



# IAEA

الوكالة الدولية للطاقة الذرية

国际原子能机构

International Atomic Energy Agency

Agence internationale de l'énergie atomique

Международное агентство по атомной энергии

Organismo Internacional de Energía Atómica

Att.

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**Seibersdorf, 2012/01/04**

## The IAEA-TEL-2011-08 National Japanese proficiency test on the determination of radionuclides in soil, grass, water and air filters

Dear Participant,

With reference to your participation in the IAEA-TEL-2011-08 National Japanese proficiency test on the determination of radionuclides in soil, grass, water and air filters organized by the IAEA Environment Laboratories in cooperation with School of Life and Environmental Sciences, University of Tsukuba, please read the attached instructions to participants (F-04) carefully before commencing the analysis and return the acknowledgment receipt form (F-05) to us, as soon as, you receive the samples.

In the package sent to you by the IAEA you should find 9 samples, in addition to a soil sample 04 which will be sent to you through the University of Tsukuba. The description of the samples and requested measurands for analysis in this proficiency test are presented in the following table:

| Sample code | Type of sample       | Approx. mass (g) | Requested measurands                               |
|-------------|----------------------|------------------|----------------------------------------------------|
| 01          | Spiked water         | 500              | H-3, Co-60, Ba-133, Cs-134, Cs-137, Eu-152, Am-241 |
| 02          | Spiked water         | 500              |                                                    |
| 03          | Spiked water         | 500              |                                                    |
| 04          | Soil                 | 150              | K-40, Cs-137, U-234, U-238, Pu-238, Pu-239+240     |
| 05          | Grass                | 250              | Cs-137                                             |
| 06          |                      |                  |                                                    |
| 07          |                      |                  |                                                    |
| 08          | Simulated air filter | -                | Co-57, Cs-134, Cs-137, Eu-152, Am-241              |
| 09          |                      |                  |                                                    |
| 10          |                      |                  |                                                    |

The levels of the gamma ray emitting radionuclides are such that they can be measured within a 6-10 hour measurement period using a conventional HPGe Gamma-spectrometer of 35% relative efficiency.

Analysis results and estimated standard combined uncertainties must be reported using the provided reporting forms. Electronic forms in word format should be used.

In order to assess the analytical performance of the method, we would like to have information on the analytical method used in the PT. Kindly refer to the reporting form F-03 to fill the requested information.

In addition, it is important to have a short description of your method and quality control procedure applied in your laboratory. This information can be completed in the Method and Quality Control Procedure Description Form (F-03).

**The deadline for result reporting is 15 of April 2012.**

You are requested to print the final reporting-forms, sign on the first page and submit it by fax or e-mail as your valid results to me at: [a.shakhashiro@iaea.org](mailto:a.shakhashiro@iaea.org), Fax: +43 1 2600 728 226.

It is imperative that we receive the printed reporting forms (F-01, F-02) duly completed, dated and signed, as this will constitute your valid results for this exercise and will be used as the definitive source of information to confirm your results.

The participants' data will be evaluated according to the following three criteria:

A) The relative bias between the Analyst's value and the IAEA value expressed as a relative bias in percentage:

$$\text{Relative bias}(\%) = \frac{\text{Value}_{\text{Analyst}} - \text{Value}_{\text{IAEA}}}{\text{Value}_{\text{IAEA}}} \times 100$$

B) The Z-Score value calculated according to the following equation:

$$Z_{\text{Score}} = \frac{\text{Value}_{\text{Analyst}} - \text{Value}_{\text{IAEA}}}{\sigma}$$

On the basis of the "fitness for purpose" principle, the target value for the standard deviation ( $\sigma$ ) is:

$$0.10 \times \text{Value}_{\text{IAEA}}$$

The laboratory performance is evaluated as satisfactory if  $|Z_{\text{Score}}| \leq 2$ ; questionable for  $2 < |Z_{\text{Score}}| < 3$ , and unsatisfactory for  $|Z_{\text{Score}}| \geq 3$ .

C) The proficiency test results will be evaluated against the acceptance criteria for trueness and precision and assigned the status "Acceptable", "Warning" or "Not Acceptable" accordingly.

