

AEC-DGM 1.1, 2016



Decommissioning Guidance Manual

Cobalt -60 Teletherapy Unit

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FOREWORD

Atomic Energy Council is the official government body established by the Atomic Energy Act No. 24 of 2008, to regulate the peaceful use of atomic energy in Uganda. As such, the Council has the mandate to conduct radiation safety on facilities which intend to terminate services involved in the use of radiation sources.

According to section 48, subsection 2 of the Act, the Council is mandated to prescribe the decommissioning procedure within a reasonable time, not exceeding sixty days after receipt of notification of the intended decommissioning from the authorised person and compliance with the Act, the Atomic Energy Regulations, 2012 and the specific license conditions.

The specific purpose of decommissioning guidelines is to ensure adequate protection of occupationally exposed workers, the environment and the members of the public from dangers of ionising radiations and the security of the radiation source.

The guidelines are to assist the Atomic Energy Council to follow systematic procedures to facilitate the carrying out of decommission of Cobalt -60 teletherapy machines.

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Deogratias Noah Luwalira
Secretary & CEO

PREFACE

The regulation of ionising radiation is governed by the Atomic Energy Act No. 24 of 2008, the Atomic Energy Regulations, 2012, national and international safety guides, and codes of practices. The Atomic Energy Council is a corporate body mandated to oversee facilities involving the use of the ionising radiation in Uganda.

The decommissioning Guidelines on cobalt-60 teletherapy require the Council and the decommissioning facilities to adhere to the set national and international standards of conducting safety and security assessments. This manual contains detailed procedures for verification of safety of the facility, verification of the workers protection, verification of medical exposure, emergency preparedness and response. I hope that this guideline will serve as a practical guide for the better carrying out of decommissioning of a facility.

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Akisophel Kisolo
Chairman

1.0 INTRODUCTION

1.1 Citation

This publication will be cited as AEC-DGM 1.1, 2016: Decommissioning Guidance Manual on Cobalt-60 teletherapy Facilities.

1.2 Background

(1) The Atomic Energy Regulations, 2012 require that an authorised person shall notify the Council of his or her intended termination of a practice three months before the termination.

(2) The Council shall prescribe the **decommissioning procedure** within a reasonable time, not exceeding sixty days after receipt of notification of the intended decommissioning from the authorised person.

(3) The authorised person shall proceed with the decommissioning process at his or her own expense and to the satisfaction of the Council.

(4) The decommissioning of a practice shall be in accordance with the Standards and any other relevant law.

An authorised person shall ensure that, as applicable and appropriate, the location, design, construction and assembly, commissioning, operation and maintenance, and decommissioning of sources are based on sound engineering practice which—

(a) Takes into account approved codes and standards and technical and scientific developments;

(b) Is supported by reliable managerial and organisational features; and

(c) Includes adequate safety margins in the design, construction and operation of sources.

The purpose of decommissioning manual is to ensure adequate protection and safety of occupationally exposed workers, and the members of the public from dangers resulting from the use of ionising radiations and the security of the radiation source.

The manual is to serve as a practical guide on carrying out decommissioning of a cobalt-60 teletherapy unit.

1.3 Purpose

The purpose of this guideline therefore, is to guide the operator on the regulatory process to follow while decommissioning the Facility/ source.

1.4 Scope

This guideline gives guidance to follow while decommissioning the teletherapy unit. The guidelines does not provide options for decommissioning techniques but assists facilities in knowing the requirements expected of them while decommissioning.

1.5 Definitions

- a. Contamination –the presence of radioactive substance in or on a material or the human body or other place where they are undesirable or could be harmful;

- b. Decommissioning –to remove safely from service and to reduce residual contamination to a level that permits termination of any applicable licenses and release of the facility from further regulatory control and for unrestricted use;
- c. Decommissioning operation –collectively refer to the planning, implementation and management of the entire decommissioning activities.
- d. Decommissioning project –refer specifically to the actual decommissioning work
- e. Decommissioning activities –means activities involved in the decommissioning project.
- f. Decommissioning strategy –a systematic assessment made on various options or alternatives of decommissioning available to find the best among them that suits to an intended decommissioning operation of a particular facility;
- g. Employees means the facility personnel, the facility’s contract workers and employees of outside contractors and subcontractors
- h. Facility –plants, equipments, buildings and structures identified under the characterization process that require decommissioning operation to be performed;
- i. Quality assurance -the planned and systematic actions and controls that are undertaken to prove that the entire activities of decommissioning operation will perform satisfactorily;
- j. Radioactive material –any material designated in national law or by a regulatory body as being subject to regulatory control because of its radioactivity;
- k. Safety assessment – a systematic evaluation made to assess the potential impact caused on workers and the general public as a result of carrying out decommissioning operation.

