

Status of the International Reference System for activity measurements of gamma-ray emitting nuclides (SIR)

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For the CCRI(II) in 2005, we have decided to present the work carried out in the SIR in a new way. This report covers the work accomplished during the two-year period starting in January 2003 rather than from the date of the last CCRI(II) meeting in May 2003. This procedure is as transparent as before, allows a simpler audit of the SIR results and is now in phase with the presentation in the BIPM Director's report. After having presented the actual status of the SIR as usual, an outline of the future submissions is given as well as some recommendations to make the receipt of submissions smoother and to improve the efficiency of the system.

1. Past SIR activity measurements (period 2003-2004)

– 2003

During 2003, 6 laboratories sent 17 ampoules to the BIPM, each containing one of nine different radionuclides providing the SIR data base with 10 new independent results. Table 1 summarizes the outcome for the year 2003. All of these results have been published and are presented in the KCDB.

Table 1. Main SIR undertaking for 2003. Radionuclides with short half lives (equal to or less than 3 d) are marked in red, gas samples in blue. The figures in the central part of the table indicate the number of ampoules sent.

Radionuclide Laboratory	¹⁸ F	⁶⁰ Co	⁶⁷ Ga	⁸⁵ Kr ¹⁾	⁹⁰ Y	¹⁰³ Ru	¹⁵³ Sm	²⁰¹ Tl	²²² Rn	Total number of ampoules / results
BNM-LNHB				4			3	3		8
CIEMAT			1							1
CNEA		1								1
IRA									1	1
NPL	1				1	1				3
RC		1								1
Number of ampoules sent	1	2	1	4	1	1	3	3	1	15
Number of new results	1	2	1	0	1	1	1	1	1	9

In parallel one ampoule of ⁵⁴Mn prepared by the PTB for the CCRI(II)-K2.Mn-54 international comparison and one ampoule of ⁹⁰Y prepared by the NIST for the CCRI(II)-K2.Y-90 international comparison have been measured in the SIR chamber to allow a direct

¹⁾ pilot study for CCRI-K2.

link of the individual results of each of these comparisons to the KCDB. The measurements of the ampoule prepared by the NPL in the frame of the ^{18}F CCRI(II)-K3 comparison has also enabled the link of this comparison to the KCDB.

Furthermore, a solid source $^{166}\text{Ho}^m$ provided by the NMIJ/AIST has also been measured for check purposes.

– 2004

In 2004, 20 ampoules coming from 9 laboratories were sent to the BIPM, each containing one of twelve different radionuclides providing the SIR data base with 18 new independent results. Table 2 details the new 2004 entries. Some of these results are either published (P), some are in Draft A/B reports and some are awaiting the laboratory results..

Table 2. Main SIR undertaking for 2004. Radionuclides with short half lives (equal to or less than 3 d) are marked in red. The figures in the central part of the table indicate the number of ampoules sent.

Radionuclide Laboratory	^{18}F	^{22}Na	^{51}Cr	^{57}Co	^{60}Co	^{85}Sr	^{109}Cd	^{131}I	^{134}Cs	^{137}Cs	^{139}Ce	^{153}Sm	Total number of ampoules / results
ANSTO												1 + (1)	1 + (1)
BARC		1											1
CIEMAT	1												1
IRMM									1	1			2
NIST							1						1
NMIJ/AIST			1	1	1	1			1	1	1		7
NPL			1										1
OMH									1				1
PTB							1	2	1				4
Number of ampoules sent	1	1	2	1	1	1	2	2	4	2	1	1 + (1)	19(20)
Number of new results	1	1	2	1	1	1	2	1	4	2	1	1	18
Report	P	P	A	A	A	A	–	P	A	A	A	B	

In parallel five ampoules of ^{125}I prepared by the NPL for the CCRI(II)-K2.I-125 international comparison have been measured in the SIR chamber in the hope that they could allow a direct link of the individual results of each of these comparisons to the KCDB. However, it seems that the activity in the ampoules was too low (about 10 MBq) to ensure a reliable response of the ionization chamber.

