Key comparison BIPM.RI(II)-K1.Co-58

MEASURAND :   **Equivalent activity of ^{58}Co**

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**

Lab i	x_i / kBq	u_i / kBq	Date of measurement
CMI-IIR	16108	123	80-01-07
OMH	16197	51	86-06-30
NPL	16257	119	91-06-20
BNM-LNHB	16393	25	92-04-21
PTB	16266	51	95-05-09
NMIJ	16281	69	00-03-14

Key comparison APMP.RI(II)-K2.Co-58

MEASURAND :   **Equivalent activity of ^{58}Co**

x_i: **result of measurement carried out at laboratory i**

        converted to the equivalent activity through the NMIJ

u_i: **combined standard uncertainty of x_i**

Lab i	x_i / kBq	u_i / kBq	Measurement report date
NMIJ	16281	69	00-04-24
BARC	16544	166	00-07-21
CNEA	16378	148	00-07-09
INER	16342	139	00-06-26
KRISS	16325	34	00-07-19
LNMRI	16749	119	00-07-04
NIM	16208	91	00-06-23

Key comparison BIPM.RI(II)-K1.Co-58

MEASURAND : Equivalent activity of ^{58}Co

Key comparison reference value: the SIR reference value for this radionuclide x_R is 16.250 MBq, with a standard uncertainty u_R of 0.040 MBq.
x_R is the mean of six of the ten SIR results (see section 4.1 of the Report).

The degree of equivalence of each laboratory with respect to the 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,
$U_i = 2[(1 - 2/n)u_i^2 + (1/n^2)\Sigma u_i^2]^{1/2}$ when each laboratory has contributed to the computation of x_R (see Appendix 2 of the Final Report).

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 following table.

Linking APMP.RI(II)-K2.Co-58 to BIPM.RI(II)-K1.Co-58

The value x_i is the equivalent activity for laboratory i participant in APMP.RI(II)-K2.Co-58
having been normalized to the value of the NMIJ as the linking laboratory.

The degree of equivalence of laboratory i participant in APMP.RI(II)-K2.Co-58 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 following table as none of these laboratories contributed to
the computation of the key comparison reference value x_R.

The degree of equivalence between two laboratories i and j, one participant in BIPM.RI(II)-K1.Co-58 and one in
APMP.RI(II)-K2.Co-58, or both participants in APMP.RI(II)-K2.Co-58, is given by a pair of terms expressed in MBq:
$D_{ij} = D_i - D_j$ and U_{ij}, its expanded uncertainty ($k = 2$), approximated by $U_{ij} = 2(u_i^2 + u_j^2 - 2fu_l^2)^{1/2}$ with l being the
linking laboratory when each laboratory is from the APMP and f is the correlation coefficient.

These statements make it possible to extend the BIPM.RI(II)-K1.Co-58 matrix of equivalence to all participants
in APMP.RI(II)-K2.Co-58.

