

Table S1. Instrumental conditions for the Varian 800 MS

Flow Parameters (L/min)		Ion Optics (volts)	
Plasma Flow	17.5	First extraction Lens	-5
Auxiliary Flow	1.35	Second extraction Lens	-158
Sheath Gas	0.31	Third extraction Lens	-197
Nebulizer Flow	1.98	Corner Lens	-220
Sampling Depth (mm)	5.0	Mirror Lens Left	33
		Mirror Lens Right	27
		Mirror Lens Bottom	28
Other		Entrance Lens	2
RF Power (kW)	1.37	Fringe Bias	-3.1
Pump Rate (rpm)	10	Entrance Plate	-28
Stabilization Delay (s)	10	Pole bias	-1
Sample Delay (s)	90		
Sample Rinsing (s)	90	Acquisition	
Spray chamber cooling (°C)	10	Points per peak	1
		Scans/Replicate	30
		Replicates/Sample	10
		Dwell time (μs)	50 000
		Analyzed <i>m/z</i>	59, 60, 61, 62, 89

Table S2. Instrument parameters for the various ICP-MS systems used during the round robin exercises

Parameters	unit	Participating laboratories				
		CNSC	RPB/UL	RMC	ANL	AECL
Manufacturer		Agilent	ThermoFinnigan	Perkin-Elmer/Sciex	Perkin-Elmer/Sciex	ThermoFisher
Model		7700X	Element 2	Elan 6000 DRC-II	ELAN 6000 DRC-II	Element XR
Mass filter configuration		Quadrupole	DF-reversed Nier-Johnson	Quadrupole	Quadrupole	DF-reversed Nier-Johnson
Collision cell technology		Yes	No	Yes	Yes	No
Resolution used		N.A.	Medium	N.A.	N.A.	Medium
Introduction system		Standard (MicroMist nebulizer, Peltier-cooled Scott double pass spray chamber, 2.5 mm id quartz torch)	Scott double pass spray chamber	Apex-Q	PFA, PC-3 Peltier-cooled	MicroMist nebulizer & cyclone chamber
Sample flow rate	mL min ⁻¹	0.4	0.6	0.35	0.83	1
Gas Flow	L min ⁻¹					
Cooling Gas Flow		n/a	16.00	15	15.00	15
Auxiliary gas flow		0.30	1.2	1.2	1.20	1.2
Sample gas flow		0.81	1.005	0.92	0.96	0.89
RF power	W	1550	1251	1500	1100	1250
Guard electrode		No	Yes	No	No	Yes
Detector voltage	V	1205 (pulse) 1712 (analog)	1600	1050 (pulse) -1600 (analog)	1000 (pulse) -1581 (analog)	2800
Sampling cone		Nickel	Nickel	Platinum	Nickel	Nickel
Skimmer cone		Nickel	Nickel	Platinum	Nickel	Nickel
<i>m/z</i> monitored		56-62	45, 58, 60, 61, 62, 64, 66, 69, 71, 115	54, 56, 57, 58, 60, 61, 62, 69, 71	45, 52-68, 115	45, 56, 57, 58, 60, 61, 62

Number of passes		100	7	10	15	6
Number of replicates		3	7	15	7	3
Acquisition time	s	70	151	101	206	120
Dwell time	ms	0.5-5	10	100	100	30
Collision cell parameters						
Gas flow	mL/min	8.3 (He)	N.A.	0.8 (NH ₃)	Not Used	N.A.

N. A. – Not applicable

Table S3. Gamma-spectrometer parameters for the quantification of ^{60}Co activity.

Parameters	unit	CNSC	RPB	UL	RMC	ANL	AECL
Manufacturer		Canberra	Canberra	ORTEC	ORTEC	ORTEC	Canberra
Model		BE5030 S	GX13022	GEM-15180	GMX35-PLUS	GEM 50195-P	GX1018
Detector type		BE-Ge	HPGe	HPGe	HPGe	HPGe coaxial	HPGe N-type
Counting efficiency	%	50	130	15	40	56	10
Detector size	cm^3	155	500	530	663	255	43
Resolution	KeV (^{60}Co , 1.332 MeV)	2.28	1.95	1.69	1.95	1.8	1.86
Counting time	s	100	120	3 600	300	640 -1 376	14 400
Dead time	%	3.7	0.08 – 0.15	0.03 – 2.58	3	9 – 18	0 – 1.5

Table S4. Results submitted by the participating laboratories for both round robin exercises.