### Trueness

The participant result is assigned "Acceptable" status for trueness if:

$$A1 \leq A2$$

where:

$$A1 = |Value_{IAEA} - Value_{Analyst}|$$

$$A2 = 2.58 \times \sqrt{u_{IAEA}^2 + u_{Analyst}^2}$$

### Precision

For evaluation of precision an estimator P is calculated for each participant, according to the following formula:

$$P (\%) = \sqrt{\left(\frac{u_{IAEA}}{Value_{IAEA}}\right)^2 + \left(\frac{u_{Analyst}}{Value_{Analyst}}\right)^2} \times 100$$

P directly depends on the measurement uncertainty claimed by the participant. The Limit of Acceptable Precision (LAP) for each analyte respectively is defined for the respective proficiency test in advance, including any adjustment due to the concentration or activity level of the analytes concerned and the complexity of the analytical problem. Participants' results are scored as "acceptable" for precision when  $P \leq LAP$ .

In the final evaluation, both scores for trueness and precision are combined. A result must obtain an "acceptable" score in both criteria to be assigned the final score "acceptable". Obviously, if a score of "not acceptable" was obtained for both trueness and precision, the final score will also be "not acceptable". In cases where either precision or trueness is "not acceptable", a further check is applied. The reported result relative bias (R. Bias) is compared with the maximum acceptable bias (MAB). If  $R. Bias \leq MAB$ , the final score will be "warning". "warning" will reflect mainly two situations. The first situation will be a result with small measurement uncertainty; however its bias is still within MAB. The second situation will appear when result close to the assigned property value is reported, but the associated uncertainty is large. If  $R. Bias > MAB$ , the result will be "Not Acceptable".

Sincerely yours,



Abdulghani Shakhshiro

Environment Laboratories

Department of Nuclear Sciences and  
Applications,

IAEA

(和訳)

Seibersdorf, 2012/01/04

IAEAによる環境物質の放射性核種測定値相互評価プロジェクト  
(IAEA Japan proficiency test)

参加者の皆さま

IAEA環境ラボラトリーが筑波大学生命環境系恩田研究室と協力して実施する、IAEAによる環境物質の放射性核種測定値相互評価プロジェクト(IAEA Japan proficiency test)につきまして、サンプルを受け取りましたら、分析を開始する前に添付の参加者への指示書類(F-04)をよく読み、できるだけ早く受領書(F-05)をご返送ください。

IAEAから送付するパッケージにはサンプルが9点入っており、更に筑波大学を通じ土壌サンプルが4点送られる予定です。サンプルの詳細とこのテストで分析に要求される測定は以下の表に記されています。

| サンプル<br>コード | 種類      | 重量(約g) | 測定                                                    |
|-------------|---------|--------|-------------------------------------------------------|
| 01          | 水       | 500    | H-3, Co-60, Ba-133, Cs-134, Cs-137,<br>Eu-152, Am-241 |
| 02          | 水       | 500    |                                                       |
| 03          | 水       | 500    |                                                       |
| 04          | 土       | 150    | K-40, Cs-137, U-234, U-238, Pu-238,<br>Pu-239+240     |
| 05          | 草       | 250    | Cs-137                                                |
| 06          |         |        |                                                       |
| 07          |         |        |                                                       |
| 08          | エアフィルター | -      | Co-57, Cs-134, Cs-137, Eu-152, Am-241                 |
| 09          |         |        |                                                       |
| 10          |         |        |                                                       |

放射性核種を放出しているガンマ線のレベルは、従来のHPGe相対効率35%のガ

シマ線スペクトロメーター を使用して、6-10時間以内に測定できるレベル。

分析結果と予想される不確定要素は所定の報告用紙でご報告下さい。 ワードフォーマットを使用した電子フォームを使用して下さい。手順の分析的パフォーマンスを評価するために、PTで使用した分析手順の情報が必要です。お手数ですが、報告用紙F-03に必要事項をご記入下さい。

更に、重要なことですが、貴研究室における手順と品質管理方法を手短に記載願います。この情報は、手順と品質管理方法記載フォーム（F-03）をご利用下さい。

結果報告の締め切り日は、2012年4月15日です。

最終報告フォームを印刷し、最初のページにサインをし、有効な結果としてファックスまたはEmailで以下に送付して下さい。

[a.shakhashiro@iaea.org](mailto:a.shakhashiro@iaea.org),

Fax: +431 2600 728 226.

IAEA のもとに、印刷された報告書（F-01, F-02）がきちんと完成され、日付、サインが記入された状態で届く事が肝要です。この報告書がこの課題の有効な結果となり、結果を確認する決定的な出所となるからです。

敬具

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and Applications,  
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