IAEA Analytical Quality in Nuclear Applications Series No. 58

IAEA-RML-2016-01 Proficiency Test for Determination of Radionuclides in Sea Water



IAEA-RML-2016-01 PROFICIENCY TEST FOR DETERMINATION OF RADIONUCLIDES IN SEA WATER

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INTERNATIONAL ATOMIC ENERGY AGENCY VIENNA, 2019

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FOREWORD

The Radiometrics Laboratory of the IAEA Environment Laboratories has been providing quality support products and services for the past 50 years. These include the organization of proficiency tests and interlaboratory comparisons, and the production of certified reference materials, including a wide range of marine sample matrices and radionuclide levels.

As part of these activities, a third proficiency test exercise was organized, at the request of the Nuclear Regulation Authority of Japan, to test the performance of participating laboratories in an analysis of radionuclides in a seawater sample. This exercise was initiated to support laboratories in seawater analyses of ³H, ¹³⁴Cs, ¹³⁷Cs and ⁹⁰Sr in relation to the accident at the Fukushima Daiichi nuclear power plant in March 2011 and subsequent contamination of the marine environment. Earlier exercises are described in IAEA Analytical Quality in Nuclear Applications Series Nos 40–43 and 51.

The IAEA is grateful to the Government of Monaco for its support and wishes to thank all the participants and laboratories who took part in this proficiency test exercise. The IAEA officers responsible for this publication were A.V. Harms, I. Osvath and D. Osborn of the IAEA Environment Laboratories.

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1. INTRODUCTION

1.1. BACKGROUND

The IAEA Environment Laboratories (IAEA-EL) in Monaco and Seibersdorf regularly organize proficiency tests (PT) for radionuclides in environmental samples to support laboratories in IAEA Member States.

1.2. OBJECTIVES

This proficiency test was initiated to support laboratories in sea water analyses of ³H, ⁹⁰Sr, ¹³⁴Cs and ¹³⁷Cs. The results of this exercise allowed the participating laboratories to evaluate their performance in the analysis of these radionuclides for this sample type.

1.3. SCOPE

This publication describes the organization and the results of a third proficiency test organized in cooperation with the Nuclear Regulation Authority (NRA) in Japan. A total of 55 laboratories from 30 countries participated in this exercise during the period September – December 2016. This included 17 laboratories from Japan and 38 laboratories from other IAEA Member States. The results of the Japanese laboratories were considered as a separate group (participants 1–17). The full list of participants is given on pages 59–65. Results of similar earlier exercises are described in IAEA Analytical Quality in Nuclear Applications Series Nos 40–43 and 51 [1–5] and in Ref. [6].

1.4. STRUCTURE

This publication contains a description of material offered and the reporting requirements (Section 2), the performance criteria (Section 3), the results of the exercise and discussion (Section 4), an appendix presenting the performance evaluation sorted by radionuclide (Appendix I), an appendix presenting the performance evaluation sorted by participant (Appendix II) and a list of participants (Appendix III).

2. MATERIAL AND METHODS

2.1. MATERIAL DISTRIBUTION AND REPORTING REQUIREMENTS

A sample containing 5 L of filtered Mediterranean sea water spiked by the IAEA with the radionuclides 3 H, 90 Sr, 134 Cs and 137 Cs was distributed to the participants, with the massic activities only known to the IAEA. The massic activities were traceable to a standard provided by Czech Metrology Institute ČMI. The combined massic activities in the exercise samples were lower than the natural activity level of 40 K in sea water (which is approximately 12 Bq kg⁻¹). The 3 H, 90 Sr, 134 Cs and 137 Cs massic activities for the samples were approximately 1.4, 0.22, 0.22 and 0.18 Bq kg⁻¹, respectively. The sample also contained a non-active Cs-carrier at 10 mg kg⁻¹ in order to stabilize the solution and to avoid adsorption of Cs to the container walls. No Sr was added to the sample as non-active Sr present naturally in sea water will act as a carrier for 90 Sr.

The participants were required to report to the IAEA the ³H, ⁹⁰Sr, ¹³⁴Cs and ¹³⁷Cs massic activities (in Bq kg⁻¹) of the proficiency test sample combined with the associated uncertainties (also in Bq kg⁻¹). Additionally, the participants were asked to submit the following:

A short description of the analytical method used for the sample analysis. The Information Sheet sent to the participants suggested for ³H distillation followed by liquid scintillation counting. For ⁹⁰Sr, precipitation from sea water as mixed Ca/Sr oxalate or carbonate followed by a standard ⁹⁰Sr procedure (e.g. a radiochemical procedure such as precipitation with fuming nitric acid, liquid-liquid extraction or extraction chromatography followed by a measurement technique such as gas-flow proportional counting or liquid scintillation counting) were suggested. For ¹³⁴Cs and ¹³⁷Cs, three methods were suggested: (i) direct gamma spectrometry, (ii) adsorption on AMP (ammonium molybdophosphate, (NH₄)₃PO₄Mo₁₂O₃₆) and subsequent gamma spectrometry;

- Type of calibration and software used for gamma ray spectrometry;
- Nuclear data used;
- An uncertainty budget for the measurement results.

The reference date for reporting massic activities was set at 1 September 2016. At this date, the ranges for the traceable massic activities in the proficiency test exercise samples sent to the participants were 1.40-1.42 Bq kg^{-1 3}H, 0.2201-0.2226 Bq kg^{-1 90}Sr, 0.2238-0.2264 Bq kg^{-1 134}Cs and 0.1756-0.1776 Bq kg^{-1 137}Cs, respectively (see Table 1).

Participant	³ H massic activity (Bq kg ⁻¹)	⁹⁰ Sr massic activity (Bq kg ⁻¹)	¹³⁴ Cs massic activity (Bq kg ⁻¹)	¹³⁷ Cs massic activity (Bq kg ⁻¹)
1*	1.40 ± 0.05	0.2203 ± 0.0016	0.2240 ± 0.0009	0.1757 ± 0.0014
2*	1.41 ± 0.05	0.2214 ± 0.0016	0.2251 ± 0.0009	0.1766 ± 0.0015
3*	1.41 ± 0.05	0.2204 ± 0.0016	0.2242 ± 0.0009	0.1759 ± 0.0014
4*	1.41 ± 0.05	0.2218 ± 0.0016	0.2256 ± 0.0009	0.1770 ± 0.0015
5*	1.41 ± 0.05	0.2211 ± 0.0016	0.2249 ± 0.0009	0.1764 ± 0.0015
6*	1.42 ± 0.05	0.2222 ± 0.0016	0.2260 ± 0.0009	0.1773 ± 0.0015
7*	1.41 ± 0.05	0.2215 ± 0.0016	0.2253 ± 0.0009	0.1767 ± 0.0015
8*	1.41 ± 0.05	0.2208 ± 0.0016	0.2245 ± 0.0009	0.1761 ± 0.0015
9*	1.41 ± 0.05	0.2217 ± 0.0016	0.2254 ± 0.0009	0.1769 ± 0.0015
10*	1.41 ± 0.05	0.2215 ± 0.0016	0.2252 ± 0.0009	0.1767 ± 0.0015
11*	1.41 ± 0.05	0.2206 ± 0.0016	0.2244 ± 0.0009	0.1760 ± 0.0015
12*	1.41 ± 0.05	0.2207 ± 0.0016	0.2244 ± 0.0009	0.1761 ± 0.0015
13*	1.41 ± 0.05	0.2219 ± 0.0016	0.2257 ± 0.0009	0.1770 ± 0.0015
14*	1.41 ± 0.05	0.2217 ± 0.0016	0.2255 ± 0.0009	0.1769 ± 0.0015
15*	1.41 ± 0.05	0.2215 ± 0.0016	0.2253 ± 0.0009	0.1767 ± 0.0015
16*	1.41 ± 0.05	0.2215 ± 0.0016	0.2252 ± 0.0009	0.1767 ± 0.0015
17*	1.41 ± 0.05	0.2209 ± 0.0016	0.2246 ± 0.0009	0.1762 ± 0.0015
18	1.40 ± 0.05	0.2203 ± 0.0016	0.2240 ± 0.0009	0.1757 ± 0.0014
19	1.41 ± 0.05	0.2205 ± 0.0016	0.2243 ± 0.0009	0.1760 ± 0.0014
20	1.41 ± 0.05	0.2214 ± 0.0016	0.2252 ± 0.0009	0.1766 ± 0.0015
21	1.41 ± 0.05	0.2209 ± 0.0016	0.2246 ± 0.0009	0.1762 ± 0.0015
22	1.41 ± 0.05	0.2213 ± 0.0016	0.2251 ± 0.0009	0.1766 ± 0.0015
23	1.41 ± 0.05	0.2206 ± 0.0016	0.2244 ± 0.0009	0.1760 ± 0.0015
24	1.41 ± 0.05	0.2214 ± 0.0016	0.2252 ± 0.0009	0.1767 ± 0.0015
25	1.41 ± 0.05	0.2217 ± 0.0016	0.2254 ± 0.0009	0.1769 ± 0.0015
26	1.41 ± 0.05	0.2213 ± 0.0016	0.2251 ± 0.0009	0.1766 ± 0.0015
27	1.41 ± 0.05	0.2208 ± 0.0016	0.2246 ± 0.0009	0.1762 ± 0.0015
28	1.41 ± 0.05	0.2209 ± 0.0016	0.2246 ± 0.0009	0.1762 ± 0.0015
29	1.41 ± 0.05	0.2211 ± 0.0016	0.2249 ± 0.0009	0.1764 ± 0.0015
30	1.41 ± 0.05	0.2216 ± 0.0016	0.2254 ± 0.0009	0.1768 ± 0.0015
31	1.42 ± 0.05	0.2223 ± 0.0016	0.2261 ± 0.0009	0.1773 ± 0.0015
32	1.41 ± 0.05	0.2210 ± 0.0016	0.2247 ± 0.0009	0.1763 ± 0.0015

TABLE 1. IAEA ASSIGNED VALUES

Participant	³ H massic activity (Bq kg ⁻¹)	⁹⁰ Sr massic activity (Bq kg ⁻¹)	¹³⁴ Cs massic activity (Bq kg ⁻¹)	¹³⁷ Cs massic activity (Bq kg ⁻¹)
33	1.42 ± 0.05	0.2223 ± 0.0016	0.2261 ± 0.0009	0.1773 ± 0.0015
34	1.41 ± 0.05	0.2210 ± 0.0016	0.2248 ± 0.0009	0.1763 ± 0.0015
35	1.41 ± 0.05	0.2219 ± 0.0016	0.2257 ± 0.0009	0.1770 ± 0.0015
36	1.41 ± 0.05	0.2208 ± 0.0016	0.2246 ± 0.0009	0.1762 ± 0.0015
37	1.41 ± 0.05	0.2215 ± 0.0016	0.2252 ± 0.0009	0.1767 ± 0.0015
38	1.41 ± 0.05	0.2216 ± 0.0016	0.2253 ± 0.0009	0.1768 ± 0.0015
40	1.41 ± 0.05	0.2216 ± 0.0016	0.2253 ± 0.0009	0.1768 ± 0.0015
41	1.41 ± 0.05	0.2219 ± 0.0016	0.2257 ± 0.0009	0.1770 ± 0.0015
42	1.41 ± 0.05	0.2211 ± 0.0016	0.2248 ± 0.0009	0.1764 ± 0.0015
43	1.41 ± 0.05	0.2217 ± 0.0016	0.2255 ± 0.0009	0.1769 ± 0.0015
44	1.41 ± 0.05	0.2204 ± 0.0016	0.2241 ± 0.0009	0.1759 ± 0.0014
45	1.41 ± 0.05	0.2210 ± 0.0016	0.2247 ± 0.0009	0.1763 ± 0.0015
46	1.41 ± 0.05	0.2212 ± 0.0016	0.2249 ± 0.0009	0.1764 ± 0.0015
47	1.41 ± 0.05	0.2210 ± 0.0016	0.2248 ± 0.0009	0.1763 ± 0.0015
48	1.41 ± 0.05	0.2211 ± 0.0016	0.2249 ± 0.0009	0.1764 ± 0.0015
49	1.41 ± 0.05	0.2212 ± 0.0016	0.2249 ± 0.0009	0.1765 ± 0.0015
50	1.41 ± 0.05	0.2211 ± 0.0016	0.2249 ± 0.0009	0.1764 ± 0.0015
51	1.41 ± 0.05	0.2208 ± 0.0016	0.2245 ± 0.0009	0.1761 ± 0.0015
52	1.41 ± 0.05	0.2210 ± 0.0016	0.2248 ± 0.0009	0.1764 ± 0.0015
53	1.41 ± 0.05	0.2222 ± 0.0016	0.2260 ± 0.0009	0.1773 ± 0.0015
54	1.41 ± 0.05	0.2212 ± 0.0016	0.2249 ± 0.0009	0.1765 ± 0.0015
55	1.42 ± 0.05	0.2226 ± 0.0016	0.2264 ± 0.0009	0.1776 ± 0.0015

TABLE 1. IAEA ASSIGNED VALUES (cont.)

* Participant from Japan

3. PERFORMANCE CRITERIA

The methodology adopted for this exercise is described in Ref. [6] and was slightly updated from the existing IAEA methodology [7] (i.e., in this exercise a k value of 2.58 instead of 2.56 was used and a normalisation factor was introduced to the trueness equation; see Equation 5 below). The scoring system took into account the accuracy, precision and trueness of the reported data and included in the evaluation both the combined standard uncertainty of the IAEA value and the combined standard uncertainty reported by the participating laboratories. The IAEA values, which were used for the data evaluation, were the certified values of radionuclides at the reference date. A result must pass three tests described in 3.1 and 3.2 below (see Table 2) to be assigned the status 'Accepted', otherwise it was assigned the status 'Warning' or 'Not accepted'.

3.1. ACCURACY

The first step in producing a score for a result $Value_{Analyst}$ was the estimation of the bias. The relative bias between the Analyst's value and the IAEA target value was calculated as follows and expressed as a percentage:

$$Bias_{\text{relative}} = \frac{Value_{\text{Analyst}} - Value_{\text{IAEA}}}{Value_{\text{IAEA}}} \times 100\%$$
(1)

The absolute value of the relative bias was compared to the Maximal Accepted Relative Bias (MARB). Participants' results were scored as 'Pass' for accuracy when:

$$|Bias_{\text{relative}}| \le \text{MARB}$$
 (2)

The MARB values used in this evaluation were 20% for both 134 Cs and 137 Cs and 25% for both 3 H and 90 Sr.

3.2. PRECISION AND TRUENESS

The precision P for each result was calculated according to the following equation:

$$P = \sqrt{\left(\frac{unc_{\text{IAEA}}}{Value_{\text{IAEA}}}\right)^2 + \left(\frac{unc_{\text{Analyst}}}{Value_{\text{Analyst}}}\right)^2} \times 100\%$$
(3)

The precision *P* was compared to the Limit of Accepted Precision (LAP). The participants' results were scored as 'Pass' for precision when:

$$P \le LAP$$
 (4)

The LAP values used in this evaluation were 20% for both ¹³⁴Cs and ¹³⁷Cs and 25% for both ³H and ⁹⁰Sr.

