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Radiological protection — Measurement for the clearance of waste contaminated with radioisotopes for medical application —

Part 2: Management of solid radioactive waste in nuclear medicine facilities

Radioprotection — Mesurage pour la libération des déchets contaminés par des radioisotopes lors des applications médicales —

Partie 2: Gestion des déchets radioactifs solides dans les installations de médecine nucléaire

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*.

A list of all the parts in the ISO 19461 series can be found on the ISO website.

Introduction

Nuclear medicine is the branch of medicine which uses in vivo radioactive tracers, also called radiopharmaceuticals, to evaluate molecular, metabolic, physiologic or pathologic properties in human beings and animals for diagnosis, monitoring and therapeutic purposes. The use of radionuclides in medicine is a well-established practice. Their favourable physical properties allow a broad use of radionuclides in vivo, in modern medicine. As a result, a wide range of radioactive waste is produced. Most of it is considered biomedical radioactive waste. The amount and types of wastes varies depending on the scale of the nuclear medical facility, the medical applications, and the involved radionuclides.

Radioactive waste generated in nuclear medicine facilities does not present a significant long term waste management problem when compared to wastes generated from nuclear fuel cycle operations, for instance. The most important characteristics of biomedical radioactive waste produced in nuclear medicine are its short half-life and low radiotoxicity. It generally contains low-energy photon emitters (<511 keV), but also alpha and beta (β^+ and β^-) emitters. It is usually of low total and specific activity. Nevertheless, the volume of radioactive waste produced can be significant, and other associated hazards may be present, such as biological and physical risks.

The radioactive waste produced is mainly in solid or liquid form. The liquid form is associated with patient urine, since it is the main elimination mechanism of radiopharmaceuticals. Liquid waste can also be associated with the washing water of potentially contaminated material or residues of syringes, vials, etc. This liquid waste possesses a particular management problem that falls outside the scope of this document. Liquids in small quantities contained in vials and syringes are generally managed as solid waste and their management is part of this document.

When planning for the handling of radionuclides in nuclear medicine facilities, it is important to design an effective program for the overall management of the biomedical radioactive waste. This includes all steps or activities involved in the management of radioactive waste from its generation to ultimate preparation for discharge or disposal. The goal is to minimize the hazards posed by radioactive waste, including the associated biological and physical hazards.

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1 Scope

This document addresses aspects of management of solid biomedical radioactive waste from its generation in nuclear medicine facilities to final clearance and disposal, as well as the manner to establish an effective program for biomedical radioactive waste management.

Liquid and gaseous wastes are excluded from the scope of the document, but solid waste includes spent and surplus solutions of radionuclides contained in vials, tubes or syringes. Therefore, this document should be useful for any nuclear medicine facilities dealing with in vivo medical applications of radionuclides and consequently with the waste associated with such applications.

This document provides a list of the main radionuclides used in nuclear medicine facilities and their main physical characteristics, as well as the guidance to write a radioactive waste management program for their sorting, collection, packaging and labelling, radioactivity surveys and decay storage, clearance levels, and transportation, if necessary, until their ultimate disposal or discharge. This document may also be useful as guidance for regulatory bodies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19461-1, *Radiological protection — Measurement for the clearance of waste contaminated with radioisotopes for medical application — Part 1: Measurement of radioactivity*

ISO 23907-1, *Sharps injury protection — Requirements and test methods — Part 1: Single-use sharps containers*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/