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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 15220-2025

Replacing GB/T 15220-1994

Analytical method for the radioactive iron in water

水中放射性铁的分析方法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document replaces GB/T 15220-1994 "Analytical Method for Iron-59 in Water". Compared with GB/T 15220-1994, the only changes are structural adjustments. Aside from editorial changes, the main technical changes are as follows:

---The analysis and measurement of "radioactive iron (^{55}Fe)" has been added (see 8.4);

---The measurement method was changed from "low-background beta measurement device measurement" to "liquid scintillation counter measurement" (see 8.4, 8.9 in the.1994 edition);

---The method of sample preparation for measurement has been changed (see 8.3, 8.7 in the.1994 edition);

---The method for measuring chemical recovery has been changed, and the calculation formula is given (see 9.2, Chapter 10 of the.1994 edition);

---Added "Quality Assurance and Control" (see 10.1, 10.2). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed and is under the jurisdiction of the National Nuclear Energy Standardization Technical Committee (SAC/TC58). This document was drafted by the China Institute of Atomic Energy and the China Institute of Radiation Protection. The main drafters of this document are. Lou Hailin,

Zheng Yifan, Cong Rili, Wen Wen, Bao Li, Wang Ruijun, Wang Shaolin, Luo Zhiping, Chen Ling, and Pang Hongchao. Ren Lixia, Qu Lili, Yang Hailan, Yang Youkun, Guo Chen. The release history of this document and the document it replaces is as follows:

---First published in 1994 as GB/T 15220-1994;

---This is the first revision. Analytical methods for radioactive iron in water

1 Scope

GB/T 15220-2025 is the Chinese national standard on analytical method for the radioactive iron in water, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 5 October 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 May 2026. Classification: ICS 27.120.99, CCS F 46. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document describes the analytical methods for iron-59 (^{59}Fe) and iron-55 (^{55}Fe) in water, including principles, reagents or materials, instruments and equipment, and sample preparation. Experimental procedures, experimental data processing, quality assurance and control, etc. This document applies to the determination of ^{59}Fe and ^{55}Fe in surface water, groundwater, drinking water, and liquid effluents from nuclear and radiation facilities. The detection limits of this method for ^{59}Fe and ^{55}Fe in water under typical conditions are given in Appendix A.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB 8999 General Requirements for Quality Assurance of Ionizing Radiation Monitoring

GB/T 10259 Liquid Scintillation Counter

GB 12379 Regulations for Environmental Nuclear Radiation Monitoring JJG694 Atomic Absorption Spectrophotometer HJ

61 Technical Specification for Radiation Environment Monitoring

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 Quenching All of these interferences affect the process of converting X-ray energy into fluorescence released in the counting bottle, leading to a decrease in counting efficiency.

3.2 The value indicating the quenching level of the sample.

Note. Due to the different models of liquid scintillation counters used, the measurement results are represented as external standard spectrum quenching indication parameter [SQP(E)], and the measurement results are represented as... This refers to the values of external standard transformed spectral index (tSIE), sample spectral index (SIS), etc.

3.3 stability The ability of a measuring instrument to maintain its metrological characteristics constant over time.

Note. The stability of a measuring instrument is judged by examining whether a set of repeated measurements follows a Poisson distribution.

3.4 Figure of merit; FOM A quantitative indicator characterizing the measurement performance of a liquid scintillation counter for a specific sample system.

Note. This is obtained by dividing the square of the detection efficiency ($E \times 100$) by the background count rate.

4.Principles Iron carrier was added to the water sample, and ^{59}Fe and ^{55}Fe were precipitated and concentrated as hydroxides. The iron was then separated and purified using anion exchange resin, separating it from calcium.