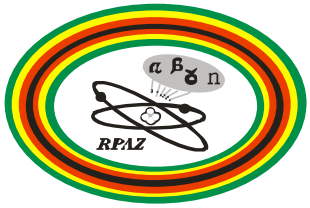

Radiation Protection Authority Of Zimbabwe

"… protecting people & the environment against radiation effects …"

GUIDE

RADIATION PROTECTION PROGRAMME

RP/LG/RPP

April, 2015

RADIATION PROTECTION PROGRAMME GUIDE

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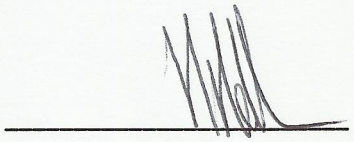

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RPAZ Guide Radiation Protection Programme Contents

RPAZ Licensee Guide: Radiation Protection Program
RPAZ/LG/RPP

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INTRODUCTION

The Radiation Protection Authority of Zimbabwe (RPAZ) is a statutory body with a mandate to protect people and the environment against the harmful effects of radiation. It was established in terms of the *Radiation Protection Act [Chapter 15:15]* (the Act).

The registrant or licensee bears the prime responsibility for safety and security for sources and facilities that give rise to radiation risks.

The Radiation Protection Programme (RPP) reflects the application of management responsibility for radiation protection and safety. As a result the effectiveness of an RPP depends on management commitment.

OBJECTIVE

This document provides guidance on meeting the requirements for the establishment of an RPP.

STRUCTURE

The key elements of an RPP are:

- Organisation structure
- Workplace monitoring
- Local rules and supervision
- Quality assurance
- Transportation of radioactive materials
- Emergency procedures
- Management of radioactive waste
- System of records
- Security of sources

These key elements are divided and dealt with in the following sections:

1. Effective Control
2. Safety Management
3. Radiation Protection
4. Management of Radioactive Waste
5. Security
6. Emergency

1 EFFECTIVE CONTROL

The registrant or licensee must demonstrate how he will maintain control over the particular dealings for which a license is sought. The arrangements should cover such things as organisational arrangements and management systems.

Statutory and Regulatory Compliance

Requirement
S.I. 62 of 2011 Part II 8. (1) (a) (ii)
Licensees shall bear the primary responsibility for compliance with all applicable requirements of these regulations.

Implementation
S.I. 62 of 2011 Part II 8. (1) (a) (i)
The registrant or licensee shall bear the primary responsibility for establishing and implementing the technical and administrative measures that are needed for ensuring protection and safety of the practices and sources for which they are authorised.

The registrant or licensee should demonstrate how statutory and regulatory compliance will be achieved.

Accountabilities and Responsibilities

Requirement
S.I. 62 of 2011 Part III 13. (1) (c)
A safety culture shall be fostered and maintained to encourage a questioning and learning attitude to protection and safety to discourage complacency, which shall ensure that the responsibilities of each individual, including those at senior management levels, for protection and safety are clearly identified.

Implementation
The registrant or licensee should spell out the accountabilities and responsibilities for all of its key functions and operations.

Communication

Requirement
S.I. 62 of 2011 Part III 13. (1) (f)
A safety culture shall be fostered and maintained to encourage a questioning and learning attitude to protection and safety to discourage complacency, which shall ensure that organisational arrangements and lines of flow of communications be effected that result in an appropriate flow of information on protection and safety at and between the various levels in the organisation of the registrant or licensee.

Implementation
The registrant or licensee should outline how information will be effectively communicated both top-down and bottom-up (vertically), and between staff (horizontally).

System of Records

Requirement
S.I. 62 of 2011 Part III 14. (2) (a)
Licensees shall keep the results of monitoring and verification of compliance, records of tests and calibration carried out, records of maintenance, training of personnel and all records related to implementation of the radiation protection programme.

Implementation
The registrant or licensee should specify how their records keeping is conducted.

The records of the following should be kept:

- Disposal of waste
- Personnel exposure
- Area surveys
- Instrument tests and calibrations
- Tests for radioactive sealed source leakage
- Inventory of sources and accountability
- Audits and reviews of radiation safety programme
- Incident and accident investigation reports
- Maintenance and repair work
- Facility modifications
- Training provided
- Evidence of health surveillance of workers
- Transportation

2 SAFETY MANAGEMENT

The registrant or licensee must describe the administrative arrangements for managing safety. These arrangements may be minimal, where only low hazards are involved, but will be more extensive for dealings of higher complexity or hazard. The safety management plan should cover things such as safety culture, safety of premises and equipment, competency and training, incidents and accidents, auditing and record keeping.

