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|---|----------------------------------|----------------------------|------------------|--|
| Procedure to submit a sample for measurement on the SIR |                                  |                            |                  |  |
| Author :<br>C Michotte                                  | Date: 11/9/2023<br>Version : 1.2 | Authorized:<br>V. Gressier | BIPM/RI-SIR-T-20 |  |

## Procedure to submit a sample for measurement on the SIR

### 1. Purpose and objectives


- 1.1. This procedure is for use by national metrology institutes or designated institutes wishing to send a sample for measurement on the SIR.

### 2. Comments

- 2.1. Please follow this procedure carefully to avoid possible delays in shipments and measurements.
- 2.2. Samples for measurement on the SIR must be supplied in ampoules that the BIPM will provide.
- 2.3. Please contact the BIPM on [sir@bipm.org](mailto:sir@bipm.org) for help in following this procedure if required.

### 3. Contents

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### 4. Scope of the procedure

4.1. The procedure covers:


- 4.1.1. The radionuclides and activities that can be accepted for measurement on the SIR
- 4.1.2. Informing the BIPM that the sample will be sent
- 4.1.3. Preparing documents for customs
- 4.1.4. Preparing the samples
- 4.1.5. Dispatching the sample
- 4.1.6. Reporting results

### 5. Radionuclides and activities

5.1. Check that the radionuclide to be sent is listed in Table 1 and that it is possible to prepare a sample of approximately 3.6 ml of radioactive solution with the activity on delivery in the range stated. For gases, please contact the BIPM at [sir@bipm.org](mailto:sir@bipm.org).


*Note: Please contact the BIPM at [sir@bipm.org](mailto:sir@bipm.org) if the radionuclide is not listed or if the radionuclide has a short half-life (marked with an asterisk in the table).*

5.2. For the short-lived radionuclides marked with an asterisk the minimum activity listed in Table 1 is sufficient large to enable repeating the SIR measurement a few times.

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| Radionuclide |   | Min. activity at delivery/ MBq | Max. activity / MBq |
|--------------|---|--------------------------------|---------------------|
| F-18         | * | 0.33                           | 23                  |
| Na-22        |   | 0.04                           | 11                  |
| Na-24        | * | 0.11                           | 7                   |
| Sc-46        |   | 0.04                           | 12                  |
| Cr-51        |   | 2.60                           | 100                 |
| Mn-54        |   | 0.10                           | 29                  |
| Co-56        |   | 0.03                           | 8                   |
| Mn-56        | * | 0.23                           | 16                  |
| Co-57        |   | 0.90                           | 100                 |
| Co-58        |   | 0.09                           | 24                  |
| Fe-59        |   | 0.08                           | 22                  |
| Co-60        |   | 0.04                           | 11                  |
| Cu-64        | * | 1.72                           | 121                 |
| Zn-65        |   | 0.16                           | 45                  |
| Ga-67        |   | 0.62                           | 100                 |
| Ge-68        |   | 0.08                           | 24                  |
| Se-75        |   | 0.23                           | 65                  |
| Sr-85        |   | 0.16                           | 45                  |
| Y-88         |   | 0.04                           | 10                  |
| Nb-95        |   | 0.11                           | 31                  |
| Mo-99        | * | 1.36                           | 50                  |
| Tc-99M       | * | 3.26                           | 230                 |
| Ru-103       |   | 0.16                           | 45                  |
| Ru-106       |   | 0.31                           | 10                  |
| Cd-109       |   | 43.29                          | 500                 |
| Ag-110M      |   | 0.03                           | 9                   |
| In-111       | * | 0.92                           | 65                  |
| Sn-113       |   | 0.31                           | 88                  |
| I-123        | * | 2.56                           | 180                 |
| Sb-124       |   | 0.05                           | 10                  |
| I-131        |   | 0.21                           | 40                  |
| Ba-133       |   | 0.23                           | 66                  |
| Cs-134       |   | 0.05                           | 10                  |
| Cs-137       |   | 0.15                           | 41                  |
| Ce-139       |   | 0.71                           | 100                 |
| Ce-141       |   | 1.41                           | 300                 |
| Ce-144       |   | 1.50                           | 15                  |
| Eu-152       |   | 0.08                           | 22                  |
| Gd-153       |   | 1.94                           | 200                 |
| Sm-153       | * | 12.21                          | 400                 |
| Eu-154       |   | 0.07                           | 21                  |
| Tb-161       |   | 9.04                           | 500                 |
| Ho-166M      |   | 0.05                           | 15                  |
| Yb-169       |   | 0.41                           | 60                  |
| Lu-177       |   | 2.98                           | 400                 |
| Ir-192       |   | 0.10                           | 29                  |
| Tl-201       | * | 6.62                           | 200                 |
| Hg-203       |   | 0.36                           | 50                  |
| Bi-207       |   | 0.06                           | 10                  |
| Ra-223       |   | 0.29                           | 30                  |
| Ac-225       |   | 0.40                           | 30                  |
| Th-228       |   | 0.07                           | 19                  |
| Np-237       |   | 0.40                           | 5                   |
| Am-241       |   | 10.94                          | 50                  |

Table 1: Radionuclides that can be accepted for measurement in the SIR and the minimum and maximum activities on the date of delivery. Please contact [sir@bipm.org](mailto:sir@bipm.org) if the radionuclide is not listed or if it has a short half life (marked with an asterisk\* in the table).