The participants' results for trueness were scored as 'Pass' when:

$$|Bias_{\text{relative}}| \le \frac{Value_{\text{Analyst}}}{Value_{\text{IAEA}}} 2.58 P \tag{5}$$

3.3. FINAL EVALUATION

For the final evaluation, all three scores were combined (see Table 2). The result was considered as 'Accepted' if it passed all three tests. If the accuracy test was failed, the result was considered as 'Not accepted'. If the accuracy test was passed but one of the other two tests was failed, the result was assigned the 'Warning' status. The 'Warning' status will reflect cases in which the reported result was close enough to the assigned property value, but its associated uncertainty was deemed to be either too small or too large.

Accuracy	Precision	Trueness	Final evaluation
Pass	Pass	Pass	Accepted
Pass	Fail	Pass	Warning
Pass	Pass	Fail	Warning
Fail	Pass/Fail	Pass/Fail	Not accepted

TABLE 2. PERFORMANCE EVALUATION CRITERIA

These evaluation criteria can also be illustrated by plotting the relative bias against the relative uncertainty of the participants' result (see Figure 1). In the illustrated case, a relative uncertainty of 1% for the IAEA value is assumed with MARB and LAP limits of 20%.

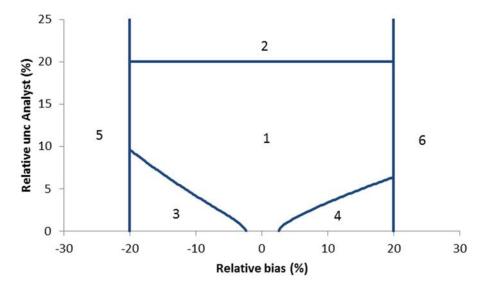


FIG. 1. Visualization of performance evaluation criteria.

The plot consists of six zones (Zone 1 'Accepted'; Zones 2, 3 and 4 'Warning'; Zones 5 and 6 'Not accepted'), whose areas are defined by the three tests used above to evaluate the data. The areas of Zones 1, 3 and 4 are finite, while the areas of Zones 2, 5 and 6 are infinite. A result located in Zone 1 passes all three tests (evaluation 'Accepted'). A result located in Zone 2 fails only the precision test as its associated uncertainty is deemed to be too large (evaluation: 'Warning'). A result located in Zones 3 and 4 fails only the trueness test as its associated uncertainty is deemed to be too stated uncertainty is deemed to be too small (evaluation: 'Warning'). A result located in Zones 5 and 6 fails (at least) the accuracy test as its relative bias is larger than the MARB (evaluation: 'Not accepted').

3.4. COMPARISON OF PARTICIPANTS' VALUES WITH THE IAEA VALUES

The means and the uncertainties for the combined participants' results were calculated according to a method developed by Cox (i.e. the weighted mean of the largest consistent subset containing p results) [8] and subsequently compared with the IAEA values. The mean of the combined participants' results, $Value_{Combined}$, was tested against the IAEA value, $Value_{IAEA}$, using this equation:

$$t = \frac{Value_{\text{Combined}} - Valu_{\text{IAEA}}}{\sqrt{(unc_{\text{Combined}})^2 + (unc_{\text{IAEA}})^2}}$$
(6)

The effective degrees of freedom v_{eff} were determined with the Welch-Satterthwaite equation. The effective degrees of freedom v_{eff} were rounded and the critical value t_{crit} for this value was identified.

The criterion for passing the *t* test was:

$$|t| < t_{\rm crit}$$

If the absolute value of t was greater than the critical value t_{crit} , this indicates there was a significant difference between the combined participants' results and the IAEA value.

(7)

4. RESULTS AND DISCUSSION

In total 159 measurement results were reported by 55 laboratories from 30 countries for ³H, ⁹⁰Sr, ¹³⁴Cs and ¹³⁷Cs. The evaluation of these results showed that 72% of all reported results were 'Accepted', while 17% of the individual measurement results were 'Not accepted' with the remaining 11% having the 'Warning' status. The performance evaluation for ³H, ⁹⁰Sr, ¹³⁴Cs and ¹³⁷Cs is summarized in Table 3. The subset of the 50 Japanese participants' results showed that 84% of all reported results were 'Accepted', while 6% of the results were 'Not accepted', with the remaining 10% having the 'Warning' status.

Radionuclide	Number of submitted results	Accepted	Warning	Not accepted
³ H	24 (10)	14 (7)	3 (1)	7 (2)
⁹⁰ Sr	27 (8)	19 (5)	4 (3)	4 (0)
¹³⁴ Cs	54 (16)	43 (15)	5 (1)	6 (0)
¹³⁷ Cs	54 (16)	38 (15)	5 (0)	11 (1)

TABLE 3. SUMMARY EVALUATION OF THE RADIONUCLIDES REPORTED

NOTE: The numbers in brackets represent the subset of Japanese results For ¹³⁴Cs there was a significant negative bias of the combined participants' results (-2.8%), while there was no significant bias for ³H (-1.0%), ⁹⁰Sr (-2.3%) and ¹³⁷Cs (2.2%) (see Table 4).

Nuclide	Combined participants' result (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	Size of the LCS* (%)	<i>t</i> -value	Critical <i>t</i> -value	Bias (%)
³ H	1.395 ± 0.021	1.41 ± 0.05	18 (75%)	-0.30	2.07	-1.0
⁹⁰ Sr	0.216 ± 0.004	0.2214 ± 0.0016	20 (74%)	-1.20	2.06	-2.3
¹³⁴ Cs	0.2187 ± 0.0022	0.2250 ± 0.0009	49 (91%)	-2.67	2.00	-2.8
¹³⁷ Cs	0.1804 ± 0.0021	0.1765 ± 0.0015	47 (87%)	1.50	1.99	2.2

TABLE 4. COMPARISON OF THE COMBINED PARTICIPANTS' RESULTS WITH THE IAEA VALUE

*Size of the LCS (largest consistent subset) denotes the percentage of the returned results contributing to combined participants' results

For ³H, ⁹⁰Sr and ¹³⁷Cs about half of the participants' results showed a negative bias (58%, 44% and 39% of the results, respectively), while for ¹³⁴Cs the 42 out of 54 participants' results (78% of the results) showed a negative bias. Coincidence summing is a problem for ¹³⁴Cs as it leads to signal loss and hence underestimation of the activity levels for this radionuclide. It is clear from the results that some participants did not make a sufficient correction for coincidence summing. For the combined Japanese results, there were no significant relative differences with the IAEA values for all four radionuclides. Table 5 summarizes the data evaluation sorted by laboratory code.

TABLE 5. SUMMARY EVALUATION

Lab code	³ H	⁹⁰ Sr	¹³⁴ Cs	¹³⁷ Cs
1*	А	А	А	А
2*	W	W	А	А
3*	А	W	А	А
4*			А	А
5*			А	А
6*	А	W	А	А
7*	NA	А	А	А
8*			А	А
9*	А	А	А	А
10*			А	А
11*			А	А
12*	А			
13*	А		А	А
14*			А	NA
15*			А	А
16*	NA	А	W	А
17*	А	А	А	А
18			А	А
19	А		А	А
20		А	А	А
21			W	NA
22			А	А
23		А	NA	А
24	А	А	А	А
25		А	А	NA
26		А	А	А
27			А	А
28			А	А
29	А	А	А	А
30	А		А	А
31		А	А	А
32	W	А	А	NA
33		А	А	А
34	NA		A and W	A and A
35	NA	А	А	А
36	А		W	А
37		NA	А	А
38	W	А	А	А

Lab code	³ H	⁹⁰ Sr	¹³⁴ Cs	¹³⁷ Cs
39		А	NA	NA
40	NA	W	А	NA
41			А	W
42		NA	А	NA
43			NA	W
44	NA	NA	А	NA
45		А	A and A	A and A
46			W	W
47	А		А	А
48	А	А		
49			NA	W
50				
51	NA		NA	NA
52			NA	NA
53		NA	А	А
54			А	W
55			А	NA

A indicates 'Accepted', W indicates 'Warning' and NA indicates 'Not accepted' * Participant from Japan

The performance evaluation sorted by radionuclide and the bias plots are presented in Appendix I (see Tables 6–9 and Figures 2–9). In the bias plots, the 'Accepted' results are represented by dark blue points. 'Warning' and 'Not accepted' results are represented by the yellow and red points, respectively. The error bars represent the standard uncertainties of the bias (with a coverage factor of k = 1). The dotted lines represent a relative bias of $\pm 25\%$ or $\pm 20\%$ (Maximum Accepted Bias for ³H/⁹⁰Sr and ¹³⁴Cs/¹³⁷Cs, respectively). The performance evaluation sorted by laboratory code is presented in Appendix II. All laboratories reported their values with standard uncertainties (k = 1). However, a large spread in the submitted uncertainties was observed with relative uncertainties (at k = 1) ranging from 2.1% to 30% for ³H, from 1.5% to 20% for ⁹⁰Sr, from 2.0% to 47% for ¹³⁴Cs and from 1.6% to 43% for ¹³⁷Cs. However, most reported relative uncertainties were in the range of 5% – 12% (³H and ⁹⁰Sr), 6% – 10% (⁶⁰Co) and 3% - 10% (¹³⁴Cs and ¹³⁷Cs).

For ³H, all participants performed a distillation of the sea water samples, followed by liquid scintillation counting (LSC). Six participants (9*, 12*, 17*, 19, 30 and 48) performed electrolytic enrichment after distillation (and obtained excellent results with, in general, small uncertainties of less than 8% at k = 1). The direct measurements after distillation yielded slightly larger uncertainties generally between 8% and 15%.

For ⁹⁰Sr, the large majority of participants used gas-flow proportional counting (GPC) of chemically separated ⁹⁰Y as the analysis technique, except Participants 20, 35, 39 and 45 who used LSC/Cherenkov counting. Chemical separation techniques used included precipitations of Sr-oxalate or Sr-carbonate, barium chromate precipitations, iron hydroxide precipitation, nitric acid precipitations, cation-exchange chromatography, Sr-extraction chromatography and direct liquid-liquid extraction of ⁹⁰Y with HDEHP (di-(2-ethylhexyl)phosphoric acid). No significant difference between the performances of the chemical separation techniques is apparent.

For ¹³⁴Cs and ¹³⁷Cs, a small majority of the participants measured the sea water samples directly with gamma spectrometry, while the remaining laboratories either used a pre-concentration technique (i.e. adsorption on ammonium molybdophosphate or Ni/Cu cyanoferrate) to separate the caesium radionuclides from the sea water matrix followed by gamma spectrometry (Participants 1*, 3*, 9*, 13* 15*, 16*, 17*, 22, 27, 33, 35, 38, 40, and 44), evaporation of the sample followed by gamma spectrometry (Participants 19 and 52) or they used a combination of techniques (Participants 23, 34, 45 and 51). No significant difference in the performance between the two techniques is apparent.

APPENDIX I. PERFORMANCE EVALUATION TABLES SORTED BY RADIONUCLIDE

	Final score	Accepted	Warning	Accepted	Not reported	Not reported	Accepted	Not accepted	Not reported	Accepted	Not reported	Not reported	Accepted	Accepted	Not reported	Not reported	Not accepted	Accepted	Not reported
	Trueness	Pass	Fail	Pass		I	Pass	Fail	-	Pass	Ι	Ι	Pass	Pass	Ι	Ι	Fail	Pass	I
	Precision	Pass	Pass	Pass	I	Ι	Pass	Pass	-	Pass	Ι	Ι	Pass	Pass	Ι	Ι	Pass	Pass	-
	Accuracy	Pass	Pass	Pass	Ι	Ι	Pass	Fail	—	Pass	-	Ι	Pass	Pass	Ι	Ι	Fail	Pass	-
	Trueness limit (%)	25	12	23	Ι	Ι	32	25	-	11	-	Ι	15	33	Ι	Ι	26	14	-
	P (%)	8.9	5.7	9.1	Ι	-	11	14	—	4.2	-	-	6.1	12	Ι	Ι	6.4	5.6	-
	Relative bias (%)	12	-25	0	-	—	16	-34	—	-1	—	-	-3	10	Ι	Ι	70	-8	-
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.04	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.04
S FOR ³ H	IAEA value (Bq kg ⁻¹)	1.40	1.41	1.41	1.41	1.41	1.42	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.40
N RESULT	Lab uncert. (Bq kg ⁻¹)	0.13	0.05	0.12		Ι	0.17	0.13	-	0.04	Ι	Ι	0.07	0.18	Ι	Ι	0.13	0.06	-
TABLE 6. EVALUATION RESULTS FOR ³ H	Lab value (Bq kg ⁻¹)	1.57	1.06	1.40	Ι	Ι	1.64	0.93	-	1.39	-	Ι	1.36	1.56	Ι	Ι	2.40	1.30	-
TABLE 6. I	Lab code	1*	2*	3*	4*	5*	6*	7*	8*	9*	10^{*}	11*	12*	13*	14*	15*	16^{*}	17*	18

	Final score	Accepted	Not reported	Not reported	Not reported	Not reported	Accepted	Not reported	Not evaluated	Not reported	Not reported	Accepted	Accepted	Not reported	Warning	Not evaluated	Not accepted	Not accepted	Accepted	Not reported
	Trueness	Pass	I	I	I	Ι	Pass		I	Ι	I	Pass	Pass	Ι	Pass	Ι	Pass	Pass	Pass	
	Precision	Pass	I	-	I	-	Pass	1	-	Ι	Ι	Pass	Pass	-	Fail	-	Fail	Fail	Pass	-
	Accuracy	Pass	I	-	I	-	Pass	1	-	Ι	I	Pass	Pass	-	Pass	-	Fail	Fail	Pass	-
	Trueness limit (%)	30	I	—	I	—	43	I	-	-	Ι	22	10	-	22	-	45	159	57	-
	P (%)	13	Ι	—	Ι	—	15	-	-	—	-	9.8	3.8	—	72	—	27	30	20	-
	Relative bias (%)	-13	I	-	I	-	11	I	-	Ι	Ι	2	1	-	-22	-	-36	106	6	-
ont.)	IAEA uncert. (Bq kg ⁻¹)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.05	0.04	0.05	0.04	0.04
S FOR ³ H (c	IAEA value (Bq kg ⁻¹)	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.42	1.41	1.42	1.41	1.41	1.41	1.41
IN RESULT	Lab uncert. (Bq kg ⁻¹)	0.16	I	Ι	I	-	0.23		Ι	Ι	Ι	0.11	0.03	Ι	0.3	Ι	0.24	0.9	0.3	-
TABLE 6. EVALUATION RESULTS FOR ³ H (cont.)	Lab value (Bq kg ⁻¹)	1.22	I	-	I	-	1.56		< 5.2	-	Ι	1.38	1.43	-	1.1	< 2.0	0.90	2.9	1.5	-
TABLE 6. I	Lab code	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37