Matrix of equivalence

Lab *j* ⟹

Lab *i* ⟓

Lab *i*	D_i	U_i	CMI-IIR D_{ij}	U_{ij}	OMH D_{ij}	U_{ij}	NPL D_{ij}	U_{ij}	BNM-LNHB D_{ij}	U_{ij}	PTB D_{ij}	U_{ij}	NMIJ D_{ij}	U_{ij}
	/ MBq		/ MBq		/ MBq		/ MBq		/ MBq		/ MBq		/ MBq	
CMI-IIR	-0.14	0.21			-0.09	0.27	-0.15	0.34	-0.29	0.25	-0.16	0.27	-0.17	0.28
OMH	-0.05	0.11	0.09	0.27			-0.06	0.26	-0.20	0.11	-0.07	0.14	-0.08	0.17
NPL	0.01	0.21	0.15	0.34	0.06	0.26			-0.14	0.24	-0.01	0.26	-0.02	0.28
BNM-LNHB	0.14	0.08	0.29	0.25	0.20	0.11	0.14	0.24			0.13	0.11	0.11	0.15
PTB	0.02	0.11	0.16	0.27	0.07	0.14	0.01	0.26	-0.13	0.11			-0.02	0.17
NMIJ	0.03	0.13	0.17	0.28	0.08	0.17	0.02	0.28	-0.11	0.15	0.02	0.17		
BARC	0.29	0.34	0.44	0.41	0.35	0.35	0.29	0.41	0.15	0.34	0.28	0.35	0.26	0.36
CNEA	0.13	0.31	0.27	0.38	0.18	0.31	0.12	0.38	-0.02	0.30	0.11	0.31	0.10	0.32
INER	0.09	0.29	0.23	0.37	0.15	0.30	0.09	0.37	-0.05	0.28	0.08	0.30	0.06	0.31
KRISS	0.07	0.10	0.22	0.26	0.13	0.12	0.07	0.25	-0.07	0.08	0.06	0.12	0.04	0.15
LNMRI	0.50	0.25	0.64	0.34	0.55	0.26	0.49	0.34	0.36	0.24	0.48	0.26	0.47	0.27
NIM	-0.04	0.20	0.10	0.31	0.01	0.21	-0.05	0.30	-0.19	0.19	-0.06	0.21	-0.07	0.23

Lab *i* ⟓

Lab *i*	D_i	U_i	BARC D_{ij}	U_{ij}	CNEA D_{ij}	U_{ij}	INER D_{ij}	U_{ij}	KRISS D_{ij}	U_{ij}	LNMRI D_{ij}	U_{ij}	NIM D_{ij}	U_{ij}
	/ MBq		/ MBq		/ MBq		/ MBq		/ MBq		/ MBq		/ MBq	
CMI-IIR	-0.14	0.21	-0.44	0.41	-0.27	0.38	-0.23	0.37	-0.22	0.26	-0.64	0.34	-0.10	0.31
OMH	-0.05	0.11	-0.35	0.35	-0.18	0.31	-0.15	0.30	-0.13	0.12	-0.55	0.26	-0.01	0.21
NPL	0.01	0.21	-0.29	0.41	-0.12	0.38	-0.09	0.37	-0.07	0.25	-0.49	0.34	0.05	0.30
BNM-LNHB	0.14	0.08	-0.15	0.34	0.02	0.30	0.05	0.28	0.07	0.08	-0.36	0.24	0.19	0.19
PTB	0.02	0.11	-0.28	0.35	-0.11	0.31	-0.08	0.30	-0.06	0.12	-0.48	0.26	0.06	0.21
NMIJ	0.03	0.13	-0.26	0.36	-0.10	0.32	-0.06	0.31	-0.04	0.15	-0.47	0.27	0.07	0.23
BARC	0.29	0.34			0.17	0.44	0.20	0.43	0.22	0.34	-0.21	0.41	0.34	0.38
CNEA	0.13	0.31	-0.17	0.44			0.04	0.41	0.05	0.30	-0.37	0.38	0.17	0.35
INER	0.09	0.29	-0.20	0.43	-0.04	0.41			0.02	0.29	-0.41	0.37	0.13	0.33
KRISS	0.07	0.10	-0.22	0.34	-0.05	0.30	-0.02	0.29			-0.42	0.25	0.12	0.19
LNMRI	0.50	0.25	0.21	0.41	0.37	0.38	0.41	0.37	0.42	0.25			0.54	0.30
NIM	-0.04	0.20	-0.34	0.38	-0.17	0.35	-0.13	0.33	-0.12	0.19	-0.54	0.30		