Participating Laboratory	Sample ID	Co-60 concentration (ng g ⁻¹)		Ni-60 concentration (ng g ⁻¹)		Age (a)			
		Measured	Std. Uncertainties	Measured	Std. Uncertainties	Calculated	Expanded Uncertainties (k=2)	Expected	Bias from Expected (%)
CNSC	1.1	11.69	0.35	4.19	0.15	2.33	0.13	2.34	-0.4
	1.2	12.79	0.24	53.56	2.82	12.52	0.48	12.98	-3.5
	1.3	13	0.30	1048	9.96	33.48	4.47	34.04	-1.6
	2.1	10.967	0.33	0.57	0.52	0.39	0.48	0.04	918
	2.2	10.162	0.31	4.78	3.19	2.93	2.26	0.83	254
	2.3	11.194	0.34	5.64	0.14	3.1	0.23	2.88	7.8
	2.4	10.891	0.33	12.99	0.63	5.97	0.45	5.96	0.1
2.5	9.418	0.29	47.07	1.38	13.62	0.59	14.02	-2.8	
RPB	1.1	13.69	0.09	6.4	0.56	2.92	0.29	2.34	24.8
	1.2	14.23	0.10	67.6	1.1	13.3	0.15	12.98	2.5
	1.3	14.06	0.11	1178	9	33.7	0.11	34.04	-1
	2.1	10.896	0.21	2.51	2.42	1.58	1.90	0.04	4025
	2.2	10.12	0.20	13.71	10.59	6.51	4.69	0.83	687
	2.3	11.26	0.22	6.27	1	3.37	0.61	2.88	17.1
	2.4	10.91	0.21	14.87	0.71	6.54	0.31	5.96	9.7
2.5	9.2	0.18	55.1	0.92	14.78	0.23	14.02	5.5	
UL	1.1	12.18	0.09	4.77	0.3	2.51	0.19	2.34	7.3
	1.2	12.91	0.75	59.44	0.52	13.1	0.51	12.98	0.9
	1.3	13.12	0.32	1195	6.11	34.39	0.26	34.04	1
	2.1	10.9	0.30	0.9	0.8	0.6	0.72	0.04	1466
	2.2	10	0.28	4	2	2.6	1.51	0.83	214
	2.3	11	0.30	6.2	0.4	3.4	0.27	2.88	18.2
	2.4	10.9	0.30	13.1	0.1	6	0.16	5.96	0.6
2.5	9.1	0.25	47.3	0.4	13.8	0.25	14.02	-1.5	
RMC	1.1	13.12	0.06	3.28	0.007	1.69	0.01	2.34	-27.8
	1.2	13.49	0.14	50.85	3.42	11.87	0.57	12.98	-8.6
	1.3	13.35	0.06	964.38	50.346	32.6495	0.54	34.04	-4.1
	2.1	11.17	0.05	0.6	1.8	0.4	1.61	0.04	944
	2.2	10.21	0.05	1.1	23.8	0.79	22.19	0.83	-4.5
	2.3	11.3	0.05	5.9	1.8	3.2	1.10	2.88	11.2
	2.4	10.88	0.05	17.2	0.8	7.22	0.30	5.96	21.1
2.5	9.36	0.04	50.9	1.8	14.17	0.32	14.02	1.1	
ANL	2.1	11.191	0.04	0.42	0.19	0.28	0.17	0.04	631
	2.2	10.169	0.03	3.1	1.23	2.02	0.98	0.83	144
	2.3	11.26	0.04	5.46	0.24	3.01	0.15	2.88	4.6
	2.4	10.825	0.04	13.05	0.13	6.02	0.06	5.96	1
	2.5	9.325	0.03	49.17	0.19	13.96	0.04	14.02	-0.4
AECL	2.1	11.257	0.22	<DL ₁		0		0.04	-100
	2.2	10.365	0.07	<DL ₂		0		0.83	-100
	2.3	11.388	0.08	5.3	0.7	2.91	0.44	2.88	1.1
	2.4	11.026	0.12	12.5	0.4	5.76	0.19	5.96	-3.4
	2.5	9.331	0.05	53	0.9	14.44	0.16	14.02	3

DL₁ = 0.4 ng g⁻¹
 DL₂ = 3 ng g⁻¹