Guide to the Development of a Radiation Management Plan (RMP) in support of Applications for an Authorisation, Registration and Licensing

In fulfilment of requirements under the

Atomic Energy & Radiation Protection Act (Act No 5 of 2005)
and
Radiation Protection & Waste Disposal Regulations (No 221 of 2011)
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1. BACKGROUND

The National Radiation Protection Authority is established under Section 33 of the Atomic Energy and Radiation Protection Act and is charged with the administration of the Act, including to (i) inform the Board annually about the extent of radiation exposure in Namibia; (ii) inspect at such intervals as may be necessary any radiation source or nuclear material in order to assess radiation safety conditions and other requirements imposed by or under the Act; (iii) establish and maintain a register of radioactive materials, imported into, or produced in, Namibia, and of premises licensed to install, store and use radiation sources or dispose of radioactive waste.

The key functions of the National Radiation Protection Authority includes (i) review and assessment of application; (ii) compliance assurance; and (iii) enforcement of the regulatory requirements; and (iv) risk assessment which entails quantification and assessment of radiation exposure to patients, persons occupationally exposed to radiation and of protection of the public against exposure from waste, natural environment, food, and sources of non-ionising radiation.

The NRPA has adopted a regulatory regime which promotes the empowerment of the operator on all aspect that will enhance protection, safety and security involving the use of radiation sources, radioactive and nuclear material. One of these the tools that the NRPA has introduced is the Radiation Management Plan, which should ideally be developed as a means of building the capacity at the facility and level and thus ensure that implementation thereof is made simpler.

2. INTRODUCTION

This document serves to provide guidance on the development of a Radiation Management Plan\(^1\) in pursuit of compliance with the requirements for an authorization, registration and licensing. The Radiation Management Plan is intended to be a comprehensive document that describes the organizational and technical arrangements to fulfil the requirements under the Atomic Energy and Radiation Protection Act (Act No of 2005, herein referred to as the Act); and the Radiation Protection and Waste Disposal (Regulation 221 of 2011, herein referred to as Regulations).

The Radiation Management Plan of a practice is the means by which the National Radiation Protection Authority forms an opinion about the ability and capability of the applicant to fulfill the requirements under the Act and the Regulations and thereby ensure the adequate protection of people and environment as well as the safety of radiation sources.

Therefore the Radiation Management Plan is a pre-requisite for any authorizations, registration and licensing issued under the Act or Regulations. It is therefore pertinent to each

\(^1\) A document that provides a description of the organisational and operational structures, methods and procedures for identifying, mitigating and monitoring radiation impacts to ensure exposure to people and the environment is limited and optimised
operator to develop and submit a Radiation Management Plan which addresses the applicable impacts associated with the practice. The major elements that should constitute any RMP are described in this guidance document.

3. BUSINESS PROFILE

The RMP should provide a clear and detailed introduction describing the technical nature of the business or operation. In particular the description should provide information relating to the radiation sources, radioactive or nuclear material that will be used or generated in the practice, including a detailed design and layout of the premises.

The radiation hazard should be described by identifying the type of radiation, the likely exposure pathways as well as the critical group (workers, public, patients, and environment) along the potential exposure pathways (the routes by which radioactive material can reach or irradiate human beings). (Ref: Sections 17.1; 21.1 of Act; Regulation 6. d-f; Regulation 8)

This section may also briefly list and introduce the requirements met or to be met under other national legislation. (Ref: Section 21.i of Act; Regulation 6.1.a, 7.4 & 8.c)

4. PRE-OPERATIONAL SAFETY ASSESSMENT

The RMP should provide results of all assessments, including environmental impact assessment and studies that have been carried out in respect of the practice concerned (Ref: Section 21.1.g of Act).

The results of the assessment should be consistent with the exposure pathways identified above and should make realistic potential dose estimates to the critical group (members of the public if workers) identified along each exposure pathway.

5. ORGANISATIONAL ARRANGEMENTS

The organisational arrangement should describe the assignment of responsibilities to different management levels, including corresponding organizational arrangements and, if applicable (for example, in the case of subcontractors), the allocation of the respective responsibilities between employers and the registrant or licensee. The description may be supported by an organisational chart and the profile of the business, legal person as well as qualifications and competencies of the Radiation Safety Officer (Ref: Section 30 of Act; Regulation 64) and technical experts (Ref: Regulation 7.3); (Ref: Section 21.e)

6. OCCUPATIONAL RADIATION PROTECTION PROGRAMME

The occupational radiation programme should identify and group all workers who are likely to receive exposure in the course of their works as a result of the proposed or existing practice. This chapter should also identify the type of radiation that each group of workers is likely to be exposed to with a full description of the exposure pathways. The programme must include
approaches and methods to be adopted for quantifying and optimising the exposure of each of the group of workers.