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## 6. Informing the BIPM that a sample will be sent

6.1. As soon as possible, contact the BIPM on [sir@bipm.org](mailto:sir@bipm.org) with the following information:

**(1) Your details:**

- Organization
- Full postal address
- Your name and job title
- Email and telephone number

**(2) Details of the sample(s):**

- Radionuclide(s)
- Estimated delivery date
- Approximate activity (kBq) on delivery

**(3) Evidence that the organization is authorized to dispatch radioactive materials:**

- Copy of organization's license to hold and export radioactivity from local regulators


6.2. The BIPM will confirm whether the ampoule(s) can be received on the date requested and will supply a small quantity of empty ampoules to the address given. These ampoules **must** be used when preparing the sample for measurement – do not substitute other types.

## 7. Customs formalities

7.1. Complete form BIPM-ADM-DOU-F-02 omitting part 4: Instruction for return. The description in box 3 should include the UN type of package if relevant. The AirWay Bill (AWB) may be sent separately by email later. In case of road transport, indicate a reference or tracking number.

7.2. For countries outside the European Union, prepare a pro-forma invoice stating a commercial value for the ampoule of 45 Euros.

7.3. Scan and email the form BIPM-ADM-DOU-F-02 (plus the pro-forma invoice if needed) to [customsbipm@bipm.org](mailto:customsbipm@bipm.org) and to [sir@bipm.org](mailto:sir@bipm.org) at least 3 weeks before shipment (1 week for countries in the European Union).

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## 8. Preparing the sample

- 8.1. Mark the ampoule (supplied by the BIPM) clearly with the radionuclide, the acronym for your laboratory and the year, using an indelible marker pen directly onto the glass. Do not fix a label onto the ampoule.
- 8.2. Dispense the standardized solution into the ampoule. The volume must be between 3.40 cm<sup>3</sup> and 3.80 cm<sup>3</sup> (this is equivalent to a filling height of 19 to 21 mm for a density of 1 g cm<sup>-3</sup>).

*Note: Ensure that all the information that will be needed to report the results is recorded (see form SIR-F-05.pdf).*

- 8.3. Flame-seal the ampoule.
- 8.4. Check that the ampoule is free from surface contamination (for example, by wiping the surface of the ampoule with a filter paper and checking the filter paper using a surface contamination monitor). Do not dispatch the ampoule if contamination is found but repeat the sample preparation.
- 8.5. Check that the ampoule is not leaking (for example, by placing the ampoule in nearly-boiling distilled water and looking for a trail of bubbles). If leakage is detected, do not dispatch the ampoule but repeat the sample preparation.

*Note: For steps 8.4 and 8.5, follow local regulations as appropriate.*

## 9. Dispatching the sample to the BIPM

- 9.1. Pack the ampoule in accordance with the appropriate IATA or ADR regulations, including any handling instructions if required.
- 9.2. Arrange the dispatch of the package using an authorized courier, door-to-door delivery to the BIPM, free of charge for the BIPM.


*Notes:*

*1) If necessary, the BIPM can collect the package from the main Paris airports (Orly or Charles-de-Gaulle) and/or clear the package through customs at the NMI cost – please contact [customsbipm@bipm.org](mailto:customsbipm@bipm.org) to discuss this option.*

*2) Please avoid delivery on Fridays if possible.*

- 9.3. Mark the package and associated documentation with the following consignee:

Mr Sammy Courte  
 Bureau International des Poids et Mesures (Département R.I.)  
 Pavillon de Breteuil  
 Parc de Saint Cloud (porte du Mail sur la D910)  
 12 Bis Grande Rue  
 92 310 Sèvres  
 France

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Email : [sir@bipm.org](mailto:sir@bipm.org)  
Tel : +33 1 45 07 70 88

Coordonnées géographiques :  
48° 49.740' N, 2° 13.197' E ou 48.82900 N, 2.21995 E

- 9.4. In case of type A or excepted package (UN2915 or UN2910), **add the following information on the package** :

“DELIVERY INSTRUCTIONS:

The package should be delivered personally to Mr S. Courte or to any other person of the Département des Rayonnements Ionisants of the BIPM. Please phone to the BIPM **before arrival** (+33 1 45 07 70 88, +33 6 31 55 31 01, +33 6 28 18 48 38, +33 1 45 07 70 70).

**The package should not be left at the reception (Accueil) of the BIPM./**

Le colis doit être livré à M. S. Courte en main propre, ou à toute autre personne du département des rayonnements ionisants. Veuillez appeler le BIPM **avant votre arrivée** (+33 1 45 07 70 88, +33 6 31 55 31 01, +33 6 28 18 48 38, +33 1 45 07 70 70). **Le colis ne doit pas être déposé à l'accueil du BIPM.”**


- 9.5. Describe the type of package (for example, Type A or Excepted package) on the Airway bill; send a scan of the AWB and dangerous goods declaration by e-mail to [customsbipm@bipm.org](mailto:customsbipm@bipm.org) and to [sir@bipm.org](mailto:sir@bipm.org).
- 9.6. Confirm by email to [sir@bipm.org](mailto:sir@bipm.org) that the package has been dispatched.
- 9.7. The BIPM will confirm by email when the package is received.

## 10. Results

- 10.1. Complete form SIR-F-05.pdf and send it to [sir@bipm.org](mailto:sir@bipm.org).
- 10.2. The BIPM will analyze the results and report them following the procedure for a CIPM key comparison in CIPM-MRA-D-05 Measurement Comparisons in the CIPM MRA.

## 11. Revision History

| Version number | Date of Issue/Review | Author     | Modifications / comments |
|----------------|----------------------|------------|--------------------------|
| 1.0            | 1/8/2018             | C Michotte | First issue              |

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|     |            |             |  |
|-----|------------|-------------|--|
| 1.1 | 6/10/2020  | C. Michotte | Changes related to the new DOU-F-02 form, including road transport. Delivery instructions in case of type A package. |
| 1.2 | 11/09/2023 | C. Michotte | Comment on Table 1 added. Table 1 updated. Address and instructions of delivery updated.                             |