Validation Method for Organically-Bound Tritium (OBT) Analysis of Reference Materials through Interlaboratory Comparison Exercises

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ABSTRACT

The measurements for tritium in the environmental samples are usually related to the tissue-free water tritium (TFWT). Research studies for the complex behaviour of tritium were performed over the years due to the increased probability of elevated tritium concentrations to be released in the environment. Laboratory methods that enable to accurately determine the various forms of tritium including organically-bound tritium (OBT) were developed and validated though interlaboratory comparison exercises, at the Environmental Control Laboratory of the Cernavoda Nuclear Power Plant (NPP) from Romania. Furthermore, sample preparation methods for OBT determinations were evaluated to develop different types of reference materials of environmental samples to be tested through interlaboratory comparison exercises.

This paper presents the preparation method of a reference material (grapes from the Cernavoda town) and the analytical measurements performed to characterize this matrix, that was tested though an interlaboratory comparison exercise at international level. The evaluation of the results of the organically-bound tritium analysis was performed according to ISO 13528:2022, robust analysis method (algorithm A).

The results obtained during the interlaboratory comparison exercise for grape samples are encouraging as a large number of participating laboratories did not change the observed dispersion of the results for a similar activity level. Therefore, the results do not seem to be dependent on the analytical procedure used. These results confirmed that the environmental matrices with low level activity could be used as a reference material, keeping the storage conditions, and checking the stability over the years.