A typical occupational radiation protection programme should contain the following sub-items.

- types of radiation hazard to protect against
- areas to be delineated as controlled and supervised areas
- methods of dose assessment (external dose; radon and radon progeny concentrations; radioactive dust concentration, etc)
- local rules and supervision
- dosimetry service provider
- equipment to be used for routine monitoring
- protective equipment to be issued
- group of workers to be monitored on an individual basis, including frequency of monitoring
- work areas to be monitored, including frequency of monitoring programme
- education and training programme
- engineered controls
- health surveillance programme
- management of doses and dose records

(Ref: Section 22.d of Act, Regulation 22-32)

7. MEDICAL EXPOSURE CONTROL

This section applies to practices and radiation sources in the medical sector only. The aim of this section is to describe how the operator will quantify the patient exposure and put in place measure for the optimisation of the patient doses by ensuring that the minimum exposure is administered for the desired image quality or targeted therapeutic dose. Some of the elements that should be described include the following

- Qualifications and Training of personnel that will be involved in the administration patient exposures.
- Treatment protocols, including the assignment of responsibilities such as prescription of treatment, diagnosis and administration thereof.
- Maintenance and calibration of equipment
- Assessment of patient doses
- Local rules and procedures
- Management of records
- Quality Assurance and Quality Control

(Ref: Section 22.d, Regulation 33-41)

8. PUBLIC EXPOSURE MONITORING PROGRAMME

This section should describe the programme for monitoring radiation exposure along pathways that could potentially affect the public and the environment. This should include the identification of the source of radiation exposure and the crucial group with the exposure
pathways. The dose along the exposure pathways must be estimated and optimized. The monitoring programme should include the following sub-headings supported by a description of each:

- description of exposure pathways
- description of critical group
- the types and estimate quantities of radiation along the identified exposure pathways
- control of visitors
- list and description of sites to be monitored
- monitoring techniques to be adopted (area monitoring, sampling, measurements, etc)
- management of records

(Ref: Section 21.f & h, 22.d; Regulations 42-46)

9. SAFETY AND SECURITY OF RADIATION SOURCES

This section must describe the measures that will be employed to ensure the safety and security of sources. The RMP must provide a reasonable description of the scenarios relating to potential breach of security involving radioactive material. This must be aided with a description of the (i) means of preventing the scenario (ii) measure in place to detect any breach in security and (iii) response in case the scenario occurs.

In addition to the above a description must be provided on how account will be kept of the inventories of the radiation sources as well as how the integrity of the radiation source will be maintained to promote safety.

(Ref: Regulations 47-51)

10. TRANSPORT PLAN

Radioactive materials offered for transport must be packed, shielded, marked and labelled in accordance with the IAEA Regulations for the Safe Transport of Radioactive Material. If transport is done by the applicant then a transport plan must be included in the RMP. However if the applicant has designated an agent for transport of its material, then the agent must provide a transport plan and obtain authorisation to transport radioactive material. Separate guidance is provided on the development of a Transport Plan.

11. EMERGENCY PREPAREDNESS AND RESPONSE

If a practice or radiation source has a potential for accidents which may provoke unplanned exposure of any person, an emergency plan appropriate for the source and its associated risks should be prepared and kept operational.

In particular the plan should characterise the content, features and extent of a potential emergency. Furthermore this section should describe the methods, procedures and instruments for assessing and mitigating the accident and its consequences.

(Ref: Regulations 53-58)
12. WASTE MANAGEMENT PROGRAMME

In this section the RMP must characterize the waste to be generated and how this will be managed consistent with the provisions of Regulations 59-77. All potential types and forms of radioactive waste must be included such as sealed radioactive sources, contaminated material or the effluents arising from the operations of the practice. The waste management programme must also describe the waste storage or disposal site, include the potential exposure pathways and the sites or groups which are likely to receive exposure originating from the waste disposal or storage site. A comprehensive description should also be provided of the estimate magnitude of the radiation exposure along the identified exposure pathways and how these will be optimized, if necessary.

(Ref: Regulations 59-77)

13. CONCLUSION

This document is intended to be a guidance document only that should be used in the development of the Radiation Management Plan. It eventually forms the basis on which the Authority develops and opinion about the intentions and capabilities of the operator to achieve the requirements of the Atomic Energy & Radiation Protection Act and Radiation Protection & Waste Disposal Regulations. Not only is it a requirement prior to granting an authorisation, registration or license, but also serves as a tool to monitor compliance on an on-going and routine basis.