6.1 Annexure A: Holding of Patients During X-Ray Procedures

Radiographers should not hold patients during x-ray procedures

i. Patients should be held only after it is determined that available restraining devices are inadequate

ii. In cases when a patient must be held, a person accompanying the patient or a parent, especially when children are involved should do it. If this is not possible staff members of other departments, e.g. nursing personnel, should do it.

iii. Permanently allocated nursing personnel involved with radiation procedures in the Radiography Department must be registered as a radiation worker and issued with a personal monitoring device (TLD).

iv. No individual should have the responsibility of routinely holding patients during x-ray procedures.

v. Individuals holding/supporting patients shall wear a protective apron and ensure that no part of their body is exposed to the primary x-ray beam.

vi. If the hands are likely to be close to the primary beam, protective gloves should be worn. When neonates are held, the exposure will normally be so small that it will not be necessary to wear protective gloves.

vii. To assist in minimizing exposure it is important for the radiographer to collimate carefully to the area of clinical interest.

viii. Pregnant women or persons under the age of 18 years should not be permitted to hold patients

6.2 Annexure B: Medical Examinations for Radiation Workers

The current Regulations concerning the control of electronic products, published in 1973 prescribe annual medical examinations. However, the International Standards concerning annual medical examinations have changed. Therefore, the regulator currently applies the following guidelines:

1. Before any person is appointed / classified as a radiation worker, he/she must undergo a medical examination.
2. Medical examinations for radiation workers should follow general pre- employment occupational medical practice for determining fitness for work.
3. In addition to the initial pre-employment medical examination each radiation worker may be required to undergo a medical examination in the event of the following:
    - When a radiation occurrence / incident resulting in an abnormally high dose is suspected to have taken place or has been confirmed.
    - When a medical practitioner deems it necessary.
    - When such an examination is considered necessary either by the regulatory authority or the holder of the licence and
    - When the radiation worker suspects that his/her health has been or will be adversely affected by occupational factors.

NOTE: Annual medical examinations and those pertaining to de-registration are no longer required by the regulator but it remains the prerogative of the licence holder should he/she deems it necessary.