If the results of these two years are put together the SIR has the following statistics:

– number of ampoules measured since the beginning of the SIR in 1976: 872

- number of independent results: 634
- number of radionuclides: 62.

In parallel to these measurements samples are checked for impurities with Ge spectrometers. In most cases the BIPM measurements confirm the measurements of the laboratories; from time to time some further impurities are found which improve the results.

2. Provisional schedule for 2005

To date nine laboratories have sent their plan for the present year. If they keep to this schedule for the seventeen radionuclides, the number of ampoules which will have been measured in the SIR by the end of 2005 could reach 900.

Table 3. Main SIR undertaking for 2005. Radionuclides with short half lives (equal to or less than 3 d) are marked in red. The figures in the central part of the table indicate the number of ampoules sent.

Radio-nuclide Laboratory	¹⁸ F	⁵¹ Cr	⁵⁷ Co	⁵⁴ Mn	⁶⁷ Ga	⁶⁵ Zn	^{99m} Tc	^{110m} Ag	¹¹¹ In	¹²⁴ Sb ²⁾	Partial number of ampoules / results
BARC						1		1			2
BNM-LNHB				1 or 3	1 or 3					1	3 or 7
CNEA											
CSIR-NML											
IFIN											
KRISS		1		1							2
NPL							1				1
OMH											
PTB	1		1						1		3
VNIIM											
Number of ampoules to be sent	1	1	1	2 or 4	1 or 3	1	1	1	1	1	11 or 15
Number of new results	1	1	1	2	1	1	1	1	1	0	10

²⁾ pilot study.

Table 3 continued

Radio-nuclide Laboratory	¹³¹ I	¹³³ Ba	¹³⁴ Cs	¹³⁷ Cs	¹⁵² Eu	¹⁹² Ir	²⁰¹ Tl	²²² Rn	Total number of ampoules / results
BARC			1						3
BNM-LNHB			1				1 or 3		5 or 11
CNEA			1		1				2
CSIR-NML	1								1
IFIN	1	1							2
KRISS	1		1	1					5
NPL									1
OMH						1			1
PTB							1	1	5
VNIIM				1					1
Number of ampoules to be sent	3	1	4	2	1	1	2 or 4	1	26 or 32
Number of new results	3	1	4	2	1	1	2	1	25

3. Some recommendations for improving the functioning of the SIR

As you are all aware the regulations for transporting, importing and exporting dangerous goods and in particular radioactive substances are becoming more and more restrictive. Some years ago the latitude for receiving radioactive parcels was comfortable and as a consequence the BIPM could be flexible. Nowadays, especially as laboratories are standardizing short half-life radionuclides which are used in nuclear medicine, a perfect synchronisation between the SIR measurements and the measurements at the NMI is required to decrease the uncertainties due to the decay. To achieve this, the parcel containing the samples should arrive on a working day which enables a rapid and problem-free pick up from the airport. The BIPM staff can be flexible but this is not useful if the parcel is not available for measurement. As in other countries, the requirements in France are to have a specially trained "Dangerous Goods Driver" to collect radioactive parcels from the airport. There are always traffic jams on a Friday on the motorway to the airport so we would appreciate receiving the radioactive parcels at the beginning of the week or at the latest on Thursday evening so that it can be cleared for collection by our trained staff early on the Friday morning. Furthermore, if we cannot collect such parcels before the week-end, the BIPM is charged for storage until the following Monday.

May I now remind you what I wrote at the end of the 33rd circular letter distributed on 2 March 2005 concerning the new implemented Quality System of the BIPM. This was: “ As part of our newly implemented Quality System a new requirement has been put in place by the BIPM administration concerning the shipment from third parties to the BIPM of pieces of equipment which are submitted for international comparisons. This concerns also the sending of ampoules of radioactive solutions to be measured in the SIR. Information about the procedure to be followed by each laboratory is described in the document labelled BIPM/ADM-Dou-P-03 which follows after this page. Please follow the instructions given and, for **each** radioactive parcel to be sent to the BIPM, fill in the document BIPM/ADM-DOU/F-12 which is attached after the procedure, at least two weeks in advance and fax it to Mrs Daniela Etter (fax number : +33 1 45 07 70 99). The ampoules sent for the SIR will not normally be sent back by the BIPM to the participating laboratory so that the paragraph “Instructions for return” is usually not relevant and can be neglected unless, for any particular reason, a laboratory may want to have their ampoule returned. I am conscious that, unfortunately, this might increase your administrative workload slightly but it will make our life at the BIPM much easier. I thank you in advance for your comprehensive help.”