Safety Policy and Objectives

Requirement
S.I. 62 of 2011 Part III 13. (1) (a)
A safety culture shall be fostered and maintained to encourage a questioning and learning attitude to protection and safety to discourage complacency, which shall ensure that policies and procedures are established that identify protection and safety as being of the highest priority.

Implementation
The registrant or licensee should outline overarching safety principles and objectives for safety.

Monitoring and Verification of Radiation Protection and Safety

Requirement
S.I. 62 of 2011 Part IV 19. (1)
Monitoring and measurements shall be conducted by licensees on the parameters necessary for the verification of compliance with the requirements of these regulations and the license or registration.

Implementation
The registrant or licensee should outline systems on how the safety principles and objectives are met and monitored.

Safety Assessments

Requirement
S.I. 62 of 2011 Part IV 18. (1)
Licensees shall as a minimum, make safety assessments related to protection and safety measures for sources within practices at different stages, including location, design, manufacture, construction, assembly, commissioning, operation, maintenance, decommissioning in order:

- **To identify the ways in which normal exposures and potential exposures could be incurred, account being taken of the effect of events external to the source as well as events directly involving the sources and their associated equipment.**
- **To determine the expected magnitude of normal exposures.**
- **To estimate the probabilities and the magnitudes of potential exposures.**
- **To assess the quality and extent of the protection and safety provision.**

Implementation
The registrant or licensee should demonstrate how radiation safety risks are assessed and how mitigation strategies will be implemented to reduce them to acceptable levels.

Training and Education

Requirement
S.I. 62 of 2011 Part III 13. (1) (d)
A safety culture shall be fostered and maintained to encourage a questioning and learning attitude to protection and safety to discourage complacency, which shall ensure that each individual is suitably trained and qualified.

Implementation
The registrant or licensee should describe a training and education programme or plan to ensure staff are equipped with the necessary knowledge and skills to safely undertake their work.

The programme should include details on:

- Training of RSO as approved by the Authority.
- Radiation awareness training for other staff, which includes:
    - nature of the hazard
    - extent of any controlled or supervised areas
    - requirements of local rules
    - emergency plans

3 RADIATION PROTECTION

The radiation protection plan should cover things such as principles of radiation protection, planning and design of the workplace, classification of work area, local procedures, radiation monitoring of individuals and the workplace.

Principles of Radiological Protection

Requirement
The Act Part IV Section 15 (5)
The holder of a license shall be responsible for ensuring that exposure to ionising radiation resulting directly or indirectly from its operation, conditions of storage, transport or disposal is kept as low as reasonably practicable and below the prescribed limits.

S.I. 62 of 2011 Part III 12.
In relation to exposures from any particular source within a practice, except for therapeutic medical exposures, protection and safety shall be optimised in order that the magnitude of individual doses, the number of people exposed and the likelihood of-incurring exposures all be kept as low as is reasonably achievable, economic and social factors being taken into account within the restriction that the doses to individuals delivered by the source be subject to the dose constraints.

Implementation
The registrant or licensee is responsible for ensuring and demonstrating that plans and arrangements are in place and implemented for the safe management of conducts.

Radiation Safety Officer

Requirement
The Act Part IV Section 16
The owner or occupier of a facility shall appoint a person experienced in radiation health and safety measures as a radiation safety officer within the facility

Implementation
The registrant or licensee is responsible for ensuring that arrangements are implemented for a suitably qualified Radiation Safety Officer (RSO) to be appointed as appropriate, to undertake specific duties to ensure that the licensee's responsibilities for radiation protection and nuclear safety are met.

The RSO:

- Shall have appropriate training and relevant experience.
- Must have authority from the registrant or licensee to stop unsafe work practices.
- Should have a position separate from production.
- Should assist the organisation in complying with the regulations.
- Will assist the registrant or licensee to implement the RPP.

The responsibilities of the RSO as outlined in the Act Part IV Section 16 are to ensure that:

- All persons using or working in the facility are supplied with at least one monitoring device and any other protective accessories necessary to carry out radiation procedures with the lowest possible risk.
- All radiation workers employed within the facility are given proper instruction on radiation safety measures and, where annual exposure exceed three-tenths of the dose equivalent limit, receive medical check-ups at least once every six months.
- Proper care is taken of radioactive wastes if they appear in the course of the use of radiation sources as described in the codes of practice issued by the Board for protection of persons exposed to ionising radiation and that the wastes are only disposed of in accordance with the licence granted for the purpose.
- Exposure records are kept as prescribed in the codes of practice for users of ionising radiation.
- Any other instructions that may be issued from time to time by the Board are implemented.

