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International Standard

ISO/FDIS 18589-7

Measurement of radioactivity in the environment — Soil —

Part 7: In situ measurement of gamma-emitting radionuclides

Mesurage de la radioactivité dans l'environnement — Sol —

Partie 7: Mesurage in situ des radionucléides émetteurs gamma

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Foreword

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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).

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This document was prepared by Technical Committee, TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 2, *Radiological protection*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 430, *Nuclear energy, nuclear technologies, and radiological protection*,in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18589-7:2013), of which it constitutes a minor revision.

The main changes are as follows:

— B.10: correction of the information related to the activity concentration of 40 K;

— E.2 and E.6: correction of Formulae (E.5) and (E.11);

— F.4 : correction of β, according to the numerical values of the example;

— F.6: modify β = 50 g cm^{-2} into β = 50 kg m^{-2};

— G.3, Footnote 1 of Table G.3: modify 1 g cm^{-2} = 10 kg cm^{-2} into 1 g cm^{-2} = 10 kg m^{-2}.

A list of all parts in the ISO 18589 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In situ gamma spectrometry is a rapid and accurate technique to assess the activity concentration of gamma-emitting radionuclides present in the top soil layer or deposited onto the soil surface. This method is also used to assess the dose rates of individual radionuclides.

In situ gamma spectrometry is a direct physical measurement of radioactivity that does not need any soil samples, thus reducing the time and cost of laboratory analysis of large number of soil samples.

The quantitative analysis of the recorded line spectra requires a suitable area for the measurement. Furthermore, it is required to know the physicochemical properties of the soil and the vertical distribution in the soil to assess the activity of the radionuclides.

Measurement of radioactivity in the environment — Soil —

Part 7: In situ measurement of gamma-emitting radionuclides

1 Scope

This document specifies the identification of radionuclides and the measurement of their activity in soil using in situ gamma spectrometry with portable systems equipped with germanium or scintillation detectors.

This document is suitable to rapidly assess the activity of artificial and natural radionuclides deposited on or present in soil layers of large areas of a site under investigation.

This document can be used in connection with radionuclide measurements of soil samples in the laboratory (see ISO 18589-3) in the following cases:

— routine surveillance of the impact of radioactivity released from nuclear installations or of the evolution of radioactivity in the region;

— investigations of accident and incident situations;

— planning and surveillance of remedial action;

— decommissioning of installations or the clearance of materials.

It can also be used for the identification of airborne artificial radionuclides, when assessing the exposure levels inside buildings or during waste disposal operations.

Following a nuclear accident, in situ gamma spectrometry is a powerful method for rapid evaluation of the gamma activity deposited onto the soil surface as well as the surficial contamination of flat objects.

NOTE The method described in this document is not suitable when the spatial distribution of the radionuclides in the environment is not precisely known (influence quantities, unknown distribution in soil) or in situations with very high photon flux. However, the use of small volume detectors with suitable electronics allows measurements to be performed under high photon flux.

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 11929 (all parts), *Determination of the characteristic limits (decision threshold, detection limit and limits of the coverage interval) for measurements of ionizing radiation — Fundamentals and application*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

IEC 61275, *Radiation protection instrumentation — Measurement of discrete radionuclides in the environment — In situ photon spectrometry system using a germanium detector*

3 Terms and definitions

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