

**Key comparison BIPM.RI(II)-K1.Cr-51**

**MEASURAND :**                    **Equivalent activity of  $^{51}\text{Cr}$**

$x_i$ :                    **result of measurement carried out in the SIR for the sample submitted by laboratory  $i$**

$u_i$ :                    **combined standard uncertainty of  $x_i$**

<b>Lab <math>i</math></b>	<b><math>x_i</math> / MBq</b>	<b><math>u_i</math> / MBq</b>	<b>Date of measurement</b>
<b>IRMM</b>	483.9	1.1	81-06-17
<b>CMI-IIR</b>	488.7	1.4	82-06-30
<b>MKEH</b>	487.3	1.3	89-10-09
<b>PTB</b>	487.6	0.9	98-04-24
<b>NIST</b>	489.4	1.4	99-05-03
<b>NMIJ</b>	487.1	1.6	04-03-15
<b>NPL</b>	487.0	3.4	04-05-28
<b>LNE-LNHB</b>	489.2	1.1	06-07-17

**Key comparison APMP.RI(II)-K2.Cr-51**

**MEASURAND :**                    **Equivalent activity of  $^{51}\text{Cr}$**

$x_i$ :                    **result of measurement carried out at laboratory  $i$ , converted to the equivalent activity through the NMIJ SIR measurement (see Final Report dated October 2005)**

$u_i$ :                    **combined standard uncertainty of  $x_i$**

<b>Lab <math>i</math></b>	<b><math>x_i</math> / MBq</b>	<b><math>u_i</math> / MBq</b>	<b>Year of measurement</b>
<b>VNIIM</b>	488.3	1.2	2004

Key comparison BIPM.RI(II)-K1.Cr-51

MEASURAND : Equivalent activity of  $^{51}\text{Cr}$

Key comparison reference value: the SIR reference value for this radionuclide  $x_R$  is 488.0 MBq, with a standard uncertainty  $u_R$  of 0.3 MBq (see section 4.1 of the Final Report dated January 2009).

The degree of equivalence of each laboratory with respect to the key comparison reference value is given by a pair of terms:  $D_i = (x_i - x_R)$  and  $U_i$ , its expanded uncertainty ( $k = 2$ ), both expressed in MBq. With  $n$  the number of laboratories,  $U_i = 2[(1 - 2/n)u_i^2 + (1/n^2)\sum u_i^2]^{1/2}$  when each laboratory has contributed to the computation of  $x_R$  (see [Metrologia](#), 42, 140-144).

The degree of equivalence between two laboratories is given by a pair of terms:  $D_{ij} = D_i - D_j = (x_i - x_j)$  and  $U_{ij}$ , its expanded uncertainty ( $k = 2$ ), both expressed in MBq. The approximation  $U_{ij} \sim 2(u_i^2 + u_j^2)^{1/2}$  is used in the Matrix of equivalence.

Linking APMP.RI(II)-K2.Cr-51 (2004) to BIPM.RI(II)-K1.Cr-51

The value  $x_i$  is the equivalent activity for laboratory  $i$  participant in APMP.RI(II)-K2.Cr-51 having been normalized to the value of NMIJ as the linking laboratory (see Final Report dated October 2005).

The degree of equivalence of laboratory  $i$  participant in APMP.RI(II)-K2.Cr-51 with respect to the key comparison reference value is given by a pair of terms:  $D_i = (x_i - x_R)$  and  $U_i$ , its expanded uncertainty ( $k = 2$ ), both expressed in MBq.

The approximation  $U_i = 2(u_i^2 + u_R^2)^{1/2}$  is used in the Matrix of equivalence.

The degree of equivalence between two laboratories  $i$  and  $j$  is given by a pair of terms:  $D_{ij} = D_i - D_j$  and  $U_{ij}$ , its expanded uncertainty ( $k = 2$ ), both expressed in MBq, where the approximation  $U_{ij} = 2(u_i^2 + u_j^2 - 2fu_i^2)^{1/2}$  is used ( $f$  is the NMIJ and  $f$  the correlation coefficient).