	Final score	Warning	Not evaluated	Not accepted	Not reported	Not reported	Not reported	Not accepted	Not reported	Not evaluated	Accepted	Accepted	Not reported	Not evaluated	Not accepted	Not reported	Not reported	Not reported	Not reported
	Trueness	Pass	-	Fail	-	Ι	Ι	Fail	Ι	Ι	Pass	Pass	Ι	Ι	Fail	Ι	Ι	Ι	I
	Precision	Fail	-	Pass	Ι	Ι	Ι	Pass	Ι	Ι	Pass	Pass	Ι	Ι	Pass	Ι	Ι	Ι	I
	Accuracy	Pass	—	Fail	-	Ι	Ι	Fail	Ι	Ι	Pass	Pass	Ι	Ι	Fail	Ι	Ι	Ι	I
	Trueness limit (%)	99	-	292	Ι	Ι	Ι	134	Ι	Ι	23	20	Ι	Ι	16	Ι	Ι	Ι	I
	P (%)	27	—	8.8	-	Ι	Ι	11	-	Ι	10	8.5	Ι	Ι	10	Ι	Ι	Ι	I
	Relative bias (%)	9-	—	1286	—	-	-	399	-	Ι	<u>S</u>	-10	Ι	Ι	-40	Ι	Ι	Ι	I
ont.)	IAEA uncert. (Bq kg ⁻¹)	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.05
S FOR ³ H (cont.)	IAEA value (Bq kg ⁻¹)	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.42
N RESULT	Lab uncert. (Bq kg ⁻¹)	0.4	Ι	1.6	Ι	Ι	Ι	0.7	Ι	Ι	0.12	0.10	Ι	Ι	0.08	Ι	Ι	Ι	I
TABLE 6. EVALUATION RESULTS FOR	Lab value (Bq kg ⁻¹)	1.3	< 0.7	19.6	Ι	Ι	Ι	7.0	Ι	< 4.5	1.34	1.27	Ι	< 3.3	0.85	Ι	Ι	Ι	I
TABLE 6. I	Lab code	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

	Final score	Accepted	Warning	Warning	Not reported	Not reported	Warning	Accepted	Not reported	Accepted	Not reported	Accepted	Accepted	Not reported	Not reported					
	Trueness	Pass	Fail	Fail	I	-	Fail	Pass	Ι	Pass	Ι	Ι	Ι	Ι	Ι	Ι	Pass	Pass	I	
	Precision	Pass	Pass	Pass	Ι	-	Pass	Pass	Ι	Pass	Ι	Ι	Ι	Ι	Ι	Ι	Pass	Pass	Ι	
	Accuracy	Pass	Pass	Pass	Ι	—	Pass	Pass	-	Pass	-	Ι	-	Ι	Ι	Ι	Pass	Pass	Ι	_
	Trueness limit (%)	20	11	7.2	Ι	-	4.5	15	Ι	31	Ι	Ι	Ι	Ι	Ι	Ι	12	20	Ι	
	P (%)	7.4	3.6	3.2	I	—	1.6	6.0	-	11	Ι	Ι	Ι	Ι	Ι	Ι	4.6	8.4	Ι	-
	Relative bias (%)	5	15	-14	Ι	—	8.8	2	-	10	Ι	Ι	Ι	Ι	Ι	Ι	0	-8		-
	IAEA uncert. (Bq kg ⁻¹)	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016
S FOR ⁹⁰ Sr	IAEA value (Bq kg ⁻¹)	0.2203	0.2214	0.2204	0.2218	0.2211	0.2222	0.2215	0.2208	0.2217	0.2215	0.2206	0.2207	0.2219	0.2217	0.2215	0.2215	0.2209	0.2203	0.2205
N RESULT	Lab uncert. (Bq kg ⁻¹)	0.017	0.009	0.006	Ι	-	0.004	0.013	Ι	0.03	Ι	Ι	Ι	Ι	Ι	Ι	0.010	0.017	I	
TABLE 7. EVALUATION RESULTS FOR	Lab value (Bq kg ⁻¹)	0.231	0.254	0.190	Ι		0.242	0.217	Ι	0.24	Ι	Ι	Ι	Ι	Ι	Ι	0.222	0.203	Ι	
TABLE 7. I	Lab code	1*	2*	3*	4*	5*	9*	7*	8*	*6	10^{*}	11*	12*	13*	14*	15*	16^{*}	17*	18	19

Lab value (Bq kg ⁻¹)Lab uncert. (Bq kg ⁻¹)IAEA value valueIAEA value (Bq kg ⁻¹)IAEA value (Bq kg ⁻¹)IAEA va	IAEA uncert. Relative bias (%) (Bq kg ⁻¹) bias (%) (0.0016 -8 0.0016 -8 0.0016 -10 0.0016 -10 0.0016 1.1 0.0016 1.1 0.0016 14 0.0016 14 0.0016 14 0.0016 14	 P (%) P (%) 5.0 5.0 5.0 5.0 7.7 7.7 - 	Trueness limit (%) 12 15 15 58 58 58 58 	Accuracy Pass Pass Pass Pass Pass Pass Pass Pas	Precision Pass Pass Pass Pass Pass Pass Pass Pas	Trueness Pass Pass Pass Pass Pass Pass Pass P	Final score Accepted Not reported Not reported Accepted Accepted Accepted
0.2214 0.2209 0.2209 0.2213 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2213 0.2213 0.2213 0.2214 0.2213 0.2213 0.2214 0.2213 0.2213 0.2214 0.2213 0.2213 0.2214 0.2213 0.2210 0.2210 0.2210 0.2210 0.2210 0.2219 0.2219		5.0 	12 - 12 - 44 15 15 58 58 	Pass – – Pass Pass Pass Pass	Pass 	Pass 	Accepted Not reported Not reported Accepted Accepted Accepted
0.2209 0.2213 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2213 0.2213 0.2214 0.2213 0.2214 0.2214 0.2213 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214 0.2214				– Pass Pass Pass Pass	– Pass Pass Pass Pass	Pass Pass Pass Pass Pass Pass Pass	Not reported Not reported Accepted Accepted Accepted Accepted
0.2213 0.2206 0.2214 0.2214 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2214 0.2215 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210		- 17 17 6.3 19 7.7 	- 44 15 58 58 	Pass Pass Pass Pass	Pass Pass Pass Pass	Pass Pass Pass Pass	Not reported Accepted Accepted Accepted Accepted
0.2206 0.2214 0.2217 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2213 0.2214 0.2211 0.2216 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210 0.2210		17 6.3 19 7.7 -	44 15 58 58 -	Pass Pass Pass Pass	Pass Pass Pass Pass	Pass Pass Pass Pass	Accepted Accepted Accepted Accepted
0.013 0.2214 0.05 0.2217 0.019 0.2213 0.019 0.2213 - 0.2208 - 0.2208 - 0.2208 - 0.2208 - 0.2209 - 0.2209 - 0.2211 0.013 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2213 0.014 0.2223 0.023 0.2210 0.023 0.2210 0.023 0.2210 0.053 0.2210 0.053 0.2210		6.3 19 7.7 -	15 58 22 -	Pass Pass Pass	Pass Pass Pass	Pass Pass Pass	Accepted Accepted Accepted
0.05 0.2217 0.019 0.2213 - 0.2208 - 0.2208 - 0.2208 - 0.2209 - 0.2209 - 0.2211 0.013 0.2216 - 0.2216 - 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2213 0.013 0.2223 0.016 0.2210 0.023 0.2210 0.023 0.2210 0.053 0.2210 0.055 0.2210		19 7.7 -	58 22 -	Pass Pass	Pass Pass	Pass	Accepted Accepted
0.019 0.2213 - 0.2208 - 0.2209 - 0.2209 - 0.2211 0.013 0.2216 - 0.2216 - 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2216 0.016 0.2210 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.053 0.2210 0.053 0.2210 0.053 0.2210		7.7	22 -	Pass	Pass	Pass	Accepted
- 0.2208 - 0.2209 - 0.2209 0.013 0.2211 - 0.2216 - 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2216 0.013 0.2223 0.016 0.2223 0.016 0.2210 0.023 0.2210 0.023 0.2210 0.023 0.2210 0.023 0.2210 0.053 0.2210 0.055 0.2210		1 1	I				
- 0.2209 0.013 0.2211 - 0.2216 - 0.2216 0.013 0.2216 0.013 0.2223 0.016 0.2210 0.015 0.2210 0.016 0.2210 0.017 0.2210 0.018 0.2210 0.019 0.2210 0.023 0.2210 0.023 0.2210 0.053 0.2210 0.055 0.2210	0.0016 -	-		I	-	-	Not reported
0.013 0.2211 - 0.2216 - 0.2216 0.013 0.2223 0.016 0.2223 0.015 0.2210 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223			I	Ι	-	-	Not reported
- 0.2216 0.013 0.2223 0.016 0.2220 0.016 0.2210 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223 0.023 0.2223	0.0016 -8	6.4	15	Pass	Pass	Pass	Accepted
0.013 0.2223 0.016 0.2210 0.015 0.2210 0.023 0.2223 - 0.2210 0.05 0.2210 0.05 0.2210	0.0016 -	-	-	-	-	-	Not reported
0.016 0.2210 0.023 0.2223 - 0.2210 - 0.2210 0.05 0.2210	0.0016 10	5.3	15	Pass	Pass	Pass	Accepted
0.023 0.2223 - 0.2210 0.05 0.2219	0.0016 6	6.9	19	Pass	Pass	Pass	Accepted
- 0.2210 0.05 0.2219	0.0016 1	10	27	Pass	Pass	Pass	Accepted
0.05 0.2219	0.0016 -	Ι	Ι	Ι	Ι	Ι	Not reported
	0.0016 13	20	58	Pass	Pass	Pass	Accepted
- 0.2208 0	0.0016 -	Ι	-	Ι	-	-	Not reported
0.163 0.019 0.2215 0	0.0016 -26	12	22	Fail	Pass	Fail	Not accepted
0.225 0.014 0.2216 0	0.0016 2	6.3	16	Pass	Pass	Pass	Accepted

	Final score	Accepted	Warning	Not reported	Not accepted	Not reported	Not accepted	Accepted	Not reported	Not reported	Accepted	Not reported	Not reported	Not reported	Not reported	Not accepted	Not reported	Not reported
	Trueness	Pass	Fail	-	Fail	-	Fail	Pass	-	Ι	Pass	Ι	Ι	Ι	Ι	Fail	-	I
	Precision	Pass	Pass	-	Pass	-	Pass	Pass	Ι	Ι	Pass	Ι	Ι	Ι	Ι	Pass	Ι	I
	Accuracy	Pass	Pass	_	Fail	—	Fail	Pass	Ι	Ι	Pass	-	Ι	Ι	Ι	Fail	Ι	I
	Trueness limit (%)	36	12	-	8.1	-	14	26	Ι	Ι	15	-	Ι	Ι	Ι	3.8	Ι	I
	P (%)	14	2.3	—	12	—	11	10	-	Ι	6.1	-	Ι	Ι	Ι	4.4	-	I
	Relative bias (%)	1	-14	-	-75	—	-51	2	-	Ι	2	Ι	Ι	Ι	Ι	-70	Γ	I
⁹⁰ Sr (cont.)	IAEA uncert. (Bq kg ⁻¹)	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016
S FOR ⁹⁰ Sr (IAEA value (Bq kg ⁻¹)	0.2213	0.2216	0.2219	0.2211	0.2217	0.2204	0.2210	0.2212	0.2210	0.2211	0.2212	0.2211	0.2208	0.2210	0.2222	0.2212	0.2226
N RESULT	Lab uncert. (Bq kg ⁻¹)	0.03	0.010		0.007	-	0.012	0.022	Ι	Ι	0.013	Ι	Ι	Ι	Ι	0.003	Ι	I
TABLE 7. EVALUATION RESULTS FOR	Lab value (Bq kg ⁻¹)	0.22	0.190	—	0.055	—	0.107	0.225	-	Ι	0.216	—	-	Ι	Ι	0.066	-	I
TABLE 7. F	Lab code	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

	Final score	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Not reported	Accepted	Accepted	Accepted	Warning	Accepted	Accepted	Accepted
	Trueness	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	1	Pass	Pass	Pass	Fail	Pass	Pass	Pass
	Precision	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Ι	Pass						
	Accuracy	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Ι	Pass						
	Trueness limit (%)	17	10	5.5	11	11	25	21	25	13	26	17	Ι	12	18	15	11	12	18	15
	P (%)	6.9	3.8	2.1	3.9	4.2	11	9.4	11	5.6	11	<i>9.T</i>	-	4.8	7.0	5.3	5.0	4.6	7.1	5.9
	Relative bias (%)	2	5	2.6	7	-2	6	-15	6	L	-3	-15	Ι	0	1	9	-12	-3	0	-2
	IAEA uncert. (Bq kg ⁻¹)	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009
S FOR ¹³⁴ Cs	IAEA value (Bq kg ⁻¹)	0.2240	0.2251	0.2242	0.2256	0.2249	0.2260	0.2253	0.2245	0.2254	0.2252	0.2244	0.2244	0.2257	0.2255	0.2253	0.2252	0.2246	0.2240	0.2243
N RESULTS	Lab uncert. (Bq kg ⁻¹)	0.015	0.009	0.005	0.009	0.009	0.022	0.018	0.022	0.012	0.023	0.015	Ι	0.011	0.016	0.013	0.010	0.010	0.016	0.013
TABLE 8. EVALUATION RESULTS FOR	Lab value (Bq kg ⁻¹)	0.219	0.236	0.230	0.241	0.220	0.206	0.191	0.205	0.210	0.218	0.191	Ι	0.225	0.228	0.239	0.198	0.218	0.225	0.219
TABLE 8. E	Lab code	1*	2*	3*	4*	5*	6 *	*7	8*	*6	10^{*}	11^{*}	12*	13*	14*	15*	16^{*}	17*	18	19