BIPM.RI(II)-K1.Co-58 and 2000 **APMP.RI(II)-K2.Co-58**

Degrees of equivalence for equivalent activity of ^{58}Co

y-axis: $[\boldsymbol{D_i} = (x_i - x_R)] / \text{(MBq)}$

x-axis labels: CMI-IIR, OMH, NPL, BNM-LNHB, PTB, NMIJ, BARC, CNEA, INER, KRISS, LNMRI, NIM

Red diamonds and **black square**: participants in BIPM.RI(II)-K1.Co-58 (the **black square** identifies the participant result prior to 1983)
Blue circles : participants in APMP.RI(II)-K2.Co-58 only
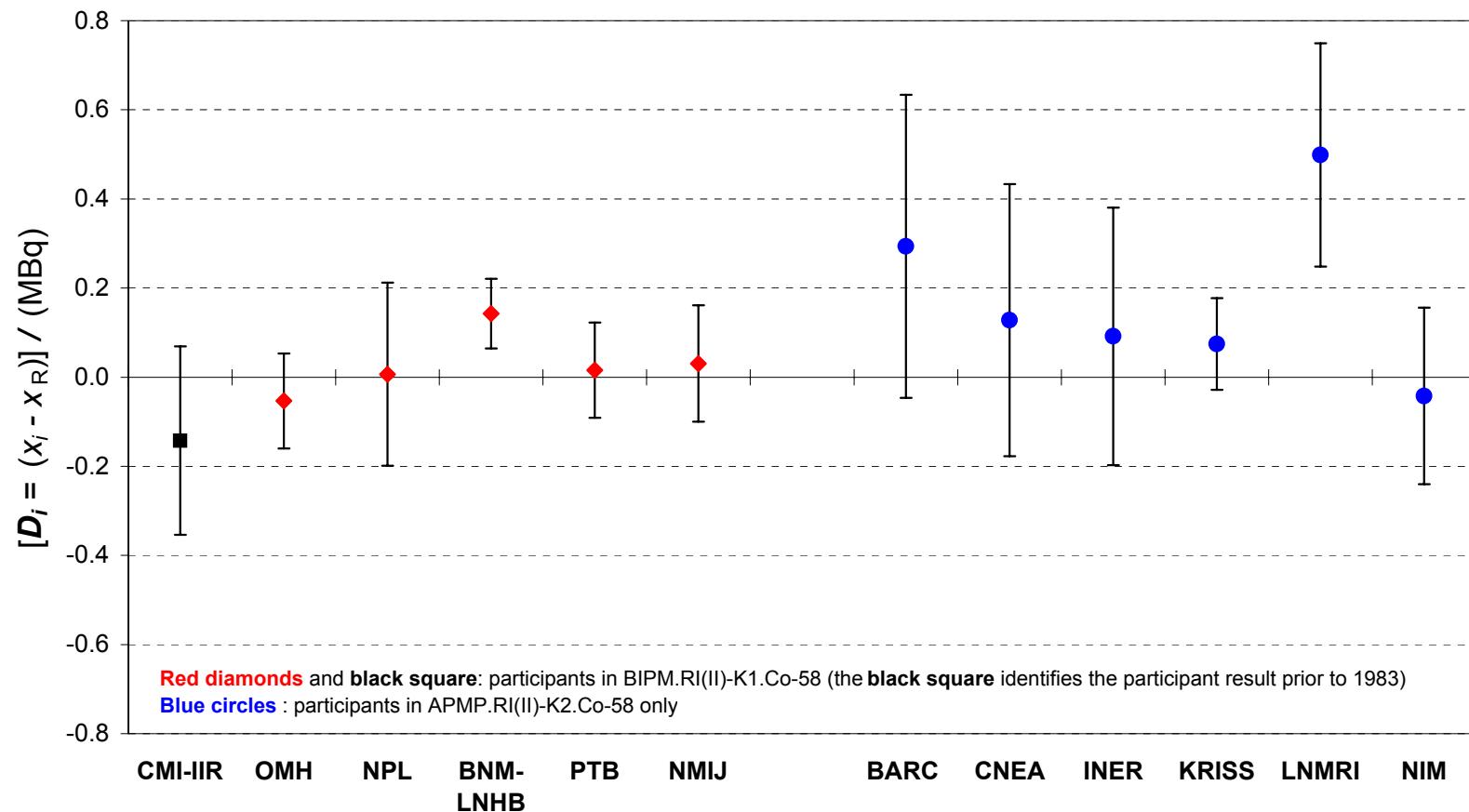
"2000 APMP.RI(II)-K2.Co-58" means that APMP.RI(II)-K2.Co-58 results were reported in year 2000.