Service Information

Water Quality for In-Service Protection of Sealed Co-60 Sources In Wet-Storage Irradiators

The integrity and performance of sealed radiation sources has been improved over several decades through developments in design criteria, encapsulation materials and manufacturing technology. However, during the last ten years, both conditions of service and performance monitoring in use have been recognised as being just as important. In particular, the effects of storage pool water chemistry on the integrity and security of sealed sources used in wet storage irradiators have become more apparent.

Experience has highlighted the importance of establishing benign conditions and of providing a methodology for controlling the water chemistry within defined limits. However, this has not proved to be simple to manage. The highly ionised chemical microclimate surrounding radioactive Co-60 sealed sources immersed in water is quite untypical of the chemistry of the bulk water in the storage pool. Source suppliers have had to learn to understand and characterise this and to validate a practical set of specifications and measurements that can be applied to product in service.

Unified specifications

In collaboration with users, the leading manufacturers of Co-60 sources have implemented a programme of destructive and non-destructive testing on sealed sources in service. A significant amount of data has been collected and a consensus has been reached regarding the most practicable specification. REVISS and MDS Nordion have together announced a unified set of requirements for water chemistry of storage pool irradiators using PURIDEC® or MDS Nordion Co-60 sources. The key elements of this specification are summarised in the tables below.

- specifications are structured in terms of primary and secondary criteria
- secondary criteria gain significance only where one or more of the primary criteria are not met
- 85% of inspected facilities using sealed Co-60 sources meet primary criteria

Data from worldwide inspection of gamma sterilisation facilities using sealed Co-60 sources show that, at present, approximately 85% of these facilities meet the primary criteria. This proportion has been rising as users have become more familiar with the methods of water quality control and with the significance of compliance with the specifications.

REVISS offers advice and support to wet storage pool operators regarding control and management measures for pool water. Contact your regional office for information or e-mail puridec@reviss.co.uk

Attribute	Working level	Excursion Limit	Measurement Frequency
Conductivity ($\mu S\ cm^{-1}$)	10 microsiemens per centimetre	20 microsiemens per centimetre	Continually on-line Recorded daily
Total halide ($mg\ l^{-1}$)	1	3	Recorded not less than quarterly

Attribute	Working level	Measurement Frequency
PH	4.5 - 8.5	Recorded not less than quarterly
Silica ($mg\ l^{-1}$)	5	Recorded not less than quarterly

In this summary, the "working level" should be regarded as the normal operational boundary. The "excursion limit" provides some latitude for operating temporarily outside the limits of the working level but corrective action must be taken to bring the attribute within working levels within 90 days. If excursion limits are exceeded, the operator should ask the source manufacturer to assess the implications.

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PURIDEC IRRADIATION TECHNOLOGIES
Proven solutions for Gamma Irradiation

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