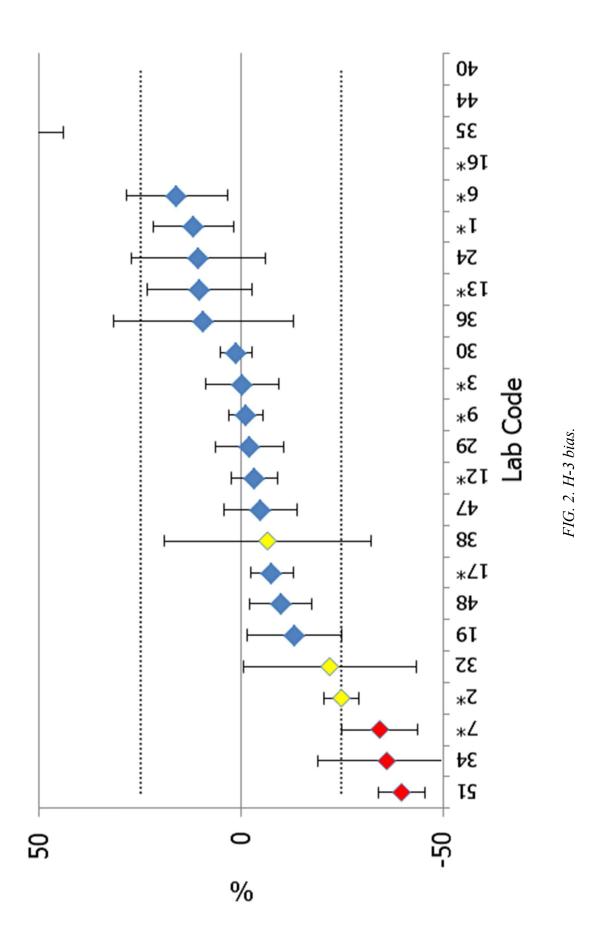
TABLE 8. EVALUATION RESULTS FOR	N RESULT		¹³⁴ Cs (cont.)							
$ \begin{array}{c c} Lab \ value \\ (Bq \ kg^{-1}) \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} Lab \\ uncert. \\ (Bq \ kg^{-1}) \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ value \\ (Bq \ kg^{-1}) \end{array} $	IAE, valu (Bq kg	(\mathbf{A}) ue (\mathbf{g}^{-1})	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
0.199 0.013 0.2252	0.22	52	0.0009	-12	6.5	15	Pass	Pass	Pass	Accepted
0.20 0.04 0.2246	 0.224	-6	0.0009	-11	20	46	Pass	Fail	Pass	Warning
0.210 0.008 0.2251	 0.225	1	0.0009	-7	3.8	9.2	Pass	Pass	Pass	Accepted
0.176 0.010 0.2244	0.224	4	0.0009	-22	5.7	12	Fail	Pass	Fail	Not accepted
0.254 0.019 0.2252	0.2252		0.0009	13	7.5	22	Pass	Pass	Pass	Accepted
0.240 0.020 0.2254	0.2254		0.0009	9	8.3	23	Pass	Pass	Pass	Accepted
0.220 0.020 0.2251	 0.2251		0.0009	-2	9.1	23	Pass	Pass	Pass	Accepted
0.23 0.03 0.2246	 0.2246		0.0009	3	11	30	Pass	Pass	Pass	Accepted
0.210 0.010 0.2246	 0.2246		0.0009	L—	4.8	12	Pass	Pass	Pass	Accepted
0.220 0.013 0.2249	 0.2249		0.0009	-2	5.8	15	Pass	Pass	Pass	Accepted
0.218 0.010 0.2254	 0.2254		0.0009	3	4.6	11	Pass	Pass	Pass	Accepted
0.226 0.017 0.2261	 0.2261		0.0009	0	7.6	20	Pass	Pass	Pass	Accepted
0.222 0.022 0.2247	 0.2247		0.0009	-1	9.9	25	Pass	Pass	Pass	Accepted
0.235 0.016 0.2261	 0.2261		0.0009	4	6.8	18	Pass	Pass	Pass	Accepted
0.191 0.014 0.2248	0.2248		0.0009	-15	7.3	16	Pass	Pass	Pass	Accepted
0.191 0.008 0.2248	0.2248	~	0.0009	-15	4.2	9.2	Pass	Pass	Fail	Warning
0.20 0.03 0.2257	 0.2257		0.0009	-14	14	31	Pass	Pass	Pass	Accepted
0.186 0.011 0.2246	0.2246		0.0009	-17	5.8	12	Pass	Pass	Fail	Warning
0.203 0.019 0.2252	 0.2252		0.0009	-10	9.4	22	Pass	Pass	Pass	Accepted

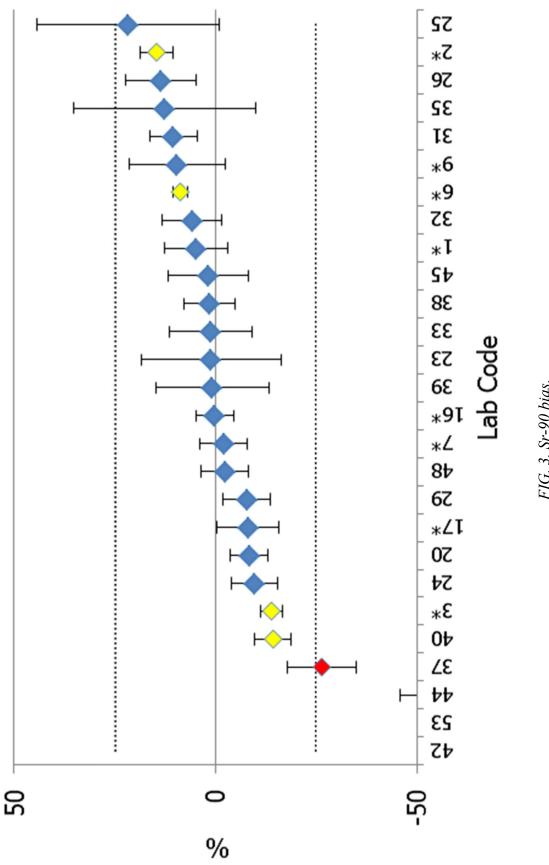
	VALUATIC	TABLE 8. EVALUATION RESULTS FOR	S FOR ¹³⁴ Cs	¹³⁴ Cs (cont.)							
Lab value (Bq kg ⁻¹)		Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
0.220		0.020	0.2253	0.0009	7	9.1	23	Pass	Pass	Pass	Accepted
0.151		0.018	0.2250	0.0009	-33	12	21	Fail	Pass	Fail	Not accepted
0.190	(0.020	0.2253	0.0009	-16	11	23	Pass	Pass	Pass	Accepted
0.18		0.03	0.2257	0.0009	-18	15	31	Pass	Pass	Pass	Accepted
0.21		0.04	0.2248	0.0009	-8	18	42	Pass	Pass	Pass	Accepted
0.15		0.07	0.2255	0.0009	-33	47	82	Fail	Fail	Pass	Not accepted
0.208	8	0.014	0.2241	0.0009	L-	6.5	16	Pass	Pass	Pass	Accepted
0.209	6	0.013	0.2247	0.0009	L-	6.2	15	Pass	Pass	Pass	Accepted
0.217	7	0.019	0.2247	0.0009	£—	8.6	21	Pass	Pass	Pass	Accepted
0.19	(0.04	0.2249	0.0009	-16	20	44	Pass	Fail	Pass	Warning
0.210	0	0.020	0.2248	0.0009	L-	9.5	23	Pass	Pass	Pass	Accepted
Ι		Ι	0.2249	0.0009	-	Ι	Ι	Ι	Ι	-	Not reported
0.28	8	0.04	0.2249	0.0009	26	13	44	Fail	Pass	Pass	Not accepted
Ι		Ι	0.2249	0.0009	-	Ι	Ι	Ι	Ι	Ι	Not reported
0.137	37	0.016	0.2245	0.0009	-39	12	18	Fail	Pass	Fail	Not accepted
0.161	51	0.025	0.2248	0.0009	-28	16	29	Fail	Pass	Pass	Not accepted
0.211	1	0.011	0.2260	0.0009	L—	5.1	12	Pass	Pass	Pass	Accepted
0.200	0	0.020	0.2249	0.0009	-11	10	23	Pass	Pass	Pass	Accepted
0.246	9	0.021	0.2264	0.0009	6	8.4	23	Pass	Pass	Pass	Accepted

·	Precision Trueness Final score	Pass Pass Accepted	- Not reported	Pass Pass Accepted	Pass Fail Not accepted	Pass Pass Accepted														
	Accuracy	Pass	Ι	Pass	Fail	Pass	Pass	Pass	Pass	Pass										
	Trueness limit (%)	18	16	4.6	25	12	23	29	31	13	37	24	Ι	13	20	17	11	12	25	18
	P (%)	6.5	6.8	1.8	8.0	4.7	8.8	12	10	5.1	15	8.7	Ι	5.4	12	6.1	4.9	4.8	9.7	7.3
	Relative bias (%)	6	-8	-3.3	20	2	3	-2	18	-3	8	5	Ι	-5	-32	11	-11	-3	0	9–
	IAEA uncert. (Bq kg ⁻¹)	0.0014	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0014	0.0014
S FOR ¹³⁷ Cs	IAEA value (Bq kg ⁻¹)	0.1757	0.1766	0.1759	0.1770	0.1764	0.1773	0.1767	0.1761	0.1769	0.1767	0.1760	0.1761	0.1770	0.1769	0.1767	0.1767	0.1762	0.1757	0.1760
N RESULTS	Lab uncert. (Bq kg ⁻¹)	0.012	0.011	0.003	0.017	0.008	0.016	0.020	0.021	0.009	0.025	0.016	Ι	0.009	0.014	0.012	0.008	0.008	0.017	0.012
TABLE 9. EVALUATION RESULTS FOR	Lab value (Bq kg ⁻¹)	0.187	0.163	0.170	0.212	0.180	0.182	0.173	0.207	0.171	0.162	0.185	Ι	0.169	0.121	0.196	0.158	0.171	0.176	0.165
TABLE 9. E	Lab code	1*	2*	3*	4*	5*	6 *	*7	8*	*6	10^{*}	11^{*}	12*	13*	14*	15*	16^{*}	17*	18	19

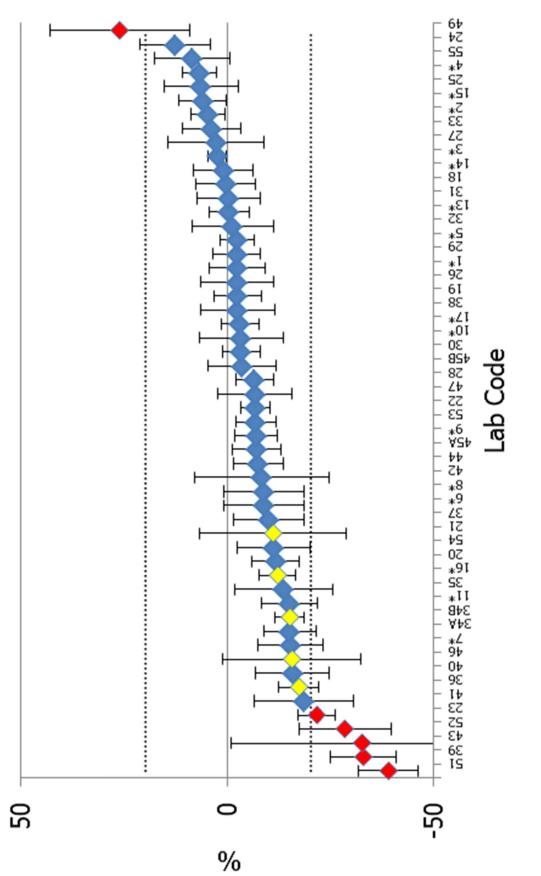
ABLE 9.	TABLE 9. EVALUATION RESULTS FOR	DN RESULT	S FOR ¹³⁷ Cs	¹³⁷ Cs (cont.)							
Lab code	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
20	0.162	0.013	0.1766	0.0015	8	8.1	19	Pass	Pass	Pass	Accepted
21	0.31	0.04	0.1762	0.0015	76	14	63	Fail	Pass	Fail	Not accepted
22	0.177	0.004	0.1766	0.0015	0.2	2.4	6.2	Pass	Pass	Pass	Accepted
23	0.165	0.008	0.1760	0.0015	9-	4.9	12	Pass	Pass	Pass	Accepted
24	0.179	0.014	0.1767	0.0015	1	6.T	21	Pass	Pass	Pass	Accepted
25	0.220	0.020	0.1769	0.0015	24	9.1	29	Fail	Pass	Pass	Not accepted
26	0.19	0.03	0.1766	0.0015	8	16	77	Pass	Pass	Pass	Accepted
27	0.174	0.013	0.1762	0.0015	-1	7.5	19	Pass	Pass	Pass	Accepted
28	0.200	0.010	0.1762	0.0015	13	5.1	15	Pass	Pass	Pass	Accepted
29	0.210	0.017	0.1764	0.0015	19	7.9	24	Pass	Pass	Pass	Accepted
30	0.195	0.020	0.1768	0.0015	10	10	29	Pass	Pass	Pass	Accepted
31	0.182	0.019	0.1773	0.0015	2	11	28	Pass	Pass	Pass	Accepted
32	0.215	0.017	0.1763	0.0015	22	7.9	25	Fail	Pass	Pass	Not accepted
33	0.178	0.012	0.1773	0.0015	0	6.8	18	Pass	Pass	Pass	Accepted
34A	0.196	0.023	0.1763	0.0015	11	12	34	Pass	Pass	Pass	Accepted
34B	0.189	0.009	0.1763	0.0015	7	4.8	13	Pass	Pass	Pass	Accepted
35	0.20	0.03	0.1770	0.0015	15	13	39	Pass	Pass	Pass	Accepted
36	0.154	0.009	0.1762	0.0015	-12	6.0	13	Pass	Pass	Pass	Accepted
37	0.197	0.019	0.1767	0.0015	11	9.7	28	Pass	Pass	Pass	Accepted

	Final score	Accepted	Not accepted	Not accepted	Warning	Not accepted	Warning	Not accepted	Accepted	Accepted	Warning	Accepted	Not reported	Warning	Not reported	Not accepted	Not accepted	Accepted	Warning	Not accepted
	Trueness	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Ι	Pass	Ι	Fail	Pass	Pass	Pass	Fail
	Precision	Pass	Pass	Pass	Fail	Pass	Fail	Pass	Pass	Pass	Fail	Pass	-	Fail	Ι	Pass	Pass	Pass	Fail	Pass
	Accuracy	Pass	Fail	Fail	Pass	Fail	Pass	Fail	Pass	Pass	Pass	Pass	-	Pass	Ι	Fail	Fail	Pass	Pass	Fail
	Trueness limit (%)	26	29	29	102	53	95	23	13	43	67	29	Ι	53	Ι	19	35	17	58	24
	P (%)	9.2	14	9.4	40	17	43	6.6	5.0	15	26	10	-	21	Ι	10	17	6.5	24	7.5
	Relative bias (%)	11	-21	21	-1	21	-15	35	5	8	2	13	-	2	Ι	-25	-20	1	4	26
¹³⁷ Cs (cont.)	IAEA uncert. (Bq kg ⁻¹)	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
	IAEA value (Bq kg ⁻¹)	0.1768	0.1765	0.1768	0.1770	0.1764	0.1769	0.1759	0.1763	0.1763	0.1764	0.1763	0.1764	0.1765	0.1764	0.1761	0.1764	0.1773	0.1765	0.1776
IN RESULT	Lab uncert. (Bq kg ⁻¹)	0.018	0.020	0.020	0.07	0.04	0.07	0.016	0.009	0.03	0.05	0.020	-	0.04	Ι	0.013	0.024	0.012	0.04	0.017
TABLE 9. EVALUATION RESULTS FOR	Lab value (Bq kg ⁻¹)	0.196	0.139	0.214	0.18	0.21	0.15	0.237	0.185	0.19	0.18	0.200	-	0.17	Ι	0.132	0.141	0.179	0.17	0.224
TABLE 9. F	Lab code	38	39	40	41	42	43	44	45A	45B	46	47	48	49	50	51	52	53	54	55