These statements make it possible to extend the BIPM.RI(II)-K1.Cr-51 Matrix of equivalence to the participant in the APMP.RI(II)-K2.Cr-51 comparison.

Key comparisons BIPM.RI(II)-K1.Cr-51 and APMP.RI(II)-K2.Cr-51: Matrix of equivalence

Lab *j* →

Lab *i* ↓

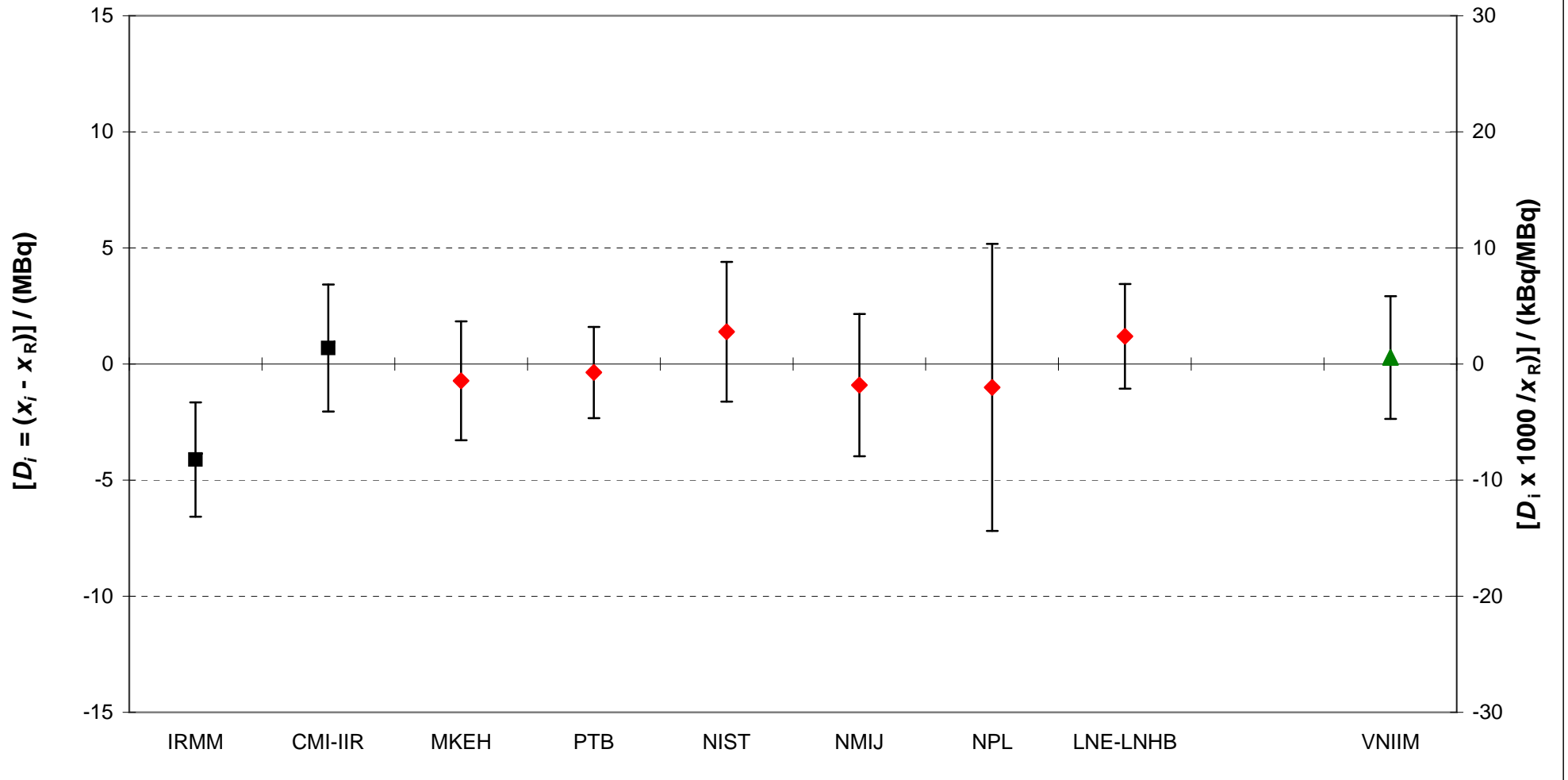
	$D_i$ $U_i$ / MBq		IRMM $D_{ij}$ $U_{ij}$ / MBq		CMI-IIR $D_{ij}$ $U_{ij}$ / MBq		MKEH $D_{ij}$ $U_{ij}$ / MBq		PTB $D_{ij}$ $U_{ij}$ / MBq		NIST $D_{ij}$ $U_{ij}$ / MBq		NMIJ $D_{ij}$ $U_{ij}$ / MBq		NPL $D_{ij}$ $U_{ij}$ / MBq	
IRMM	-4.1	2.5			-4.8	3.6	-3.4	3.4	-3.7	2.9	-5.5	3.6	-3.2	3.9	-3.1	7.1
CMI-IIR	0.7	2.7	4.8	3.6			1.4	3.8	1.1	3.3	-0.7	4.0	1.6	4.3	1.7	7.4
MKEH	-0.7	2.6	3.4	3.4	-1.4	3.8			-0.4	3.2	-2.1	3.8	0.2	4.1	0.3	7.3
PTB	-0.4	2.0	3.7	2.9	-1.1	3.3	0.4	3.2			-1.8	3.3	0.5	3.7	0.6	7.0
NIST	1.4	3.0	5.5	3.6	0.7	4.0	2.1	3.8	1.8	3.3			2.3	4.3	2.4	7.4
NMIJ	-0.9	3.1	3.2	3.9	-1.6	4.3	-0.2	4.1	-0.5	3.7	-2.3	4.3			0.1	7.5
NPL	-1.0	6.2	3.1	7.1	-1.7	7.4	-0.3	7.3	-0.6	7.0	-2.4	7.4	-0.1	7.5		
LNE-LNHB	1.2	2.3	5.3	3.1	0.5	3.6	1.9	3.4	1.6	2.9	-0.2	3.6	2.1	3.9	2.2	7.1
VNIIM	0.3	2.6	4.4	3.3	-0.4	3.7	1.0	3.5	0.6	3.0	-1.1	3.7	1.2	3.1	1.3	7.2

