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FORMAT AND CONTENT OF RADIOACTIVE WASTE MANAGEMENT PROGRAM FOR NUCLEAR MEDICAL CENTRES

REGULATORY GUIDE

PAKISTAN NUCLEAR REGULATORY AUTHORITY

For Further Details

Directorate of Policies & Procedures
PAKISTAN NUCLEAR REGULATORY AUTHORITY
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FORMAT AND CONTENT OF RADIOACTIVE WASTE MANAGEMENT PROGRAM FOR NUCLEAR MEDICAL CENTRES

ABSTRACT

Radioactive waste is generated in Nuclear Medical Centres (NMCs) by the use of radioisotopes for diagnostic and therapeutic purposes. This radioactive waste can be a potential hazard to human health and environment as it emits ionizing radiation. It is therefore, necessary to manage the radioactive waste safely. To achieve this purpose, licensee is required to prepare Radioactive Waste Management Program (RWMP) and submit to the Authority for approval as per Regulations on Radioactive Waste Management - (PAK/915). This Regulatory Guide (RG) describes the standard format and content of RWMP for NMCs.

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1. INTRODUCTION

A wide variety of radioisotopes are being used extensively in Nuclear Medical Centres (NMCs). As a result, radioactive waste is generated which should be managed and disposed off with particular care in order to protect the workers, general public and the environment from the harmful effects of ionizing radiation. As per PAK/915, the licensee generating radioactive waste is required to prepare Radioactive Waste Management Program (RWMP) for safe handling of radioactive waste and submit the same to the Authority for review and approval before implementation. In order to bring consistency in preparation of RWMP, PNRA has prepared this Regulatory Guide (RG) that describes the standard format and content of RWMP.

2. OBJECTIVE

This RG provides guidance to the licensee of NMCs for preparation of RWMP.

3. SCOPE

This RG is applicable to NMCs only.

4. FORMAT AND CONTENT OF RADIOACTIVE WASTE MANAGEMENT PROGRAM

Development of RWMP by the licensee is regulatory requirement, therefore, it is necessary to provide guidance to the licensee on the contents and other relevant information to enable them in preparing RWMP. This section gives the required information which an RWMP should contain. The licensee should develop its RWMP, by adopting and implementing applicable guidance provided in this RG, commensurate with the level of radiation risk associated with its facility i.e. by applying graded approach.

4.1 General Instructions

The licensee should follow the following guidance during preparation of RWMP:

i. Provide clear, concise, factual and latest/updated information;

ii. A table of contents including figures, tables, annexes, etc. along with page numbers should be included;

iii. Definitions and abbreviations should be consistent throughout the document;

iv. Duplication of information should be avoided. In case where necessary, reference of relevant section should be made; and

v. Legible drawings, diagrams, layouts, maps, and tables should be added, wherever necessary, with proper reference.

4.2 Contents of RWMP

Following should be the general contents of RWMP:

4.2.1 Introduction of the Facility

This section should describe introduction of the facility i.e. name, location and map of the facility, activities (diagnostic, therapeutic, etc.) being performed at the facility, types of radioisotopes (unsealed/sealed) used at the facility, etc.

4.2.2 Purpose and Scope

This section should describe purpose of RWMP for which it is prepared i.e. the activities planned to be achieved by the implementation of RWMP and scope i.e. activities covered under this program.

4.2.3 Responsibilities

This section should describe responsibilities of all individuals involved in radioactive waste management activities including Disused Sealed Radioactive Sources (DSRS) along with the organogram of radioactive waste management division /group.

4.2.4 General Safety Considerations

This section should describe the following:

i. Methodology to control the exposure to ionizing radiation As Low As Reasonably Achievable (ALARA);
ii. Methodology to work with volatile radionuclide, if any;
iii. Ventilation system in the radioactive waste management area;
iv. Display instructions such as procedures/work instructions of radioactive waste management at relevant area;
v. Radiation warning signs in the radioactive waste handling and storage area in English/Urdu as well as in local languages;
vi. Prohibition of eating/drinking/smoking/storing food or applying cosmetics in the radioactive waste management area; and
vii. Shielding of containers used for radioactive waste storage and mechanism of access control of radioactive waste management area.

This section should also describe protective measures taken in the radioactive waste management area such as use of protective clothing and disposable gloves while managing radioactive waste including DSRS, workers contamination monitoring, etc.

4.2.5 Sources of Radioactive Waste

This section should describe list of all radioactive sources including half life and activity being used per week at the facility, all processes generating radioactive waste, types of radioactive waste (solid, liquid and gaseous) including DSRS, expected volume per month of radioactive waste, etc.

4.2.6 Waste Prevention and Minimization

This section should describe the means adopted at the facility for the prevention and minimization of radioactive waste such as planning of activities, techniques and equipment for handling radioactive waste so as to control the generation of radioactive waste including any secondary waste; measures for the decontamination of area, equipment, material and the prevention of the spread of contamination; use of short-lived radionuclides; re-use of materials; etc.