Other responsibilities:

- Radiation and contamination monitoring
- Maintaining an inventory of sources
- Supervising the work of contractors using ionising radiation on the operator's property
- Assessment and identification of controlled and supervised areas
- QA program for maintaining protection measures
- Controlling access to controlled areas
- Arranging individual dose assessments
- Drafting and reviewing local rules
- Checks to ensure compliance with regulatory requirements
- Supervision of work in controlled areas
- Advising and requiring the use of appropriate personal protective equipment in controlled areas
- Providing and ensuring the training of personnel
- Investigating and documenting incidents and accidents
- Submitting required reports to the Regulatory Authority
- Maintaining required records and documents

Classification of Work Areas

Requirement
S.I. 62 of 2011 Part V 22.
Licensees shall designate

- **Areas in which there is a potential to receive more than three tenths of the annual occupational dose limits specified in section 11 as controlled areas, and**
- **Areas in which the annual dose limits specified in section 11 as supervised areas**

Implementation

The registrant or licensee is responsible for ensuring that arrangements are in place for the classification of work areas associated with conducts and dealings involving ionising radiation.

Controlled areas are required to have procedural controls in place to restrict radiation exposures.
Supervised areas should have procedures to review exposure conditions.

Controlled area requirements:	Supervised area requirements:
• Demarcation • Restriction of access • Signs • Monitoring • Local rules	• Delineation • Signs • Monitoring

Local Rules and Procedures

Requirement
S.I. 62 of 2011 Part V 25. (a)
Licensees shall establish in writing comprehensive rules and procedures in English and Shona or Ndebele to ensure adequate levels of protection and safety for workers and other persons.

Implementation
The registrant or licensee is responsible for demonstrating and ensuring that local rules and procedures are in place, correctly displayed and are implemented to provide an adequate level of protection, safety and supervision for controlled persons and visitors.

Work in a controlled area must be carried out in accordance with written local rules.
Local rules should include:

- Name of person(s) responsible for supervising the work.
- Description of controlled and supervised areas.
- General radiation safety measures.
- Dose investigation levels.
- Emergency plans.

The registrant or licensee is responsible for demonstrating that all staff have read and understood the local rules and procedures.

Personal Protective Equipment

Requirement
S.I. 62 of 2011 Part V 23. (b)
Registrants and licensees shall ensure that radiation workers be provided with suitable and adequate personal protective equipment.

Implementation
The registrant or licensee is responsible for ensuring that plans and arrangements are implemented for the provision of adequate and appropriate personal protective equipment.

Monitoring of the Workplace

Requirement
S.I. 62 of 2011 Part V 24. (1)
Registrants and licensees shall establish, maintain and keep under review a program for monitoring of the work place commensurate with the nature of the risk associated with the sources or the radiation generating equipment.

Implementation
The registrant or licensee is responsible for ensuring that plans and arrangements are in place and are implemented for regular radiation and contamination monitoring of the workplace.

A workplace monitoring programme should include:

- Measurement methods and procedures.
- Quantities to be measured.
- Place and time-scale of measurements.
- Reference levels and actions if exceeded.
- Classification of areas.
- Personal monitoring.

The monitoring programme must be supervised by the RSO and the Qualified Expert.

Monitoring of Individuals

Requirement
S.I. 62 of 2011 Part V 26. (1)
Registrants and licensees shall be responsible for arranging the assessment of occupational exposure of the radiation worker working in controlled areas and provide for individual monitoring at frequency determined by the Authority.

Implementation
The registrant or licensee is responsible for ensuring that plans and arrangements are in place and are implemented for individual monitoring and assessment of exposure to controlled persons or visitors.

Individual monitoring is required for those:

- Normally employed in controlled areas;
- Working regularly in supervised areas, or occasionally in controlled areas.

Records of individual monitoring must be kept.

The purpose of monitoring is to demonstrate that exposures are adequately controlled.

Investigation levels must be set.

Quality Assurance

Requirement
S.I. 62 of 2011 Part III 14. (1)
Registrants and licensees shall observe quality assurance standards prescribed in the Act, these regulations and directives issued by the Authority

Implementation
The registrant or licensee is responsible for ensuring that a quality assurance program is in place and being implemented.

A quality assurance program should include descriptions of:

- Arrangements for ensuring that regulatory radiation safety requirements are addressed and satisfied.
- Periodical review procedures, including the system of maintaining and modifying the procedure.
- Optimising occupations and public exposures as low as reasonably achievable.
- Periodic maintenance and testing of safety related equipment.
- Manufacturer's safety instructions.
- Service arrangements with other organisations and qualified experts.

Transport

Requirement
S.I. 62 of 2011 Part X 44. (1)
No person or entity shall engage in the transport of radioactive material without the appropriate authorisation. Any transport of radioactive material shall be carried out in compliance with the applicable national transport regulations and with the technical requirements of the regulations for the Safe Transport of Radioactive Material of the International Atomic Energy Agency, as amended form time to time.