1.6 OBJECTIVES

The objectives of the decommissioning are to:

- (i) ensure that facilities and work performance meet all necessary requirements of the regulations;
- (ii) ensure that the relevant operational documents and instructions are being followed;
- (iii) verify that the staff are qualified;
- (iv) verify that any deficiency or deviation detected in a previous inspection has been corrected within the established deadline and to identify current deficiencies and deviations from standards; and
- (v) Gather knowledge on any incidents or accidents for the purposes of sharing with other relevant stakeholders.

2 MANAGEMENT OF DECOMMISSIONING

2.1 Statutory Provisions

The Council is mandated by Section 74 to establish regulatory guides such as Decommissioning guidance manual for decommissioning of facilities.

The Council shall prescribe the decommissioning procedure within a reasonable time, not exceeding sixty days after receipt of notification of the intended decommissioning from the authorised person Section 48 (2) of the AEA.

2.2 Regulatory requirement for termination of a practice

- (1) An authorised person shall notify the Council of his or her intended termination of a practice three months before the termination.
- (2) The Council shall prescribe the decommissioning procedure within a reasonable time, not exceeding sixty days after receipt of notification of the intended decommissioning from the authorised person.
- (3) The authorised person shall proceed with the decommissioning process at his or her own expense and to the satisfaction of the Council.
- (4) The decommissioning of a practice shall be in accordance with the Standards and any other relevant law.

2.3 Decommissioning Plan

- i. A licensee who intends to carry out a decommissioning operation on a facility to which he is licensed to shall develop a decommissioning plan. The plan shall be prepared to include all the components specified in the following sub-sections and shall be submitted together with an application letter and appropriate supporting documents to AEC and other relevant authorities for an approval prior to commencement of the decommissioning project.
- ii. The plan should be comprehensive enough to cover the entire scope of decommissioning activities identified in the decommissioning operation. It should be able to identify and describe the components in their approximate chronological order and should be expended to provide descriptive information and details, which are very important to ensure adequate establishment and effective implementation of radiation protection programme and industrial health and safety programme for the decommissioning operation.
- iii. In cases where the decommissioning operation is intended to be carried out on part of an operating facility, it has to be clearly indicated in the plan. In developing the plan for such situation, care must be taken not to jeopardize the existing safety and security measures and programmes of the operational facility if new radiation protection and industrial health and safety programmes have to be developed or the existing programmes have to be modified to suit the decommissioning operation.
- iv. Any comments or issues raised during the review of the decommissioning plan by AEC shall be resolved before commencement of the decommissioning project.

2.4 Decommissioning Strategy

- i. The licensee shall carry out an analysis to select a decommissioning strategy if there is more than one option or alternative available for the decommissioning of the facility. The decommissioning strategy is important to be made known to AEC and other

relevant authorities as to why such option is considered as the most suitable and selected for the intended decommissioning of the facility.

- ii. In carrying out the analysis for the selection of the strategy, current regulations, standards, safety, cost, licensee's capability, social impact, condition and operational history of the facility, availability of decommissioning technology and waste disposal facility should be taken into account and incorporated into the decision making process.
- iii. Each strategy should be described in the form it would be applied to the facility. The basic principles, criteria and rationale used and the relevant information considered to select the strategy should be clearly indicated. Any modifications to the strategies that have been considered should be described.

2.5 Waste Management

Decommissioning operation invariably involves with generation of radioactive waste. The waste generated is usually of different nature and form than the waste generated and handled during the operating period of the facility. Therefore waste management should be properly addressed in the decommissioning plan. Effort must be taken by the licensee to choose the right decontamination strategy and technique that can minimize the generation of waste.

2.6 Decommissioning Program

Decommissioning program activities include

- (1) Developing regulations and guidance to assist staff and the regulated community;
- (2) Conducting research to develop data, techniques, and models used to assess public exposure from the release of radioactive material resulting from site decommissioning;
- (3) Reviewing and approving decommissioning plans (DPs) and license termination plans (LTPs);
- (4) Reviewing and approving license amendment requests for decommissioning facilities;
- (5) Inspecting licensed and non-licensed facilities undergoing decommissioning;
- (6) Developing environmental assessments (EAs) and environmental impact statements (EISs) to support the AEC's reviews of decommissioning activities;
- (7) Reviewing and approving final site status survey reports; and
- (8) Conducting confirmatory surveys.