In order to finish this paper on a more positive note, it is always possible for a laboratory to submit a contribution to the SIR which was scheduled in advance, to change the radionuclide to be measured in the SIR chambers or to cancel for any technical reason a scheduled submission. So long as such changes remain limited the BIPM can cope. The BIPM wishes to be and to remain at the disposal of the national laboratories and to facilitate as much as possible the measurements in the SIR. We are doing our best to keep the system working for you in the most convenient and efficient way.

INFORMATION FOR LABORATORIES SHIPPING EQUIPMENT TO THE BIPM FOR COMPARISONS

1 General Information

- Equipment shipped to the BIPM for comparisons is subject to Customs' formalities, which vary according to the country of origin.
- Before shipping any material to the BIPM, the laboratory should complete the relevant parts of the form **BIPM/ADM-DOU/F-12**, and return it to the BIPM (fax: +33 1 45 07 70 99). The form should be received by the BIPM at least 2 weeks before shipment is planned.
- Parcels from countries other than the E.U. must be labelled as follows:

BIPM - REGLEMENTATION SPECIALE - NE PAS DEDOUANER D'OFFICE

and the laboratory from which the equipment originates should give specific instructions to their carrier to contact the BIPM [Contact: Administration, tel.: +33 1 45 07 70 04 fax: +33 1 45 07 70 99] prior to clearing the instrument through Customs. The BIPM will then take the appropriate action to clear the equipment through French Customs.

- No Customs' operations are carried out on Saturdays or Sundays. The laboratory should ensure that if their equipment is subject to Customs' formalities, it should arrive in France on a working day of the week preceding that planned for the comparison.
- Customs' operations for hand carried equipment may require processing by our forwarder. In this case, relevant costs will be charged to the laboratory.

2 Customs' formalities

2.1 Equipment arriving from a country within the E.U.:

- There are no Customs' formalities. The laboratory does not need to take further action.

2.2 Equipment arriving from a country outside the E.U.:

- There are Customs' formalities. In order for the equipment to pass through Customs, the laboratory is required to undertake one of the following procedures:

- i. ship the equipment with an ATA carnet. This carnet is available through the Chamber of Commerce and Industry (or equivalent within your country, provided your country recognises this system). It simplifies the Customs' operations and avoids duties and taxes;
- ii. ship the equipment by diplomatic bag to the relevant Embassy in Paris (although this has the advantage of by-passing all Customs' formalities, it is unlikely that this process is available to all laboratories);
- iii. if neither of these procedures can be adopted, a temporary importation will be arranged by the forwarding agent of the BIPM (all sections of the form **BIPM/ADM-DOU/F-12** must then be completed).

3 Transport of equipment between Paris Airports and the BIPM

- For equipment originating from a laboratory within the E.U. as well as for those countries employing the ATA carnet system, it is expected that the laboratory will arrange a door-to-door delivery. In the case of air transport, it is expected that the laboratory will arrange for their carrier to transport the equipment to and from Paris airports and the BIPM.
- Where a temporary importation has to be arranged, the BIPM via its forwarding agent will arrange and meet the transport of the equipment to and from Paris airports and the BIPM.

4 Insurance of equipment

- In all cases, organisation and payment of insurance for a visiting laboratory's instrument remain the responsibility of the visiting laboratory.

5 Return of equipment

- It is the responsibility of the laboratory to make prior arrangements for the return of their equipment after the comparison. The BIPM should be informed of these arrangements using form **BIPM/ADM-DOU/F-12**.