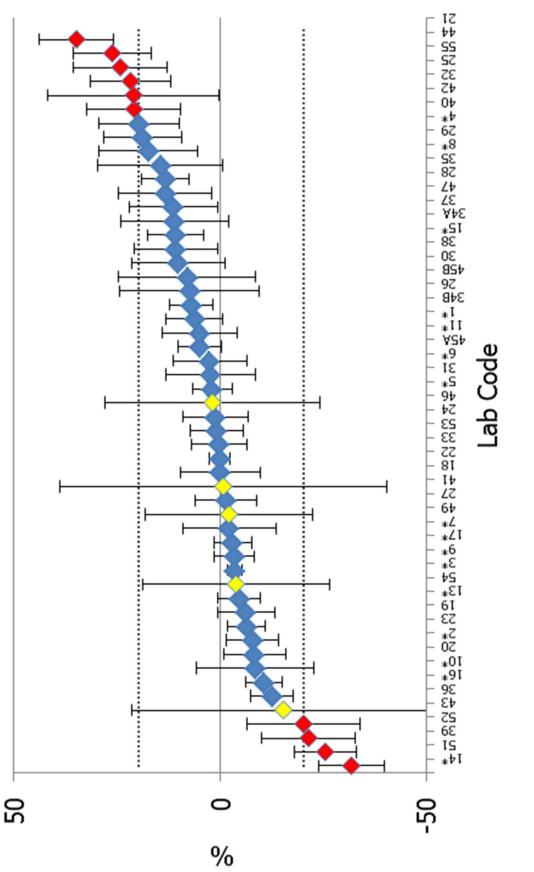




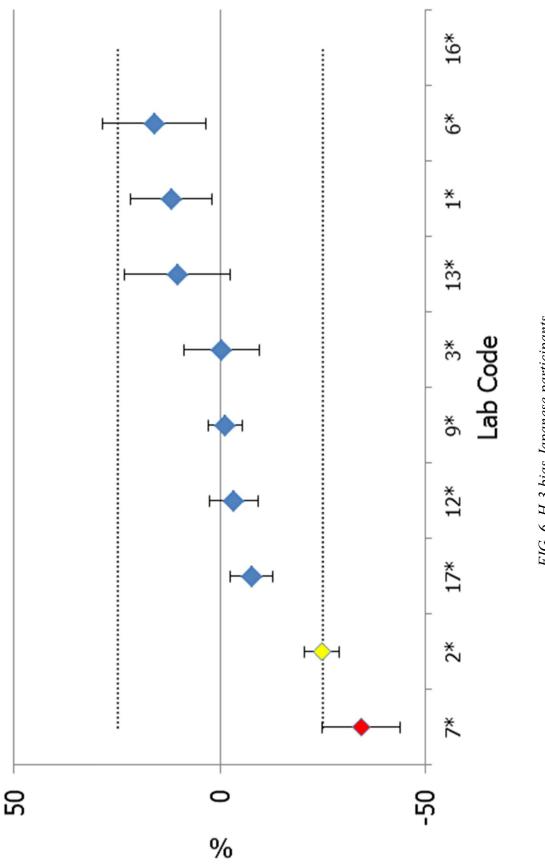




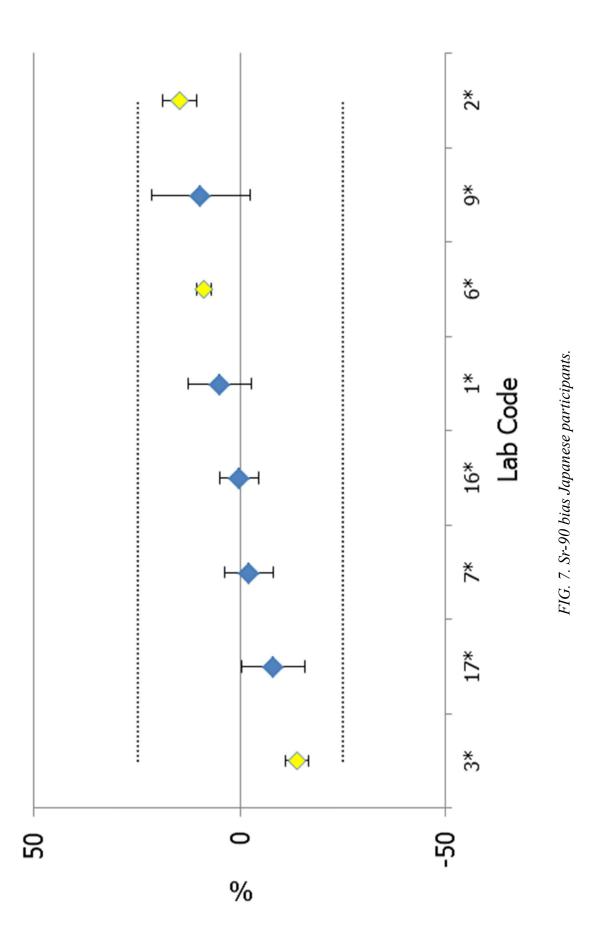












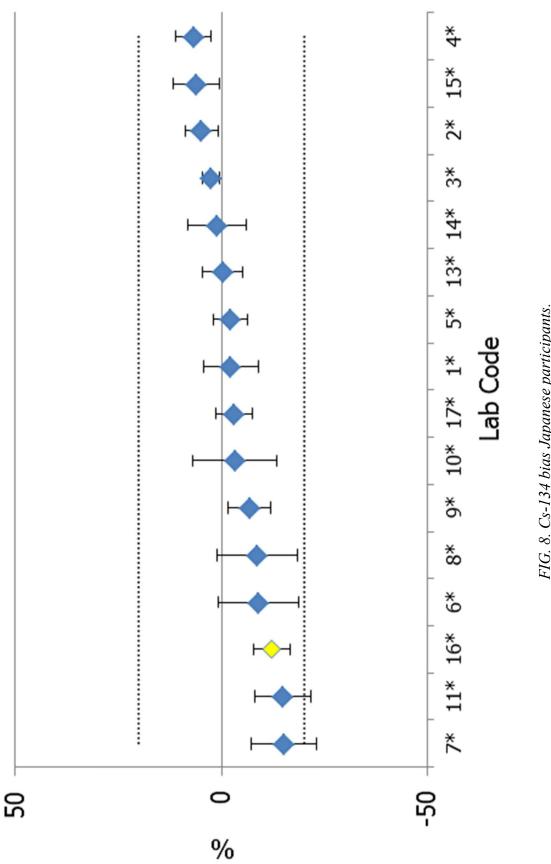
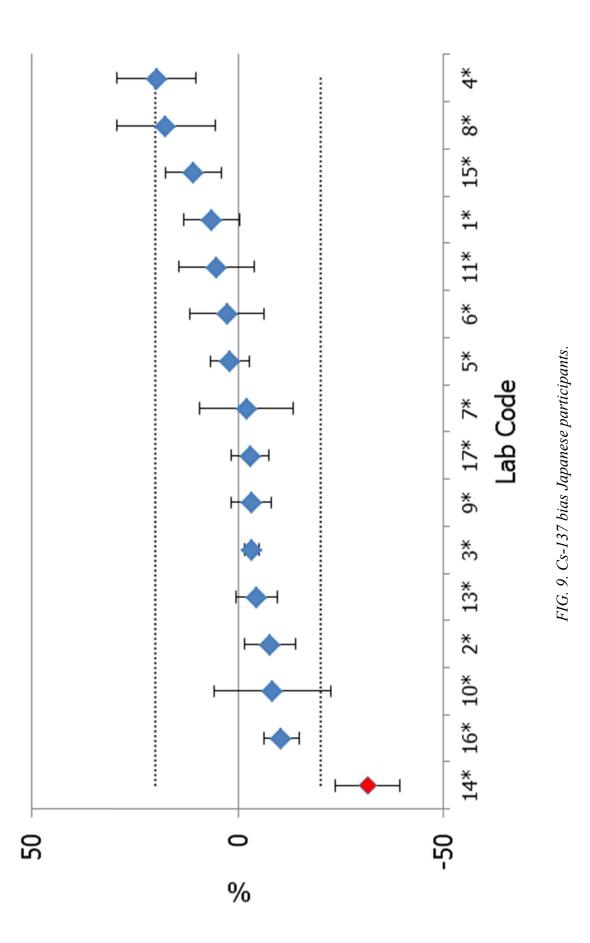


FIG. 8. Cs-134 bias Japanese participants.



APPENDIX II. PERFORMANCE EVALUATION TABLES SORTED BY LABORATORY CODE

	Final score	Accepted	Accepted	Accepted	Accepted
	Trueness	Pass	Pass	Pass	Pass
	Accuracy Precision	Pass	Pass	Pass	Pass
	Accuracy	Pass	Pass	Pass	Pass
	Trueness limit (%)	25	20	17	18
	P (%)	8.9	7.4	6.9	6.5
	Relative bias (%)	12	5	2	9
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.000	0.0014
1*	IAEA value (Bq kg ⁻¹)	1.40	0.2203	0.2240	0.1757
URY CUDE	Lab uncert. (Bq kg ⁻¹)	0.13	0.017	0.015	0.012
ABLE 10. LABUKATUKY CUDE 1*	Lab value (Bq kg ⁻¹)	1.57	0.231	0.219	0.187
I ABLE 10.	Radio- nuclide	H _£	90 Sr	^{134}Cs	^{137}Cs

TABLE 10, LABORATORY CODE 1*

ſ					
	Final score	Warning	Warning	Accepted	Accepted
	Trueness	Fail	Fail	Pass	Pass
	Accuracy Precision	Pass	Pass	Pass	Pass
	Accuracy	Pass	Pass	Pass	Pass
	Trueness limit (%)	12	11	10	16
	P (%)	5.7	3.6 11	3.8	6.8
	Relative bias (%)	-25	15	5	8-
2*	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015
	IAEA value (Bq kg ⁻¹)	1.41	0.2214	0.2251	0.1766
TABLE 11. LABORATORY CODE 2*	Lab uncert. (Bq kg ⁻¹)	0.05	0.009	0.009	0.011
LABORAT	Lab value (Bq kg ⁻¹)	1.06	0.254	0.236	0.163
TABLE 11.	Radio- nuclide	Ηε	90 Sr	^{134}Cs	^{137}Cs

TABLE 12.	TABLE 12. LABORATORY CODE 3*	ORY CODE	3*									
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score	
H_{E}	1.40	0.12	1.41	0.04	0	9.1	23	Pass	Pass	Pass	Accepted	
$^{1}\mathrm{S}^{06}$	0.190	0.006	0.2204	0.0016	-14	3.2	<i>2</i> .7	Pass	Pass	Fail	Warning	
^{134}Cs	0.230	0.005	0.2242	0.0009	2.6	2.1	5.5	Pass	Pass	Pass	Accepted	
^{137}Cs	0.170	0.003	0.1759	0.0014	-3.3	1.8	4.6	Pass	Pass	Pass	Accepted	
TABLE 13.	TABLE 13. LABORATORY CODE 4*	ORY CODE	4*									
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score	
Ηε	Ι	Ι	1.41	0.05	-	Ι	—	-	-	-	Not reported	

Not reported

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0.0016 0.0009 0.0015

0.2218

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 $^{90}\mathrm{Sr}$

0.2256 0.1770

0.009

0.241

 ^{134}Cs

0.017

0.212

 ^{137}Cs

Accepted Accepted

Pass Pass

Pass Pass

Pass

3.9 8.0

Pass

25

20

TABLE 14	TABLE 14. LABORATORY CODE 5*	ORY CODE	5*									
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score	
H _ε	I	I	1.41	0.04	I	I	I	I	I	I	Not reported	
90 Sr		Ι	0.2211	0.0016	-	-	-	-	-	-	Not reported	
^{134}Cs	0.220	600.0	0.2249	0.0009	-2	4.2	11	Pass	Pass	Pass	Accepted	
^{137}Cs	0.180	0.008	0.1764	0.0015	2	4.7	12	Pass	Pass	Pass	Accepted	
TABLE 15	TABLE 15. LABORATORY CODE 6*	ORY CODE	6*		·							_
	T a b and and	Lab	IAEA	IAEA	Deletino		F					

Final score	Accepted	Warning	Accepted	Accepted
	Pass A	Fail W	Pass A	
Trueness	Pa	Fa	Pa	Pass
Precision	Pass	Pass	Pass	Pass
Accuracy Precision	Pass	Pass	Pass	Pass
Trueness limit (%)	32	4.5	25	23
P (%)	11	8.8 1.6 4.5	11	8.8
Relative bias (%)	16	8.8	6	3
IAEA uncert. (Bq kg ⁻¹)	0.05	0.0016	0.0009	0.0015
IAEA value (Bq kg ⁻¹)	1.42	0.2222	0.2260	0.1773
Lab uncert. (Bq kg ⁻¹)	0.17	0.004	0.022	0.016
Lab value (Bq kg ⁻¹)	1.64	⁹⁰ Sr 0.242	¹³⁴ Cs 0.206	¹³⁷ Cs 0.182
Radio- nuclideLab value (Bq kg^{-1})Lab uncert.Image: Construction of the state of t	H_{ϵ}	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs

TABLE 16.	TABLE 16. LABORATORY CODE 7*	ORY CODE	7*								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H٤	0.93	0.13	1.41	0.04	-34	14	25	Fail	Pass	Fail	Not accepted
90 Sr	0.217	0.013	0.2215	0.0016	2	6.0	15	Pass	Pass	Pass	Accepted
^{134}Cs	0.191	0.018	0.2253	6000.0	-15	9.4	21	Pass	Pass	Pass	Accepted
^{137}Cs	0.173	0.020	0.1767	0.0015	-2	12	29	Pass	Pass	Pass	Accepted
TABLE 17.	TABLE 17. LABORATORY CODE 8*	ORY CODE	8*								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score

		·			
	Final score	Not reported	Not reported	Accepted	Accepted
	Trueness	-	-	Pass	Pass
	Accuracy Precision	-	Ι	Pass	Pass
	Accuracy	-	-	Pass	Pass
	Trueness limit (%)	-	-	25	31
	P (%)	-	-	11	10
	Relative bias (%)	Ι	Ι	6	18
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015 18
TABLE 17. LABORATORY CODE 8*	$ \begin{array}{c c} Lab \\ uncert. \\ uncert. \\ (Bq\ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ uncert. \\ (Bq\ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ uncert. \\ (Bq\ kg^{-1}) \end{array} $	1.41	0.2208	0.2245	0.1761
	Lab uncert. (Bq kg ⁻¹)	-	-	0.022	0.021
LABORAT	Lab value (Bq kg ⁻¹)	Ι	Ι	134 Cs 0.205	¹³⁷ Cs 0.207
TABLE 17.	Radio- nuclide	Ηε	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs

TABLE 18	TABLE 18. LABORATORY CODE 9*	ORY CODE	9*	·							
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
Ηε	1.39	0.04	1.41	0.04	-1	4.2	11	Pass	Pass	Pass	Accepted
90 Sr	0.24	0.03	0.2217	0.0016	10	11	31	Pass	Pass	Pass	Accepted
^{134}Cs	0.210	0.012	0.2254	6000.0	L-	5.6	13	Pass	Pass	Pass	Accepted
^{137}Cs	0.171	0.009	0.1769	0.0015	-3	5.1	13	Pass	Pass	Pass	Accepted
TABLE 19	TABLE 19. LABORATORY CODE 10*	ORY CODE	10^{*}								