Lab *i* ↓

	$D_i$ $U_i$ / MBq		LNE-LNHB $D_{ij}$ $U_{ij}$ / MBq		VNIIM $D_{ij}$ $U_{ij}$ / MBq	
IRMM	-4.1	2.5	-5.3	3.1	-4.4	3.3
CMI-IIR	0.7	2.7	-0.5	3.6	0.4	3.7
MKEH	-0.7	2.6	-1.9	3.4	-1.0	3.5
PTB	-0.4	2.0	-1.6	2.9	-0.6	3.0
NIST	1.4	3.0	0.2	3.6	1.1	3.7
NMIJ	-0.9	3.1	-2.1	3.9	-1.2	3.1
NPL	-1.0	6.2	-2.2	7.1	-1.3	7.2
LNE-LNHB	1.2	2.3			0.9	3.3
VNIIM	0.3	2.6	-0.9	3.3		

### BIPM.RI(II)-K1.Cr-51 and the 2004 APMP.RI(II)-K2.Cr-51

Degrees of equivalence for equivalent activity of  $^{51}\text{Cr}$



**Red diamonds** and **black squares**: participants in BIPM.RI(II)-K1.Cr-51

**Green triangle**: participant in APMP.RI(II)-K2.Cr-51 (2004)

**The black colour** identifies participant's results prior to 1983

Note: the right-hand axis shows approximate relative values only