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Cs-137 Analytical Variations in IMS network particulate samples: Insights from Ten Years of IDC and Radionuclide Laboratories Results

The International Monitoring System (IMS) is a unique global network designed to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Complementary to three waveform technologies, the 80-station radionuclide network provides continuous worldwide monitoring. This radionuclide network is further supported by 16 specialized laboratories, which offer independent expert analysis of IMS samples upon request. This work presents a comparative assessment of Cs-137 analysis results performed by the International Data Centre (IDC) and Provisional Technical Secretariat-certified radionuclide laboratories over the past decade. Cs-137 was selected for its relevance to monitoring, its long half-life (thus mitigating decay-related uncertainties), and because initial difference tests obtained from the data evaluation revealed notable discrepancies. Using both difference tests and zeta scores, potential causes of these inconsistencies, including peak interference, baseline underestimation, and background subtraction methods were investigated. The obtained results underscore the need for ongoing analytical refinements to ensure reliable radionuclide measurements in support of effective verification activities.

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