4.2.7 Radioactive Waste Management Activities

4.2.7.1 Collection, Segregation and Characterization of Radioactive Waste

This section should describe the methodology of collection, segregation and characterization of different types of radioactive waste generated at the facility. For the collection of radioactive solid waste, describe the following:

i. Containers material along with the containers properties e.g. rigidity, leak-resistant, impervious to moisture;
ii. Containers compatibility with the radioactive waste collected (physical, chemical, biological and radioactive);
iii. Radioactive waste filling in the containers; lining of containers with heavy gauge plastic bag;
iv. Marking of plastic bag with the name of radionuclide and date of storage;
v. Clear display of radiation sign on radioactive waste containers;
vi. Containers shielding to keep the radiation level within limits; and
vii. Proper scheduling of radioactive waste collection so that bio-hazardous materials are not allowed to deteriorate in the containers, etc.

For the collection of radioactive liquid waste, describe the following:

i. Collection of liquid waste from active toilets;
ii. Construction of delay tanks along with the connected leak proof pipelines;
iii. Delay strategy and time period;
iv. Material of drums such as polyethylene drums instead of plastic bags used for bio-hazardous waste; and

v. Mechanism of collection of contaminated radioactive liquid waste.

If gaseous radioactive waste is generated, describe the mechanism of its management.

Describe the methodology of segregation and characterization adopted at the facility for the solid as well as liquid waste; the basis of segregation and characteristics considered for segregation such as half-life, activity, physical and chemical form, metallic and nonmetallic forms, dispersible and non-dispersible forms and combustible and non-combustible forms, distinction of radioactive waste containers from non radioactive waste containers, etc.

4.2.7.2 Packaging and Labeling of Radioactive Waste

This section should describe the information on packaging (types, properties, etc.) and labeling (e.g. information recorded for each waste container such as type/name of waste, date of collection, etc.).

4.2.7.3 Storage of Radioactive Waste

This section should describe the purpose and methodology of radioactive waste storage; capacity of radioactive waste storage area/building; types of radioactive waste stored; storage time for each type of radioactive waste, features of radioactive waste storage area/building e.g. physical isolation, away from flammable material, fire detection system, protection from extreme temperature, public access control, illumination, ventilation, labeling with radiation warning signs, etc.

4.2.8 Transfer/Transport of Radioactive Waste

This section should describe the process for the transfer/transport of radioactive waste/DSRS during the waste management and its compatibility with the transport requirements of Regulations for the Safe Transport of Radioactive Material - (PAK/916).

4.2.9 Radioactive Waste Disposal & Effluent Discharge

This section should describe the methodology used at the facility for the disposal of solid waste, effluent discharge and mechanism of DSRS deposited at the designated facilities. It should also provide the safety assessment demonstrating that the public exposure committed by the discharges is below the exemption/clearance level as specified in Regulations on Radiation Protection - (PAK/904). Describe the monitoring/sampling means along with its frequency before disposal of solid radioactive waste and effluent discharge. Furthermore, provide the layout of discharge pathways.

4.2.10 Clearance of Radioactive Waste

This section should include the process being followed for clearance of radioactive waste including DSRS from regulatory control as per PAK/915.

4.2.11 Radiation Protection Measures

This section should describe radiation protection measures (e.g. time, distance and shielding) taken during management of radioactive waste at the facility. Furthermore, describe area classification, personal dosimetery including type of radioactivity/radiation measuring and monitoring devices (e.g. Film Badge, Thermo-Luminescent Dosimeter (TLD), Pocket Dosimeter), workplace monitoring, etc. used at the facility. Please refer relevant section of Radiation Protection Program, if available.

4.2.12 Quality Assurance during Waste Management

This section should describe the processes developed and implemented by the facility for quality assurance to ensure safe management of radioactive waste. These processes should include: resources, knowledge management, training and re-training of workers, control of records, process control, procurement of equipment/items, etc required for the implementation of this program.

4.2.13 Definitions and Abbreviations

This section should describe definitions of important terminologies mentioned in the RWMP as well as the abbreviations.

4.2.14 References, Tables, Annexes

In this section, applicable references, tables and annexures necessary for implementation of RWMP should be provided.

4.3 Revision / Update

Licensee should review RWMP after every five years and update it accordingly, (if required). In case of any changes in the processes/practices and/or in the technology, licensee should submit the updated RWMP to the Authority for approval well before its implementation.

5. REFERENCES

1. Regulations on Radioactive Waste Management - (PAK/915), Pakistan Nuclear Regulatory Authority (PNRA), Islamabad, (2005).
2. Regulations on Radiation Protection - (PAK/904), Pakistan Nuclear Regulatory Authority (PNRA), Islamabad (2004).
3. Regulations for the Safe Transport of Radioactive Material - (PAK/916), Pakistan Nuclear Regulatory Authority (PNRA), Islamabad (2007).
4. Management of Radioactive Waste from the use of Radionuclides in Medicine, (TECDOC- 1183), International Atomic Energy Agency (IAEA), Vienna (2000).
5. Management of Waste from the Use of Radioactive Material in Medicine, Industry, Agriculture, Research and Education, Safety Guide (WS-G-2.7), International Atomic Energy Agency (IAEA), Vienna (2005).
6. The Management System for the Processing, Handling and Storage of Radioactive Waste, Safety Guide (GS-G-3.3), International Atomic Energy Agency (IAEA), Vienna (2008).

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