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PROFICIENCY TEST EXERCISES FOR CTBT RADIONUCLIDE LABORATORIES

Content

Since 2000, the Provisional Technical Secretariat (PTS) of the CTBTO has organized an annual proficiency test exercise (PTE) for 16 radionuclide laboratories supporting its network of radionuclide monitoring stations. Sixty-three of the 80 stations comprising this network have been certified against rigid technical requirements and are delivering standard data products to national data centers. The laboratories re-analyze samples from stations on a periodic basis for quality assurance, provide more accurate and precise measurements, and clarify the presence or absence of fission products and/or activation products in the case of a suspect or irregular analytical result from a particular station. The PTEs is a means of monitoring the quality of analytical results provided by certified laboratories and as a basis for assuring data quality from an uncertified laboratory during the certification process. The PTEs use the same types of air filter as those used at the stations but spiked with CTBT-relevant nuclides with certified activities, or spectrum only. Participating laboratories analysed these samples by HPGe gamma-ray spectrometry. Experience indicates that the most common problems in analysis of these samples include: (1) correction for cascade summing (majority of CTBT-relevant nuclides exhibit cascade summing); (2) decay correction of daughter nuclides which are not in equilibrium with their parents (use of Bateman ingrowth and decay equations); (3) peak fitting and spectrum deconvolution, and (4) uncertainty budget. In the evaluation of PTE results, some of the more common difficulties are: (1) problems with nuclear decay data used by participants and provider of the samples; (2) homogeneity of the sample, especially when compressed; (3) volatile nuclides and the non-applicability of the use of certified activity values obtained gravimetrically (mass dispensed on the filter); (4) questions about the accuracy of the certified value provided by the sample provider when very different from the consensus value of participants; (5) classification of nuclides for evaluation and grading (major, minor, possible, false positives). The paper describes some of the main challenges in the identification and quantification of nuclides in the PTEs and how the PTE results are used by participating laboratories to improve their analytical techniques and data quality. The main challenges in organizing and conducting the PTEs and how these are being addressed by the PTS will also be discussed.

About the Presenter

Ms. Naoko Nakashima (Inoue) is Radionuclide Officer, International Monitoring System (IMS) Division, Comprehensive Nuclear Test-Ban-Treaty Organization (CTBTO). She joined CTBTO in December 2013, and mainly responsible on QA/QC program coordination of the 16 laboratories under the IMS network, including annual proficiency test exercises (PTEs). She also works for certification of the laboratories and for installation & certification of radionuclide monitoring stations, including particulate monitoring and noble gas monitoring.

Ms. Nakashima (Inoue) has received PhD from the University of Tokyo in the field of Nuclear Engineering and Management, a Masters in Radiochemistry from Kyushu University, and a Bachelor of Chemistry from Kyushu University.

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