2.7 Tasks and Procedures

There should be a clear description given on tasks planned for carrying out the decommissioning activities and those who (the licensee's personnel or contractors) will perform the tasks.

2.8 Solid Radioactive Waste

The licensee should indicate in the plan a summary of the types of solid radioactive waste that are expected to be generated from decommissioning activities including structural and component metal, concrete, contaminated components and piping. The licensee should ensure

that a temporary storage is provided and adequate to cater for the amount of solid waste generated.

The wastes should be segregated and packaged immediately after they are generated. The waste package should immediately be transported to an approved disposal site upon completion of packaging process. In cases where the waste has to be stored on site due to unavailability of an approved disposal site or for other reasons, a safe and secured storage place has to be made available prior to commencement of the decommissioning activities.

2.9 Cost Estimate and Funding Mechanisms

Cost estimate should be calculated and included in the decommissioning plan. It can be calculated based on information provided in the decommissioning plan, such as, facility description, decommissioning activities and waste management. The estimate can be used to assist in preparing the project schedule, workforce requirement and phased funding.

2.10 Funding mechanisms

The plan should have description on funding mechanism, which are already present or will be in place for the completion of the decommissioning activities on a time scale as commensurate in the decommissioning plan. The description should also include a summary of measures that will be used to manage project risks and prevent or mitigate cost escalation.

2.11 Safety Assessment

A new safety assessment is normally required when a facility moves from an operational to a decommissioning mode. The licensee shall ensure that this assessment is carried out for the intended decommissioning operation and it should be included in the decommissioning plan. A detailed safety assessment report can be prepared separately, but it should be submitted together with the decommissioning plan to AEC when applying for an approval.

The extent and detail of the safety assessment should commensurate with the complexity and the hazard associated with the facility. It should be able to identify and evaluate both radiological and non-radiological hazard associated with the decommissioning operation. It should be able to assess adequacy of protection and safety to employees involved, public and the environment resulting from physical and mechanical changes, deteriorating condition of the facility and the possibility of accident happened while carrying out decommissioning activities.

2.12 Lessons Learned Programme

The lesson learned programme should be established and described in the QA programme. It should consist of the followings:

- description of the lessons learned from the decommissioning operation;
- procedures for capturing and recording the lessons learned during the decommissioning operation;
- description on method for making the information available to others within and outside the organization; and

- Description of the feedback mechanism for this information in the overall decommissioning operation.

2.13 Emergency Planning and Preparedness

The licensee is required by the Radiation Protection (Basic Safety Standard) Regulations 1989 to establish emergency planning and preparedness to cater for any accident or incident that may occur during implementation of the decommissioning operation. It is one of the components required to be included in the radiation protection programme

2.14 Validation and Final Radiation Survey

The licensee should describe in the decommissioning plan an overview of a plan for conducting the final radiation survey. The results of the final radiation survey should be included in the final decommissioning report.

2.15 Completion of Decommissioning

A final report on decommissioning operation shall be prepared by the licensee once the decommissioning project is completed. It should provide the confirmation of completion of decommissioning operation and should be reviewed and approved by AEC.

The final decommissioning report should be prepared according, but not limited, to the followings:

- i. the decommissioning objective;
- ii. a description of the facility and site;
- iii. the decommissioning criteria used;
- iv. a description of the decommissioning activities;
- v. a description of any remaining buildings or equipment not decommissioned or partially decommissioned;
- vi. the final radiation survey report;
- vii. an inventory of radioactive wastes generated including indication of their storage and/or disposal;
- viii. an inventory of non-radioactive waste generated including indication of their storage and/or disposal;
- ix. an inventory of materials and equipment released from regulatory control;
- x. a list of structures, areas or equipment designated for restricted use;
- xi. a comparison of actual volumes of waste generated during decommissioning works with the amounts projected in the plan;
- xii. a summary of abnormal events and incidents that occurred during decommissioning;
- xiii. a summary of occupational and public doses received during decommissioning;
- xiv. site release report and
- xv. the lesson learned during the decommissioning process.

REFERENCES

1. Atomic Energy Regulations, 2012
2. KINGS Lecture notes on Decommissioning of nuclear facilities
3. Removal of Alcyon II, CGR, MeV 60Co Teletherapy Head and Evaluation of Exposure Dose by Yasser TawfikSelim et al.