	Final score	Not reported	Not reported	Accepted	Accepted
	Trueness	-	Ι	Pass	Pass
	Accuracy Precision Trueness	-	Ι	Pass	Pass
	Accuracy	-	Ι	Pass	Pass
	Trueness limit (%)	-	Ι	26	37
	P (%)	-	Ι	-3 11	15
	Relative bias (%)	-	Ι		8
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015
10^{*}	IAEA IAEA value uncert. (Bq kg ⁻¹) (Bq kg ⁻¹)	1.41	0.2215	0.2252	0.1767
ORY CODE	Lab uncert. (Bq kg ⁻¹)	-	Ι	0.023	0.025
TABLE 19. LABORATORY CODE 10*	Lab value (Bq kg ⁻¹)	-	Ι	0.218	0.162
TABLE 19.	Radio- nuclide	H٤	$^{90} m Sr$	^{134}Cs	^{137}Cs

	Final score	Not reported	Not reported	Accepted	Accepted
	Trueness	Ι	Ι	Pass	Pass
	Precision	Ι	Ι	Pass	Pass
	Accuracy Precision	-	Ι	Pass	Pass
	Trueness limit (%)	Ι	Ι	17	24
	P (%)	Ι	Ι	7.9	8.7 24
	Relative bias (%)	-	Ι	-15	5
[]*	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015
	IAEA value (Bq kg ⁻¹)	1.41	0.2206	0.2244	0.1760
ORY CODE	Lab uncert. (Bq kg ⁻¹)	-	Ι	0.015	0.016
TABLE 20. LABORATORY CODE 11*	Lab value (Bq kg ⁻¹)	Ι	Ι	0.191	¹³⁷ Cs 0.185
TABLE 20.	Radio- nuclide	Ηε	90 Sr	^{134}Cs	^{137}Cs

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I					
	Final score	Accepted	Not reported	Not reported	Not reported
	Trueness	Pass	Ι	Ι	I
	Trueness Accuracy Precision	Pass	Ι	-	-
	Accuracy	Pass	Ι	—	-
	Trueness limit (%)	15	Ι	-	-
	P (%)	6.1 15	Ι	-	-
	Relative bias (%)	-3	Ι	I	Ι
12*	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	6000.0	0.0015
	$ \begin{array}{c c} Lab \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ uncert. \\ uncert. \\ uncert. \end{array} $	1.41	0.2207	0.2244	0.1761
ORY CODE	Lab uncert. (Bq kg ⁻¹)	0.07	Ι	-	—
TABLE 21. LABORATORY CODE 12*	Lab value (Bq kg ⁻¹)	1.36	Ι	Ι	-
TABLE 21.	Radio- nuclide	Hε	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs

	Final score	Accepted	Not reported	Accepted	Accepted	
	Trueness	Pass	—	Pass	Pass	
	Precision	Pass	Ι	Pass	Pass	
	Accuracy Precision	Pass	-	Pass	Pass	
	Trueness limit (%)	33	-	12	13	
	P (%)	12	—	4.8	5.4	
	Relative bias (%)	10	Ι	0	-2	
	IAEA uncert. (Bq kg ⁻¹)	0.05	0.0016	0.0009	0.0015	
13*	IAEA value (Bq kg ⁻¹)	1.41	0.2219	0.2257	0.1770	
DRY CODE	Lab uncert. (Bq kg ⁻¹)	0.18	-	0.011	0.009	
TABLE 22. LABORATORY CODE 13*	Lab value (Bq kg ⁻¹)	1.56		0.225	0.169	
TABLE 22.	Radio- nuclide	H _ε	$^{90} m{Sr}$	^{134}Cs	^{137}Cs	

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TABLE 23. LABORATORY CODE 14*Radio- Radio- (Bq kg ⁻¹)Lab (Bq kg ⁻¹)IAEA value (Bq kg ⁻¹)IAEA uncert. (Bq kg ⁻¹)IAEA uncert. (Bq kg ⁻¹)IAEA walue (Bq kg ⁻¹)IAEA uncert. (Bq kg ⁻¹)IAEA trueness (Bq kg ⁻¹)IAEA trueness <b< th=""><th>I</th><th></th><th></th><th></th><th>-</th><th></th></b<>	I				-	
AEA IAEA IAEA Relative P (%) Trueness Accuracy Precision alue uncert. bias (%) ps (%) $P (\%)$ Imit (%) Accuracy Precision 41 0.05 - - - - - - .2217 0.0016 - - - - - - .2255 0.0009 1 7.0 18 Pass Pass .1769 0.015 -32 12 20 Fail Pass		Final score	Not reported	Not reported	Accepted	Not accepted
AEA IAEA IAEA Relative P (%) Trueness Accuracy Precision alue uncert. bias (%) ps (%) $P (\%)$ Imit (%) Accuracy Precision 41 0.05 - - - - - - .2217 0.0016 - - - - - - .2255 0.0009 1 7.0 18 Pass Pass .1769 0.015 -32 12 20 Fail Pass		Trueness	-	Ι	Pass	Fail
AEA IAEA Relative P (%) alue uncert. bias (%) p (%) q kg ⁻¹) (Bq kg ⁻¹) bias (%) P (%) .41 0.05 - - .2217 0.0016 - - .2255 0.0009 1 7.0 .1769 0.0015 -32 12		Precision	-	-	Pass	Pass
AEA IAEA Relative P (%) alue uncert. bias (%) p (%) q kg ⁻¹) (Bq kg ⁻¹) bias (%) P (%) .41 0.05 - - .2217 0.0016 - - .2255 0.0009 1 7.0 .1769 0.0015 -32 12		Accuracy	-	Ι	Pass	Fail
AEA IAEA Relative alue uncert. bias (%) q kg ⁻¹) (Bq kg ⁻¹) bias (%) 41 0.05 - .2217 0.0016 - .2255 0.0009 1 .1769 0.0015 -32		Trueness limit (%)	Ι	Ι	18	20
AEA IAEA alue uncert. 41 0.05 .2217 0.0016 .2255 0.0009 .1769 0.0015		P (%)	-	Ι	7.0	12
AEA alue q kg ⁻¹) .41 .2217 .2255 .2255			Ι	Ι	1	-32
TABLE 23. LABORATORY CODE 14* Radio- Lab value Lab nuclide Lab value uncert. $3H$ - - ^{90}Sr - 1.41 ^{90}Sr - 0.228 ^{137}Cs 0.121 0.014 0.1769		IAEA uncert. (Bq kg ⁻¹)	0.05	0.0016	0.000	0.0015
TABLE 23. LABORATORY CODERadio-Lab valueLabRadio-(Bq kg ⁻¹)(Bq kg ⁻¹) ^{3}H ^{90}Sr ^{134}Cs 0.2280.016 ^{137}Cs 0.1210.014	14^{*}	IAEA value (Bq kg ⁻¹)	1.41	0.2217	0.2255	0.1769
TABLE 23. LABORATRadio-Lab valueRadio-Lab valuenuclide(Bq kg ⁻¹) ^{3}H - ^{90}Sr - ^{134}Cs 0.228 ^{137}Cs 0.121	ORY CODE	Lab uncert. (Bq kg ⁻¹)	-	-	0.016	0.014
TABLE 23. Radio- nuclide ³ H ⁹⁰ Sr ¹³⁴ Cs ¹³⁷ Cs	LABORAT	Lab value (Bq kg ⁻¹)	Ι	Ι	0.228	0.121
	TABLE 23.	Radio- nuclide	Ηε	90 Sr	^{134}Cs	^{137}Cs

	Final score	Not reported	Not reported	Accepted	Accepted	
	Trueness	Ι	Ι	Pass	Pass	
	Precision	-	—	Pass	Pass	
	Accuracy Precision	-	-	Pass	Pass	
	Trueness limit (%)	-	Ι	15	17	
	P (%)	—	—	5.3	6.1	
	Relative bias (%)	-	—	6	11	
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015 11	
15*	IAEA L value u (Bq kg ⁻¹) (Bd	1.41	0.2215	0.2253	0.1767	
ORY CODE	Lab uncert. (Bq kg ⁻¹)	—	-	0.013	0.012	
TABLE 24. LABORATORY CODE 15*	Lab value (Bq kg ⁻¹)	I	Ι	0.239	0.196	
TABLE 24.	Radio- nuclide	H _ε	90 Sr	^{134}Cs	^{137}Cs	

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Final score	Not accepted	Accepted	Warning	Accepted
Trueness	Fail	Pass	Fail	Pass
Precision	Pass	Pass	Pass	Pass
Accuracy	Fail	Pass	Pass	Pass
Trueness limit (%)	26	12	11	11
P (%)	6.4	4.6	5.0	4.9
Relative bias (%)	70	0	-12	-11
IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016		0.0015 -11
IAEA value (Bq kg ⁻¹)	1.41	0.2215	0.2252	0.1767
Lab uncert. (Bq kg ⁻¹)	0.13	0.010	0.010	0.008
Lab value (Bq kg ⁻¹)	2.40	0.222	0.198	0.158
Radio- nuclide	H٤	90 Sr	^{134}Cs	^{137}Cs
	$ \begin{array}{c cccc} Lab & IAEA & IAEA \\ uncert. & value & uncert. \\ (Bqkg^{-1}) & (Bqkg^{-1}) & (Bqkg^{-1}) \end{array} \begin{array}{c ccccc} Relative \\ bias(\%) & P(\%) & Iimit(\%) \end{array} \begin{array}{c cccccccc} Accuracy \\ Iimit(\%) & Iimit(\%) \end{array} \end{array} \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Lab value $(Bq kg^{-1})$ Lab $uncert.$ $(Bq kg^{-1})$ IAEA $value(Bq kg^{-1})IAEAuncert.Relativebias (\%)P (\%)Truenesslimit (\%)PrecisionTrueness2.400.131.410.04706.426FailPassFail$	Lab value $(Bq kg^{-1})$ IAEA $value(Bq kg^{-1})IAEAvalue(Bq kg^{-1})IAEAuncert.(Bq kg^{-1})IAEAuncert.Bq kg^{-1}Relativebias (\%)P (\%)TruenessImit (\%)PrecisionTrueness2.400.131.410.04706.426FailPassFail0.2220.0100.22150.001604.612PassPassPassPass$	Lab value $(Bq kg^{-1})$ IAEA $valueBq kg^{-1}IAEAvalueBq kg^{-1}IAEAuncert.(Bq kg^{-1})IAEAuncert.Bq kg^{-1}IAEAuncert.bias (\%)Relativepias (\%)Tuenesspinit (\%)TuenessAccuracyPrecisionTueness2.400.131.410.04706.426FailPassFail0.2220.0100.22150.001604.612704.6PassPassPass0.1380.0100.22520.0009-125.011PassPassPassPass$

TABLE 26.	TABLE 26. LABORATORY CODE 17*	ORY CODE	17^{*}									
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score	
H _ε	1.30	0.06	1.41	0.04	-8	5.6	14	Pass	Pass	Pass	Accepted	
$^{90}\mathrm{Sr}$	0.203	0.017	0.2209	0.0016	-8	8.4	20	Pass	Pass	Pass	Accepted	
¹³⁴ Cs	0.218	0.010	0.2246	0.0009	-3	4.6	12	Pass	Pass	Pass	Accepted	
^{137}Cs	0.171	0.008	0.1762	0.0015	-3	4.8	12	Pass	Pass	Pass	Accepted	
TABLE 27.	TABLE 27. LABORATORY CODE 18	ORY CODE	18									
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score	

ABLE 27.	. LABORAT	TABLE 27. LABORATORY CODE 18	18								
Radio- nuclide	Lab value (Bq kg ⁻¹)		$ \begin{array}{c c} Lab & IAEA & IAEA \\ uncert. & value & uncert. \\ (Bq \ kg^{-l}) & (Bq \ kg^{-l}) \end{array} $	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)		Accuracy Precision Trueness	Trueness	Final score
Hε	Ι	Ι	1.40	0.04	Ι	Ι	Ι	Ι	-	-	Not reported
$^{90}\mathrm{Sr}$	Ι	-	0.2203	0.0016	Ι	Ι	Ι	Ι	-	-	Not reported
^{134}Cs	¹³⁴ Cs 0.225	0.016	0.2240	6000.0	0	7.1	7.1 18	Pass	Pass	Pass	Accepted
^{137}Cs	¹³⁷ Cs 0.176	0.017	0.1757	0.0014	0	7.9	25	\mathbf{Pass}	\mathbf{Pass}	\mathbf{Pass}	Accepted

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	Final score	Accepted	Not reported	Accepted	Accepted		_	Final score	Not reported
	Trueness	Pass	Ι	Pass	Pass			Trueness	Ι
	Precision	Pass	-	Pass	Pass			Precision	Ι
	Accuracy	Pass	—	Pass	Pass			Accuracy	-
	Trueness limit (%)	30	-	15	18		_	Trueness limit (%)	Ι
	P (%)	13	-	5.9	7.3			P (%)	Ι
	Relative bias (%)	-13	-	-2	9-		-	Relative bias (%)	Ι
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0014			IAEA uncert. (Bq kg ⁻¹)	0.04
19	IAEA value (Bq kg ⁻¹)	1.41	0.2205	0.2243	0.1760		20	IAEA value (Bq kg ⁻¹)	1.41
DRY CODE	Lab uncert. (Bq kg ⁻¹)	0.16	-	0.013	0.012		DRY CODE	Lab uncert. (Bq kg ⁻¹)	Ι
TABLE 28. LABORATORY CODE 19	Lab value (Bq kg ⁻¹)	1.22	-	0.219	0.165		TABLE 29. LABORATORY CODE 20	Lab value (Bq kg ⁻¹)	Ι
TABLE 28.	Radio- nuclide	H _ε	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs		TABLE 29.	Radio- nuclide	H_{E}

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TABLE 30. LABORATORY CODE 21										
	Lab uncert. (Bq kg ⁻¹)	$\left \begin{array}{c c} IAEA & I_{I} \\ value & ur \\ (Bq kg^{-1}) & (Bc \\ \end{array} \right $	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score
	Ι	1.41	0.04	Ι	-	-	Ι	Ι	Ι	Not reported
	I	0.2209	0.0016	I	-	Ι	Ι		Ι	Not reported
	0.04	0.2246	0.0009	-11	20	46	Pass	Fail	Pass	Warning
	0.04	0.1762	0.0015	92	14	63	Fail	Pass	Fail	Not accepted

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ABLE 31.	TABLE 31. LABORATORY CODE 22	ORY CODE	22	-	-			-	-	-	
Radio- nuclide	Lab value (Bq kg ⁻¹)		$ \begin{array}{c c} Lab \\ uncert. \\ (Bq\ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ uncert. \\ (Bq\ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ uncert. \\ (Bq\ kg^{-1}) \end{array} $	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
H_{ϵ}	-	-	1.41	0.04	Ι	-	-	Ι	Ι	Ι	Not reported
$^{90}\mathrm{Sr}$	I	I	0.2213	0.0016	I	Ι	I	I	I	I	Not reported
^{134}Cs	0.210	0.008	0.2251	0.0009	L-	3.8	3.8 9.2	Pass	Pass	Pass	Accepted
^{137}Cs	¹³⁷ Cs 0.177	0.004	0.1766	0.0015	0.2	2.4	6.2	Pass	Pass	Pass	Accepted

