



**International Atomic Reference Material Agency**

## **Instructions for the IARMA ERAD-PT-2024**

### **Environmental Radioactivity Proficiency Test on the Determination of Natural and Anthropogenic Radionuclides in Hay and Water**

#### **1. Receipt and Verification of Package**

Upon receiving the package, kindly conduct a thorough examination of its contents. Compare the received items with the details provided in the attached packing list. After confirming the accuracy, please proceed to sign and date the packing list. This signed document should then be promptly submitted to IARMA through email or your designated Portal page.

#### **2. Choice of Method/Procedure**

##### **2. Methodology Selection**

Participants are granted the flexibility to employ any established method of their preference. It is important to note that these test items are not intended for the validation of novel procedures. For the Hay test item, a 20 g test portion ensures the internal homogeneity required for accurate results.

#### **3. Description of the test items**

##### **a. Hay test item IARMA-177**

###### **Matrix origin**

The Hay bulk material underwent a meticulous process that involved initial air-drying in an oven, followed by milling and homogenization within a controlled laboratory environment. Rigorous checks for homogeneity were carried out at every stage of bulk material handling before advancing to subsequent processing and bottling steps. The material is supplied in units of 200 g each.

##### **b. Water test items IARMA-178 to -180**

###### **Matrix origin**

The drinking water utilized for these test items was drawn from a controlled natural source situated in Radmirje, Slovenia. To ensure optimal conditions, the water was subjected to an acidification process before its incorporation into the testing process.

### **Test items preparation**

Through a gravimetric approach, precise quantities of a standardized solution containing a certified blend of radionuclides were introduced into the water samples. Furthermore, a 2% m/m nitric acid solution was employed for acidification purposes. Subsequent to bottling, a comprehensive homogeneity assessment was conducted, producing results that conform to the required standards.

## **4. Test items handling**

### **a. Hay test item IARMA-177**

- Prior to sub-sampling, ensure the thorough homogenization of the Hay test item IARMA-177 for a duration of 2 minutes.
- Allow sufficient time for the Hay powder to settle before unsealing the bottle.
- Exercise necessary precautions during the opening of the test item bottle to prevent dispersion of fine particles within the laboratory.
- Following the completion of analysis, determine the dry-to-wet ratio of the Hay by subjecting a minimum 5 g aliquot of the test item to drying. The recommended drying temperature is 80°C, spanning overnight (approximately 12 hours).
- The Hay exhibits a density of **0.28 ± 0.03** [g/cm<sup>3</sup>].

### **b. Water test items IARMA-178 to 180**

- Record the initial gross mass of the bottles (including screw cap and labels) by weighing and document this on the provided Packing list.
- Before transferring contents for  $\gamma$ -spectrometry measurements, ensure a thorough mixing of the water test items.
- All measurement results must be presented on a mass basis. In the event that measurements are taken by volume, conversion to mass units is necessary by multiplying the volume with the test item's density of 0.999 ± 0.05 [g/ml].

## **5. Reporting Requirements**

- Utilize the IARMA Portal page to submit all measurement outcomes. Each participant will receive their Username and password in due course.
- Quantitative and qualitative analysis measurement results should be reported based on the Hay test item IARMA-177, specifically for the quantifiable radionuclides **K-40, Co-60, Ba-133, Cs-137, Eu-152, U-238 and Am-241**, expressed in [Bq/kg dry mass].
- For water test items IARMA-178 to 180, present measurement results in [Bq/kg] for **Co-60, Ba-133, Cs-137, Eu-152, U-238, and Am-241**.

- In cases where a radionuclide is undetectable, denote it as "undetectable" and express it as less than the method detection limit in [Bq/kg].
- All measurement results, along with their combined standard uncertainty (at the 1-sigma level), must be conveyed in [Bq/kg] dry mass for Hay and [Bq/kg] for water test items.
- Limit the decimal point to two digits in your reporting.
- Employ "NR" for unreported outcomes and "NA" for Not Applicable cases.
- All results should be corrected for decay to the **reference date of September 15, 2024.**
- The target date for submitting results is **November 15, 2024.**

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