Implementation
The registrant or licensee is responsible for ensuring that arrangements are implemented for the safe transport of controlled apparatus and controlled material, both on and off site.

Further guidance can be found in the Transport Guide.

4 MANAGEMENT OF RADIOACTIVE WASTE

A full description and anticipated amounts of any radioactive wastes, including discharges arising from the proposed dealing and the arrangements for the safe handling, treatment, storage and disposal of any such waste should be set out in a radioactive waste management plan.

Requirement
S.I. 62 of 2011 Part VIII 36. (1)
Registrants and licensees shall be primarily responsible for the safe management of radioactive waste.

Implementation
The registrant or licensee is responsible for ensuring that all radioactive waste arising from conducts and dealings, existing and anticipated, is appropriately managed. The registrant or licensee is also responsible for ensuring that appropriate plans and arrangements are in place for the safe storage, disposal or transfer of any such waste.

The plans should include:

- Contractual agreements for the return of spent sealed sources to the manufacturer.
- Arrangements for the transferring the waste to local storage or a licensed disposal facility.
- Disposal by the registrant or licensee at the facility.

5 SECURITY

Arrangements for the security of sources to prevent theft, damage or unauthorised use must be provided. These arrangements should ensure that control of sources is not relinquished without compliance with any requirements of the regulations and conditions of license, and provide for periodic inventories to confirm that all sources are in their assigned locations and are secure.

Requirement
S.I. 62 of 2011 Part III 17.
Sources shall be kept secure so as to prevent theft or damage, by ensuring that:

- **Control of a source not be relinquished without compliance with all relevant requirements specified in the registration or license, and without immediate communication to the Authority.**
- **A source is not to be transferred unless the receiver possesses a valid authorisation.**
- **A periodic inventory of movable sources be conducted at appropriate intervals to confirm that they are in their assigned locations and are secure.**

Implementation
The registrant or licensee is responsible for ensuring arrangements are made and implemented for the security of radiation sources during their use, storage and transport to prevent unauthorised access, damage, theft, loss or unauthorised use.

The arrangements should include administrative and physical controls and barriers to ensure that the control of these items is not relinquished or improperly transferred.

The plan should include:

- A description of the source including details such as isotope, activity and date of measurement, serial number and physical and chemical form.
- A description of the radiation practice for which the source is used and the categorisation of the source.
- A description of the specific location of the source in the building or facility where it is used or stored.
- A plan of the building or facility in which the source is used or stored including the physical security measures used to protect the source.
- Allocation of responsibilities for security to competent and qualified persons with appropriate authority to carry out their responsibilities.
- A description of the specific security concerns to be addressed, for example theft or sabotage, or mechanical or electronic failure of a physical security measure.
- A description of the physical security measures that will be used to address the security concerns and meet the requirements of the Code.
- A description of the procedural security measures that will be used to address the security concerns and meet the requirements of the Code
- Arrangements for review and revision of the Source Security Plan.

6 EMERGENCY

Emergency arrangements should be developed for all foreseeable emergencies such as fire, floods, dispersion of materials, overexposure of operators, or theft or loss of controlled material. The arrangements should include the responsibilities of all parties in the event of an emergency, contact arrangements, emergency procedures, emergency equipment and reporting arrangements. This plan should be integrated into the organisation or facility emergency plan.

Requirement
S.I. 62 of 2011 Part IX 40. (a)
Registrants and licensees shall if a radioactive material or substance under their responsibility has a potential for accidents which may provoke unforeseen exposure of any person, ensure that an emergency plan appropriate for the source and its associated risks is prepared by the registrants and licensees shall be specified in the guidelines issued by the Authority.

Implementation
The registrant or licensee is responsible for providing detailed emergency plans for any conduct or dealing which give rise to a need for emergency intervention. This plan should be based on an assessment of the consequences of reasonably foreseeable accidents, and should aim to minimise the consequences and ensure the protection of on-site personnel, the public and the environment.

The plan should include:

- Identification of potential exposure situations and the need of intervention.
- Procedures for dealing with:
    - Potential damage to the source.
    - Loss of source shielding.
    - Stuck sources.
    - Accidental exposure of an individual.
- Description of the countermeasures and instruments.
- Provision for assessment of the accident and protection and mitigation actions.
- Procedures to notify and communicate relevant authorities and organisations.
- System of training and exercises.
- Procedures for periodic review of the plan.

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Safety Principles:

- Justification of facilities and activities
- Optimisation of protection
- Limitation of risks to individuals
- Protection of present and future generations
- Prevention of accidents
- Emergency preparedness and response
- Protective actions to reduce existing or unregulated radiation risks

— Fundamental Safety Principles: Safety Fundamentals,

IAEA Safety Standards Series No. SF - 1 (2006)

Radiation Protection Authority of Zimbabwe

Harare