TABLE 32	TABLE 32. LABORATORY CODE 23	ORY CODE	23								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H_{ϵ}	I	Ι	1.41	0.04	Ι	Ι	Ι	I	Ι	Ι	Not reported
$^{90}\mathrm{Sr}$	0.22	0.04	0.2206	0.0016	1.1	17	74	Pass	Pass	Pass	Accepted
^{134}Cs	0.176	0.010	0.2244	6000.0	-22	5.7	12	Fail	Pass	Fail	Not accepted
^{137}Cs	0.165	0.008	0.1760	0.0015	9-	4.9	12	Pass	Pass	Pass	Accepted
TABLE 33	ΤΑΒΙ Ε 33-Ι ΑΡΟΒΑΤΟΡΥ CODE 24		70								
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Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score

TABLE 33.	TABLE 33. LABORATORY CODE 24	ORY CODE	24		-		-	-		-		
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	Lab IAEA uncert. value (Bq kg ⁻¹) (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)		Accuracy Precision	Trueness	Final score	
Ηε	1.56	0.23	1.41	0.04	11	15	43	Pass	Pass	Pass	Accepted	
$^{90}\mathrm{Sr}$	⁹⁰ Sr 0.200	0.013	0.2214	0.0016 -10	-10	6.3 15	15	Pass	Pass	Pass	Accepted	
^{134}Cs	¹³⁴ Cs 0.254	0.019	0.2252	6000.0	13	7.5	7.5 22	Pass	Pass	Pass	Accepted	
^{137}Cs	¹³⁷ Cs 0.179	0.014	0.1767	0.0015	1	6'L	21	\mathbf{Pass}	Pass	\mathbf{Pass}	Accepted	

TABLE 34.	LABORAT	TABLE 34. LABORATORY CODE 25	25								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
Ηε	Ι	Ι	1.41	0.04	-	-	-	-	-	I	Not reported
90 Sr	0.27	0.05	0.2217	0.0016	22	19	58	Pass	Pass	Pass	Accepted
^{134}Cs	0.240	0.020	0.2254	0.0009	9	8.3	23	Pass	Pass	Pass	Accepted
^{137}Cs	0.220	0.020	0.1769	0.0015	24	9.1	29	Fail	Pass	Pass	Not accepted
TABLE 35.	LABORAT	TABLE 35. LABORATORY CODE 26	26								

35.	LABORAT	TABLE 35. LABORATORY CODE 26	26					_			
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score
	< 5.2	Ι	1.41	0.04	I	Ι	Ι	Ι	Ι	Ι	Not evaluated
90 Sr	0.252	0.019	0.2213	0.0016 14	14	7.7	22	Pass	Pass	Pass	Accepted
	¹³⁴ Cs 0.220	0.020	0.2251	0.0009	-2	9.1	23	Pass	Pass	Pass	Accepted
	¹³⁷ Cs 0.19	0.03	0.1766	0.0015	8	16	44	Pass	Pass	\mathbf{Pass}	Accepted

	-									
Radio- Lab value nuclide (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
I	I	1.41	0.04	I	I	I	I	I	I	Not reported
1	-	0.2208	0.0016	Ι		Ι				Not reported
0.23	0.03	0.2246	0.0009	3	11	30	Pass	Pass	Pass	Accepted
0.174	0.013	0.1762	0.0015	-1	7.5	19	Pass	Pass	Pass	Accepted
	o value 4 kg ⁻¹) - 23 174	Lab uncert. (Bq kg ⁻¹) - 0.03 0.013	Lab IAEA uncert. value (Bq kg ⁻¹) (Bq kg ⁻¹) - 1.41 - 0.2208 0.03 0.2246 0.013 0.1762	Lab IAEA uncert. value (Bq kg ⁻¹) (Bq kg ⁻¹) - 1.41 - 0.2208 0.03 0.2246 0.013 0.1762	Lab IAEA IAEA uncert. value uncert. (Bq kg ⁻¹) (Bq kg ⁻¹) (Bq kg ⁻¹) - 1.41 0.04 - 0.2208 0.0016 0.03 0.2246 0.0009 0.013 0.1762 0.0015	Lab IAEA IAEA IAEA Relative P uncert. value uncert. value uncert. bias (%) P (Bq kg ⁻¹) (Bq kg ⁻¹) (Bq kg ⁻¹) (Bq kg ⁻¹) bias (%) P - 1.41 0.04 - - - - P - 0.2208 0.0016 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Lab uncert.IAEA valueIAEA uncert.IAEA uncert.IAEA uncert.IAEA uncert.Relative bias (%) $P (\%)$ Trueness limit (%)AccuracyPrecision $ 1.41$ 0.04 $ 1.41$ 0.04 $ 0.2208$ 0.0016 $ 0.03$ 0.2246 0.0009 3 11 30 PassPass 0.013 0.1762 0.0015 -1 7.5 19 PassPass	Lab uncert.IAEA valueIAEA uncert.IAEA uncert.IAEA uncert.Relative bias (%)P (%)Trueness limit (%)AccuracyPrecisionT $ 1.41$ 0.04 $ 1.41$ 0.04 $ -$ </td

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ABLE 37.	LABORAT	TABLE 37. LABORATORY CODE 28 Dodio Lab Dodio Lab	28 IAEA	IAEA	Dolotico		L. Constant				
	(Bq kg ⁻¹)	uncert. (Bq kg ⁻¹)	$ \begin{array}{c c} \mbox{uncert.} & \mbox{value} \\ \mbox{(Bq } kg^{-1}) & \mbox{(Bq } kg^{-1}) \\ \end{array} \right) \label{eq:Bq } \left(\mbox{Bq } kg^{-1} \right) $	uncert. $(Bq kg^{-1})$	bias (%)	P (%)	limit (%) Accuracy Precision Trueness	Accuracy	Precision	Trueness	Final score
	Ι	Ι	1.41	0.04	Ι	Ι	Ι	Ι	Ι	Ι	Not reported
	Ι	Ι	0.2209	0.0016	Ι	Ι	Ι	Ι	Ι	Ι	Not reported
	¹³⁴ Cs 0.210	0.010	0.2246	0.0009	L—	4.8	4.8 12	Pass	Pass	Pass	Accepted
	¹³⁷ Cs 0.200	0.010	0.1762	0.0015 13	13	5.1 15	15	Pass	Pass	Pass	Accepted

TABLE 38.	TABLE 38. LABORATORY CODE 29	ORY CODE	29								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H_{ϵ}	1.38	0.11	1.41	0.04	-2	9.8	22	Pass	Pass	Pass	Accepted
90 Sr	0.204	0.013	0.2211	0.0016	-8	6.4	15	Pass	Pass	Pass	Accepted
^{134}Cs	0.220	0.013	0.2249	6000.0	-2	5.8	15	Pass	Pass	Pass	Accepted
^{137}Cs	0.210	0.017	0.1764	0.0015	19	6°.L	24	Pass	Pass	Pass	Accepted
TABLE 20	τάρι ε 30.Τ Αρωρ Απωργ ζούε 30		30								
I VDEE 37.	TVDOUVI										
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score

	[
Final score	Accepted	Not reported	Accepted	Accepted
Trueness	Pass	-	Pass	Pass
Precision	Pass	-	Pass	Pass
Accuracy	Pass	-	Pass	Pass
Trueness limit (%)	10	Ι	11	29
P (%)	3.8	-	4.6	10
Relative bias (%)	1	Ι	-3	10
IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	6000.0	0.0015
IAEA value (Bq kg ⁻¹)	1.41	0.2216	0.2254	0.1768
Lab uncert. (Bq kg ⁻¹)	0.03	-	0.010	0.020
Lab value (Bq kg ⁻¹)		Ι	0.218	¹³⁷ Cs 0.195
Radio- nuclide	Ηε	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Lab value $(Bq kg^{-1})$ Lab uncert. $(Bq kg^{-1})$ IAEA value $(Bq kg^{-1})$ IAEA uncert. $(Bq kg^{-1})$ IAEA $(Bq kg^{-1})$ IAEA uncert. $(Bq kg^{-1})$ IAEA uncert. $(Bq kg^{-1})$ IAEA $(Bq kg^{-1})$ IAEA 	$ \begin{array}{l l l l l l l l l l l l l l l l l l l $	Lab value $uncert.$ IAEA $valueuncert.IAEAuncert.IAEAuncert.Relativebias (\%)P (%)Truenesslimit (%)AccuracyPrecisionTrueness(Bq kg-1)(Bq kg-1)(Bq kg-1)(Bq kg-1)(Bq kg-1)p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}p_{100}$

TABLE 40.	TABLE 40. LABORATORY CODE 31	ORY CODE	31								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H _ε	Ι	Ι	1.42	0.05	-	Ι	Ι	Ι	Ι	Ι	Not reported
90 Sr	0.246	0.013	0.2223	0.0016	10	5.3	15	Pass	Pass	Pass	Accepted
^{134}Cs	0.226	0.017	0.2261	6000.0	0	7.6	20	Pass	Pass	Pass	Accepted
^{137}Cs	0.182	0.019	0.1773	0.0015	2	11	28	Pass	Pass	Pass	Accepted
TABLE 41.	TABLE 41. LABORATORY CODE 32	ORY CODE	32								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
3H	1.1	0.3	1.41	0.04	-22	27	55	Pass	Fail	Pass	Warning

TABLE 41.	LABORAT	TABLE 41. LABORATORY CODE 32	32						-		
Radio- nuclide	Lab value (Bq kg ⁻¹)		$ \begin{array}{c c} Lab & IAEA & IAEA \\ uncert. & value & uncert. \\ (Bq \ kg^{-1}) & (Bq \ kg^{-1}) \end{array} (Bq \ kg^{-1}) \\ \end{array} $	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)		Accuracy Precision	Trueness	Final score
H_{ϵ}	1.1	0.3	1.41	0.04	-22	27	55	Pass	Fail	Pass	Warning
$^{90}\mathrm{Sr}$	⁹⁰ Sr 0.234	0.016	0.2210	0.0016	9	6.9	19	Pass	Pass	Pass	Accepted
^{134}Cs	0.222	0.022	0.2247	0.0009	1	6.6	25	Pass	Pass	Pass	Accepted
^{137}Cs	¹³⁷ Cs 0.215	0.017	0.1763	0.0015	22	<i>6</i> . <i>L</i>	25	Fail	Pass	Pass	Not accepted

TABLE 42	TABLE 42. LABORATORY CODE 33	ORY CODE	33								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score
Ηε	< 2.0	Ι	1.42	0.05	—	Ι	-	-	-	Ι	Not evaluated
$^{90}\mathrm{Sr}$	0.225	0.023	0.2223	0.0016	1	10	27	Pass	Pass	Pass	Accepted
^{134}Cs	0.235	0.016	0.2261	0.0009	7	6.8	18	Pass	Pass	Pass	Accepted
^{137}Cs	0.178	0.012	0.1773	0.0015	0	6.8	18	Pass	Pass	Pass	Accepted
TABLE 43	TABLE 43. LABORATORY CODE 34	ORY CODE	34								
	-	Lab	IAEA	IAEA	F		F				

.Е 43.	TABLE 43. LABORATORY CODE 34	ORY CODE	34	-	-			-	-		
	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score
1	0.90	0.24	1.41	0.04	-36	27	45	Fail	Fail	Pass	Not accepted
	Ι	Ι	0.2210	0.0016	Ι	-	Ι	Ι	Ι	Ι	Not reported
^{134}Cs	0.191	0.014	0.2248	0.0009	-15	7.3	16	Pass	Pass	Pass	Accepted
^{134}Cs	0.191	0.008	0.2248	0.0009	-15	4.2	9.2	Pass	Pass	Fail	Warning
^{137}Cs	0.196	0.023	0.1763	0.0015	11	12	34	Pass	Pass	Pass	Accepted
^{137}Cs	0.189	0.009	0.1763	0.0015	7	4.8	13	Pass	Pass	Pass	Accepted

TABLE 44.	TABLE 44. LABORATORY CODE 35	DRY CODE	35								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H_{E}	2.9	6.0	1.41	0.05	106	30	159	Fail	Fail	Pass	Not accepted
90 Sr	0.25	0.05	0.2219	0.0016	13	20	58	Pass	Pass	Pass	Accepted
^{134}Cs	0.20	0.03	0.2257	0.0009	-14	14	31	Pass	Pass	Pass	Accepted
^{137}Cs	0.20	0.03	0.1770	0.0015	15	13	39	Pass	Pass	Pass	Accepted
TABLE 45.	TABLE 45. LABORATORY CODE 36	JRY CODE	36								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
3H	15	٤ 0	1 41	0.04	0	00	57	Dass	Dace	Dace	Accented

	Final score	Accepted	Not reported	Warning	Accepted
	Trueness	Pass	-	Fail	Pass
	Accuracy Precision	Pass	-	Pass	Pass
	Accuracy	Pass	-	Pass	Pass
	Trueness limit (%)	57	Ι	5.8 12	13
	P (%)	20	Ι	5.8	6.0 13
	Relative bias (%)	6	-	-17	-12
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	6000.0	0.0015 -12
TABLE 45. LABORATORY CODE 36	LabIAEAIAEAuncert.valueuncert.(Bq kg^{-1})(Bq kg^{-1})	1.41	0.2208	0.2246	0.1762
		0.3	Ι	0.011	600.0
LABORAT	Lab value (Bq kg ⁻¹)	1.5	Ι	¹³⁴ Cs 0.186	¹³⁷ Cs 0.154
TABLE 45. LA	Radio- nuclide	³ H 1.5	$^{90} m{Sr}$	^{134}Cs	^{137}Cs

TABLE 46.	TABLE 46. LABORATORY CODE 37	ORY CODE	37								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H_{ϵ}	-	Ι	1.41	0.04	-	-	-	-	-	-	Not reported
90 Sr	0.163	0.019	0.2215	0.0016	-26	12	22	Fail	Pass	Fail	Not accepted
^{134}Cs	0.203	0.019	0.2252	6000.0	-10	9.4	22	Pass	Pass	Pass	Accepted
^{137}Cs	0.197	0.019	0.1767	0.0015	11	<i>T.</i> 9	28	Pass	Pass	Pass	Accepted
TABLE 47.	TABLE 47. LABORATORY CODE 38	ORY CODE	38								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
	-			_							

ABORA	TABLE 47. LABORATORY CODE 38	38								
$\begin{bmatrix} Lab value \\ (Bq kg^{-1}) \end{bmatrix}$ (Lab uncert. (Bq kg ⁻¹)	LabIAEAIuncert.valueu(Bq kg ⁻¹)(Bq kg ⁻¹)(B	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision Trueness	Trueness	Final score
	0.4	1.41	0.04	9-	27	66	Pass	Fail	Pass	Warning
0.225	0.014	0.2216	0.0016	2	6.3	16	Pass	Pass	Pass	Accepted
0.220	0.020	0.2253	0.0009	-2	9.1	23	Pass	Pass	Pass	Accepted
	0.018	0.1768	0.0015	11	9.2	26	Pass	Pass	Pass	Accepted

