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Tritium and carbon-14 activity in gaseous effluents and gas discharges of nuclear installations —

Part 2: Determination of tritium and carbon-14 activities sampled by bubbling technique

Activité du tritium et du carbone 14 dans les effluents gazeux et les rejets gazeux des installations nucléaires —

Partie 2: Détermination de l'activité du tritium et du carbone 14 prélevés par la technique du barbotage

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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Introduction

Discharges from nuclear installations are subject to regulatory requirements established by various regulatory bodies. Rigorous control of the discharges is implemented within the framework of water and air discharge permits. In particular, this involves making measurements of the physical, chemical and radioactivity characteristics in the gaseous and liquid effluents. The decommissioning of these nuclear installations also generates liquid and gaseous effluents that should be characterized and quantified before their discharge.

Tritium and carbon-14 are usually present in the gaseous effluents of nuclear power plants and other types of nuclear installations. ISO 2889[1] presents the methods and provisions for sampling airborne substances from the exhaust stacks of nuclear facilities. The provisions defined therein cover all physical forms of the materials present in gaseous effluents: aerosol particles, vapours and gases. These provisions are more restrictive for radioactive aerosol measurements, given greater possibilities of losses in the transport lines. However, in the gaseous effluents of nuclear facilities, tritium and carbon-14 are present in gas or vapour forms as multiple chemical compounds, which requires adapting the provisions of ISO 2889[1]. Furthermore, ISO 2889:2023[1] only deals with tritium and carbon-14 sample collection in Annexes H and K.

Therefore, the ISO 20041 series go further by addressing, in detail, the provisions specific to sampling methods, sample preparation and calculations for determining the tritium and carbon-14 activities. ISO 20041-1[9] covers the sampling methods or techniques for tritium and carbon-14. This document covers activity analysis of tritium and carbon-14 sampled emissions by the bubbling technique.