South African Health Products
Regulatory Authority
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19 August 2022

GUIDELINE FOR PERSONAL MONITORING WHEN A LEAD RUBBER APRON IS WORN MEDICAL AND VETERINARY USE OF DIAGNOSTIC X-RAY EQUIPMENT

This is a guideline for individuals exposed to ionizing radiation because of their occupation in the medical and veterinary industry who makes use of diagnostic X-Ray equipment.

Document History

Final Version	Reason for Amendment	Effective Date
0	First issue and published for implementation	September 2012
1	– Content structured on the new SAHPRA Guideline Template – Title amended from general guideline for Personal Monitoring for Med Vet use of Diagnostic X-Ray Equipment – A unique document number SAHPGL-RDN-XR-08 allocated to this Guideline	August 2022

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Glossary

Abbreviation/ Term	Meaning
PRMD	Personal Radiation Monitoring Device used to measure absorbed dose of ionizing radiation
Ionizing Radiation	Radiation emanating from a listed electronic product, capable of producing ions directly or indirectly in its passage through matter
SAHPRA	South African Health Products Regulatory Authority
Service providers of PRMD's	Approved service/lab providing monitoring devices to license holders
Licence Holder	Any person who has been registered in terms of the regulation
Regulation	Regulations relating to the Control of Electronic Products (No R1332 of 3 August 1973)
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)
Radiation dosimetry	The measurement, calculation and assessment of the ionizing radiation dose absorbed by an object, usually the human body.
Attenuate	A reduction of intensity of a radiation as it passes through an absorbing or scattering medium

1. INTRODUCTION

Occupational exposure to ionizing radiation can result in deleterious effects that may manifest themselves not only in exposed individuals but in their descendants as well. Monitoring of persons occupationally exposed to ionizing radiation is an essential component of any radiation safety program. The purpose of a dosimetry program is to provide occupational workers with an estimation of their radiation dose and to highlight unsafe practices.

A Personal Radiation Monitoring Device (PRMD) is a radiation sensor designed to measure the radiation dose received by a person, who is occupationally exposed to radiation, over a specified period.

Note: The license holder is responsible to ensure that radiation workers on his/her premises wear a PRMD.

1.1 Purpose

Lead aprons are used in medical facilities to protect workers and patients from unnecessary X-Ray radiation exposure from diagnostic radiology procedures. A lead (or lead equivalent) apron is a protective garment which is designed to shield the body from harmful radiation, usually in the context of medical imaging. The purpose of this guideline is to ensure that PRMD are worn on correct position to ensure maximum and correct radiation dose measurements.

1.2 Scope

The guideline provides recommendations regarding the use of lead aprons during procedures involving the use of ionizing radiation in the medical and veterinary industry.

2. LEGAL PROVISION

The Hazardous Substances Act, 1973 (Act 15 of 1973) and Regulations (No R1332 of 3 August 1973) govern the safe use of X-Ray equipment in South Africa.

3. RECOMMENDATIONS

3.1 Background

Diagnostic radiology is an essential part of present-day veterinary practice being exposed to ionizing radiation may influence the human body. Effects of ionizing radiation are respectively called somatic and stochastic. effects. Stochastic effects may include genetic effects. Somatic effects are characterized by observable changes occurring in the body organs of the exposed individual.

These changes may appear from within a few hours to many years later, depending on the amount and duration of exposure of the individual. In veterinary medicine, the possibility that anyone may be exposed to enough radiation to create somatic effect is extremely remote.

Genetic effects are more a cause for concern at the lower doses used in veterinary radiology. Although the radiation doses may be small and appear to cause no observable damage, the probability of chromosomal damage in the germ cells, with the consequence of mutations, does exist. These mutations may give rise to genetic defects and therefore make these doses significant, when applied to many individuals.

Hence, this is the reason why it is a requirement quired for occupationally exposed individuals to be monitored.

3.2 PMRD Wearing guide

WEARING POSITION OF PRMD

If ONLY a lead rubber apron is worn:

- *Wear the PRMD in front of the body,* **OUTSIDE** *the apron, between the neck and waist, preferably at the collar.*
- *The PRMD must be facing outwards towards the source of exposure.*

If a lead rubber apron with eye and thyroid protection is worn:

- *Wear* the PRMD at the waist **UNDER** the protective apron.

3.3 Precautions

i. Normal text The PRMD must be worn only during periods of occupational exposure.

ii. Do not wear the PRMD when receiving dental, radiographic or nuclear medicine examinations.

iii. Wear only the assigned PRMD. Do not wear any other individual's PRMD.

iv. The PRMD must not be kept inside a pocket where coins, keys, or other objects can attenuate incident X-Rays before it reaches the PRMD.

v. Do not tamper with or unnecessarily expose a PRMD to radiation, heat or moisture.

vi. Do not store the PRMD near a radiation source (e.g. do not leave it attached to a lead apron that will be stored in the X-Ray examination room).

vii. Remove the PRMD from clothes before it is washed.

viii. Return the PRMD at the end of wearing period.

ix. PRMD is considered late if not returned by the due date to the Radiation Monitoring Service provider. A lost (non-returned) PRMD causes a permanent gap in the individual's exposure history record. Lost PRMD's must be reported.

3.4 Pregnant radiation workers

Refer to document on "Management of Pregnant Radiographers and other staff members" with special reference to pregnant radiographers, available from SAHPRA: Radiation Control or at: https://www.sahpra.org.za/radiation-control-guidelines -and -codes-of-practice/

3.5 Notifications of over-exposures

The Service Provider will notify the user and SAHPRA: Radiation Control of an exposure which exceeds the prescribed limits.

In the event of an over-exposure the user must complete and immediately return form GLF-RDN-XR-10A (RC010) to SAHPRA: Radiation Control.

This form is available from the SAHPRA: Radiation Control or at: https://www.sahpra.org.za/radiation-control-application-and -report-forms/

3.6 Service Providers of PRMD's Approved

Provider	Contact	Email
SABS Holdings	012 428 6199	rps@sabs.co.za
Dosimeter Services (Pty) Ltd	012 677 8074	nds@netcare.co.za

4. REFERENCES

The following related documents are referenced:

4.1 Management of Pregnant Radiographers and Other Staff: https://www.sahpra.org.za/radiation-control-guidelines -and -codes-of-practice/

4.2 Estimation of effective dose equivalent to staff in diagnostic radiology

4.3 Faulkner, K ; Harrison, R M, Bristol: IOP Publishing, Physics in medicine & biology, 1988, Vol.33 (1), p.83-91

4.4 Estimation of X-radiation Protective Coats in Abdominal Angiography. KOSHIDA, KICHIRO et al *Nippon Hōshasen Gijutsu Gakkai zasshi* 61.7 (2005): 989–996. Web.

4.5 Monitoring of staff wearing lead-rubber aprons: https://www.sahpra.org.za/radiation-control-guidelines -and -codes-of-practice/

4.6 Jones, J R, England, British journal of radiology, 1986, Vol.59 (706), p.1051-1052

4.7 How Effective Are Lead-Rubber Aprons in Protecting Radiosensitive Organs from Secondary Ionizing Radiation? Hayre, C.M, H Bungay, and C Jeffery. *Radiography (London, England. 1995)* 26.4 (2020): e264–e269. Web.

4.8 Effects of Exposure – ICRPaedia (web)

5. VALIDITY

This guideline is valid for a period of 5 years from the effective date of revision and replaces the old general guideline for Personal Monitoring for Med Vet use of Diagnostic X-Ray Equipment, revised September 2012. It will be reviewed on this timeframe or as and when required.