TABLE 48.	TABLE 48. LABORATORY CODE 39	ORY CODE	39								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
Ηε	< 0.7	-	1.41	0.04	-	Ι	Ι	-	-	Ι	Not evaluated
90 Sr	0.22	0.03	0.2213	0.0016	1	14	36	Pass	Pass	Pass	Accepted
^{134}Cs	0.151	0.018	0.2250	6000.0	-33	12	21	Fail	Pass	Fail	Not accepted
^{137}Cs	0.139	0.020	0.1765	0.0015	-21	14	29	Fail	Pass	Pass	Not accepted
TABLE 49.	TABLE 49. LABORATORY CODE 40	ORY CODE	40								
Radio-	Lab value	Lab	IAEA	IAEA	Relative	(%) d	Trueness	Acouracy	Drecision	Tueness	Final score

BLE 49.	TABLE 49. LABORATORY CODE 40	ORY CODE	40								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
³ H	19.6	1.6	1.41	0.04	1286	8.8	292	Fail	Pass	Fail	Not accepted
$^{90}\mathrm{Sr}$	0.190	0.010	0.2216	0.0016	-14	5.3 12	12	Pass	Pass	Fail	Warning
^{134}Cs	0.190	0.020	0.2253	6000.0	-16	11	23	Pass	Pass	Pass	Accepted
^{37}Cs	¹³⁷ Cs 0.214	0.020	0.1768	0.0015	21	9.4	29	Fail	Pass	Pass	Not accepted

	Final score	Not reported	Not reported	Accepted	Warning	
	Trueness	Ι	Ι	Pass	Pass	
	Accuracy Precision	-	-	Pass	Fail	
	Accuracy	-	Ι	Pass	Pass	
	Trueness limit (%)	-	-	31	102	
	P (%)	Ι	Ι	15	40	
	Relative bias (%)	-	-	-18	-1	
	IAEA uncert. (Bq kg ⁻¹)	0.05	0.0016	0.0009	0.0015	
3 41	IAEA value (Bq kg ⁻¹)	1.41	0.2219	0.2257	0.1770	
ORY CODE	Lab uncert. (Bq kg ⁻¹)	-	-	0.03	0.07	
TABLE 50. LABORATORY CODE 41	Lab value (Bq kg ⁻¹)	-	Ι	0.18	0.18	
TABLE 50.	Radio- nuclide	H _ε	90 Sr	^{134}Cs	^{137}Cs	

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TABLE 51	. LABORAT	TABLE 51. LABORATORY CODE 42	42								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	Lab IAEA uncert. value (Bq kg ⁻¹) (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
Ηε	I	I	1.41	0.04	I	I	I	I	I	I	Not reported
$^{90}\mathrm{Sr}$	⁹⁰ Sr 0.055	0.007	0.2211	0.0016 -75		12	8.1	Fail	Pass	Fail	Not accepted
^{134}Cs	¹³⁴ Cs 0.21	0.04	0.2248	6000.0	8	18	42	Pass	Pass	Pass	Accepted
^{137}Cs	¹³⁷ Cs 0.21	0.04	0.1764	0.0015	21	17	53	Fail	Pass	Pass	Not accepted

TABLE 52	TABLE 52. LABORATORY CODE 43	ORY CODE	43								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)		Accuracy Precision	Trueness	Final score
Ηε	I	Ι	1.41	0.04	I	I	I	I	I	I	Not reported
$^{90}\mathrm{Sr}$	Ι	Ι	0.2217	0.0016			Ι		I	Ι	Not reported
^{134}Cs	0.15	0.07	0.2255	6000.0	-33	47	82	Fail	Fail	Pass	Not accepted
^{137}Cs	0.15	0.07	0.1769	0.0015	-15	43	56	Pass	Fail	Pass	Warning

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	Final score	Not accepted	Not accepted	Accepted	Not accepted
	Trueness	Fail	Fail	Pass	Fail
	Accuracy Precision Trueness	Pass	Pass	Pass	Pass
		Fail	Fail	Pass	Fail
	Trueness limit (%)	134	14	6.5 16	23
	P (%)	11	11	6.5	6.6
	Relative bias (%)	399	0.0016 -51	L—	35
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	6000.0	0.0014
44	$ \begin{array}{c c} Lab & IAEA \\ uncert. & value \\ (Bq \ kg^{-l}) & (Bq \ kg^{-l}) \end{array} $	1.41	0.2204	0.2241	0.1759
DRY CODE	Lab uncert. (Bq kg ⁻¹)	0.7	0.012	0.014	0.016
TABLE 53. LABORATORY CODE 44	Lab value (Bq kg ⁻¹)	0°.L	0.107	¹³⁴ Cs 0.208	0.237
TABLE 53.	Radio- nuclide	H _ε	90 Sr	^{134}Cs	^{137}Cs

	Final score	Not reported	Accepted	Accepted	Accepted	Accepted	Accepted
	Trueness	-	Pass	Pass	Pass	Pass	Pass
	Precision	-	Pass	Pass	Pass	Pass	Pass
	Accuracy	-	Pass	Pass	Pass	Pass	Pass
	Trueness limit (%)	Ι	26	15	21	13	43
	P (%)	Ι	10	6.2	8.6	5.0	15
	Relative bias (%)	Ι	2	L	-3	5	8
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0009	0.0015	0.0015
45	IAEA value (Bq kg ⁻¹)	1.41	0.2210	0.2247	0.2247	0.1763	0.1763
DRY CODE	Lab uncert. (Bq kg ⁻¹)	Ι	0.022	0.013	0.019	0.009	0.03
TABLE 54. LABORATORY CODE 45	Lab value (Bq kg ⁻¹)	-	0.225	0.209	0.217	0.185	0.19
TABLE 54.	Radio- nuclide	H _ε	$^{90}\mathrm{Sr}$	^{134}Cs	^{134}Cs	^{137}Cs	¹³⁷ Cs

TABLE 55. LABORATORY CODE 46

Final score	Not evaluated	Not reported	Warning	Warning
Trueness	-	-	Pass	Pass
Accuracy Precision	-	-	Fail	Fail
	-	-	Pass	Pass
Trueness limit (%)	-		44	67
P (%)	-	-	20	26
Relative bias (%)	-	Ι	-16	2
IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	6000.0	0.0015
IAEA value (Bq kg ⁻¹)	1.41	0.2212	0.2249	0.1764
Lab uncert. (Bq kg ⁻¹)		Ι	0.04	0.05
Lab value (Bq kg ⁻¹)	< 4.5	Ι	0.19	¹³⁷ Cs 0.18
Radio- nuclide	H_{ϵ}	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs

TABLE 56	TABLE 56. LABORATORY CODE 47	ORY CODE	47								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
H _ε	1.34	0.12	1.41	0.04	-2	10	23	Pass	Pass	Pass	Accepted
90 Sr	-	-	0.2210	0.0016	-	Ι	-	-	-	-	Not reported
^{134}Cs	0.210	0.020	0.2248	6000.0	L	9.5	23	Pass	Pass	Pass	Accepted
^{137}Cs	0.200	0.020	0.1763	0.0015	13	10	29	Pass	Pass	Pass	Accepted
TABLE 57	TABLE 57. LABORATORY CODE 48	ORY CODE	48								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Precision	Trueness	Final score
31.1		010	F F F	100	10	L C		¢	L.	e	-

TABLE 57	TABLE 57. LABORATORY CODE 48	ORY CODE	48								
Radio- nuclide	Lab value (Bq kg ⁻¹)		$ \begin{array}{c c} Lab \\ uncert. \\ (Bq\ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ uncert. \\ (Bq\ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ uncert. \\ uncert. \\ uncert. \end{array} $	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy Precision	Precision	Trueness	Final score
H_{E}	1.27	0.10	1.41	0.04	-10	8.5	8.5 20	Pass	Pass	Pass	Accepted
$^{90}\mathrm{Sr}$	⁹⁰ Sr 0.216	0.013	0.2211	0.0016 -2	-2	6.1 15	15	Pass	Pass	Pass	Accepted
^{134}Cs		-	0.2249	6000.0	-		I	Ι	-	I	Not reported
^{137}Cs	-	I	0.1764	0.0015	I	I	I	-	I	I	Not reported

	Final score	Not reported	Not reported	Not accepted	Warning
	Trueness	Ι	Ι	Pass	Pass
	Accuracy Precision	-	Ι	Pass	Fail
	Accuracy	-		Fail	Pass
	Trueness limit (%)	Ι	Ι	44	53
	P (%)	-	Ι	13	21
	Relative bias (%)	-	Ι	26	-2
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	6000.0	0.0015 -2
49	IAEA value (Bq kg ⁻¹)	1.41	0.2212	0.2249	0.1765
DRY CODE	Lab uncert. (Bq kg ⁻¹)	Ι		0.04	0.04
TABLE 58. LABORATORY CODE 49	Lab value (Bq kg ⁻¹)	I		0.28	0.17
TABLE 58.	Radio- nuclide	H _ε	$^{90}\mathrm{Sr}$	^{134}Cs	¹³⁷ Cs

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al score	svaluated	reported	reported	Not reported
	Not 6	Not	Not	Not
Trueness	Ι	Ι	Ι	Ι
Precision	-	Ι	-	-
Accuracy	-	Ι	-	—
Trueness limit (%)	Ι	Ι	I	I
P (%)	-	Ι	-	Ι
Relative bias (%)	Ι	Ι	-	Ι
IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015
IAEA value (Bq kg ⁻¹)	1.41	0.2211	0.2249	0.1764
Lab uncert. (Bq kg ⁻¹)	-			
	< 3.3	Ι	-	—
Radio- nuclide	H٤	$^{90} m{Sr}$	^{134}Cs	^{137}Cs
	$ \begin{array}{c c} Lab \ value \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} Lab \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} LAEA \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} Relative \\ bias \ (\%) \end{array} $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{l lllllllllllllllllllllllllllllllllll$	Lab value (Bq kg ⁻¹)Lab uncert. (Bq kg ⁻¹)IAEA value (Bq kg ⁻¹)IAEA wert. (Bq kg ⁻¹)Relative bias (%)P (%)Trueness limit (%)PrecisionPrecision< 3.3

	Final score	Not accepted	Not reported	Not accepted	Not accepted
	Trueness	Fail	-	Fail	Fail
	Accuracy Precision	Pass	Ι	Pass	Pass
	Accuracy	Fail	-	Fail	Fail
	Trueness limit (%)	16	-	18	19
	P (%)	10	Ι	12	10
	Relative bias (%)	-40	Ι	-39	-25
	IAEA uncert. (Bq kg ⁻¹)	0.04	0.0016	0.0009	0.0015 –25
51	IAEA value (Bq kg ⁻¹)	1.41	0.2208	0.2245	0.1761
DRY CODE	Lab uncert. (Bq kg ⁻¹)	0.08	Ι	0.016	0.013
TABLE 60. LABORATORY CODE 51	Lab value (Bq kg ⁻¹)	0.85	Ι	0.137	0.132
TABLE 60.	Radio- nuclide	H _ε	90 Sr	^{134}Cs	^{137}Cs

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TABLE 61.	TABLE 61. LABORATORY CODE 52	ORY CODE	52								
Radio- nuclide	Lab value (Bq kg ⁻¹)		Lab IAEA uncert. value (Bq kg ⁻¹) (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score
Hε	Ι	Ι	1.41	0.04	Ι	Ι	Ι	Ι	Ι	I	Not reported
$^{90}\mathrm{Sr}$	Ι	Ι	0.2210	0.0016	Ι		Ι	Ι	Ι	Ι	Not reported
^{134}Cs	¹³⁴ Cs 0.161	0.025	0.2248	0.0009	-28	16	29	Fail	Pass	Pass	Not accepted
^{137}Cs	¹³⁷ Cs 0.141	0.024	0.1764	0.0015	-20	17	35	Fail	Pass	Pass	Not accepted

TABLE 62	TABLE 62. LABORATORY CODE 53	ORY CODE	53								
Radio- nuclide	Lab value (Bq kg ⁻¹)	Lab uncert. (Bq kg ⁻¹)	IAEA value (Bq kg ⁻¹)	IAEA uncert. (Bq kg ⁻¹)	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision	Trueness	Final score
Ηε	I	I	1.41	0.05	I	I	I	I	I	I	Not reported
$^{90}\mathrm{Sr}$	0.066	0.003	0.2222	0.0016	-10	4.4	3.8	Fail	Pass	Fail	Not accepted
^{134}Cs	0.211	0.011	0.2260	6000.0	L	5.1	12	Pass	Pass	Pass	Accepted
^{137}Cs	0.179	0.012	0.1773	0.0015	1	6.5	17	Pass	Pass	Pass	Accepted
TABLE 63	TABLE 63. LABORATORY CODE 54	ORY CODE	54								
Dodio	T de minim	Lab	IAEA	IAEA	Dolotino		T				

ORY	DE 54							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \rightarrow \frown $	Relative bias (%)	P (%)	Trueness limit (%)	Accuracy	Accuracy Precision Trueness	Trueness	Final score
- 1.41 0.04		Ι	Ι	Ι	Ι	Ι	Ι	Not reported
- 0.2212 0.0016	1.5	Ι	Ι	Ι	Ι	Ι	Ι	Not reported
0.020 0.2249 0.0009	~	-11 10	10	23	Pass	Pass	Pass	Accepted
0.04 0.1765 0.0015		4	24	58	Pass	Fail	Pass	Warning

	Ð	pç	pa		pe
	Final score	Not reported	Not reported	Accepted	Fail Not accepted
	Trueness	—	-	Pass	Fail
	Accuracy Precision Trueness	—	Ι	Pass	Pass
		—	-	Pass	Fail
	Trueness limit (%)	Ι	Ι	23	24
	P (%)	-	Ι	8.4	7.5 24
	Relative bias (%)	Ι	Ι	6	26
	IAEA uncert. (Bq kg ⁻¹)	0.05	0.0016	0.000	0.1776 0.0015 26
cc	$ \begin{array}{c c} Lab \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ value \\ uncert. \\ (Bq \ kg^{-1}) \end{array} \begin{array}{c c} IAEA \\ uncert. \\ (Bq \ kg^{-1}) \end{array} $	1.42	0.2226	0.2264	
I ADLE 04. LADUKALUKI UUDE 33		Ι	Ι	0.021	0.017
	Lab value (Bq kg ⁻¹)	Ι	Ι	¹³⁴ Cs 0.246	¹³⁷ Cs 0.224
I ABLE 04.	Radio- nuclide	H_{ϵ}	$^{90}\mathrm{Sr}$	^{134}Cs	^{137}Cs

TABLE 64. LABORATORY CODE 55

APPENDIX III. LIST OF PARTICIPATING LABORATORIES

AUSTRALIA

Green, L.	Australian Radiation Protection and Nuclear Safety Agency 619 Lower Plenty Road Yallambie 3085	
BELGIUM		
Bruggeman, M.	Belgian Nuclear Research Centre SCK-CEN Boeretang 200 2400 Mol	
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Li, Y.	Laboratory of Marine Isotopic Technology and Environmental Risk Assessment Third Institute of Oceanography 184# Daxue Rd, 361005 Xiamen	
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