

# IAEA-TERC-2023-02 ALMERA Proficiency Test Exercise, Pie-charts, S-Shapes and Reported Results with Scores

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### Abstract

The IAEA Terrestrial Environmental Radiochemistry Laboratory (TERC) provided a Proficiency Test (PT) on determination of anthropogenic and natural radionuclides in water, soil and simulated contaminated surface samples. This year's PT was designed to monitor and demonstrate the performance and analytical capability of the participating laboratories and to identify gaps and problem areas where further development is needed. The sample set was formulated to support these goals.

## 1 Description of Samples

- Sample 1: Spiked Water, anthropogenic and natural radionuclides, gross alpha and beta (GAB)
- Sample 2: Spiked Water, anthropogenic and natural radionuclides and GAB (environmental levels)
- Sample 3: Spiked Water, quality control sample, no data reporting and evaluation
- Sample 4: Japanese Soil, anthropogenic and natural radionuclides
- Sample 5: Simulated contaminated surface sample, gamma and beta emitting radionuclides
- Sample 6: Simulated contaminated surface sample, gamma emitting radionuclide (Cs-134)
- Sample 7: Simulated contaminated surface sample, beta emitting radionuclide (Sr-90)

## **1.1 Sample 1, 2 and 3, Spiked Water**

Matrix origin:

Drinking water sourced from Seibersdorf, Austria.

Sample preparation:

The raw water was gravimetrically spiked with known amounts of a prepared standard solution, containing a mixture of certified radionuclides and acidified to  $< \text{pH } 2$  ( $0.05 \text{ M HNO}_3$ ) for stability. The stability of the samples has been tested and guaranteed during the PT reporting period only. Sample 01 and Sample 02 were spiked with several radionuclides. This included H-3 and U isotopes for Sample 01 and Sr-90, Ra-226 and progeny for Sample 02. The identification of gamma emitting radionuclides is one of the tasks of this proficiency test, therefore they are not specified in advance.

The activity concentration and uncertainty were assigned by formulation, and control measurements by gamma-ray spectrometry, alpha spectrometry and liquid scintillation counting have been performed prior to shipment.

## **1.2 Sample 4, Japanese Soil**

The soil was collected on 25 September 2020 in Japan by the University of Tsukuba. It was milled and sieved, and the grain size fraction used for this exercise was 90-250  $\mu\text{m}$ . The bottled samples were sterilised (25 kGy gamma dose) and the related certificate is available on the PT website. It contains caesium and naturally occurring radionuclides typically found in soils.

Approximately 100 g has been provided for gamma-ray spectrometry measurement.

The determination of target values and associated uncertainties of the anthropogenic and natural radionuclides has been carried-out by measurements in one laboratory and confirmed by measurements in another laboratory. The samples were characterized for gamma emitting radionuclides only.

### **1.3 Samples 5, 6 and 7, Simulated contaminated surface samples**

Three circles for surface contamination monitoring have been included in this proficiency test (Figure 1). They were prepared using our in-house printing technique. One blank sample of the same size, outlined with black ink (not-spiked) was also added for correction (Sample 08).

The blue ink was spiked with a gamma-emitting radionuclide, Cs-134. The exercise asked for its identification and activity to be reported (Sample 06).

The magenta ink was spiked with Sr-90 and the activity should be reported (Sample 07), with correction for Y-90 activity.

The mixed ink sample (blue and magenta) has been printed at a lower activity compared to the single ink circles for both radionuclides (Sample 05). Both Cs-134 and Sr-90 activity should be reported for this sample.

The reference date 2023-01-01 should be used for decay correction.

## 2 Evaluation of results

Results reported by participants were evaluated using the following stepwise approach.

The evaluation follows the methodology applied for the annual IAEA proficiency testing schemes in the areas of radionuclide measurements and trace element analysis.

### 2.1 Relative bias (Samples 1, 2, 4, 5, 6 and 7)

The relative bias is the relative difference between the reported and the target value (the best estimate of the true value)

$$Bias_{relative} = \frac{Value_{reported} - Value_{target}}{Value_{target}} * 100\%$$

The relative bias is compared to the Maximum Acceptable Relative Bias (MARB) which has been determined for each property value, considering the analytical methods, the analyte level in the sample and the complexity of the analysis.

When  $|Bias_{relative}| \leq MARB$ , the result will be rated "Accepted (A)" for trueness.

### 2.2 Evaluation approach for radionuclide activity concentration values (Samples 1, 2 and 4) and activity values per sample (Samples 5, 6 and 7)

Based on fit-for-purpose and good laboratory practice principles, the expanded relative uncertainty should cover the relative bias (as defined in 2.1):

The  $P$  value corresponds to the relative combined uncertainty of the relative bias

$$P = \sqrt{\left(\frac{u_{target}}{A_{target}}\right)^2 + \left(\frac{u_{reported}}{A_{reported}}\right)^2} * 100\%$$

The relative bias is then compared to the expanded uncertainty of the relative bias:

$$|Bias_{relative}| \leq k * P$$

where  $k$  is the coverage factor:  $k = 2.58$  for a level of confidence of 99%.

When the above criterion is fulfilled, the reported result is not significantly different from the target values considering the uncertainties associated with both values. The reported uncertainty of measurement is large enough to cover the bias of the method.

In addition, the  $P$  value is compared to the MARB.

$$P \leq MARB$$

When this criterion is fulfilled, the measurement uncertainty is not overestimated and fit-for-purpose in relation to the MARB criterion of this PT exercise. When both criteria related to the measurement uncertainty are fulfilled, the reported result is rated "accepted (A)" for precision (measurement uncertainty). The result is rated "Not Accepted (N)" for precision if either of the two conditions are not fulfilled.

The final score is assigned according to the detailed evaluation described above. The possible scores are listed below:

- "Accepted (A)" when both, trueness and precision were rated "Accepted"
- "Not Accepted (N)" when the trueness rating is "Not Accepted"
- "Warning (W)" when the trueness rating is "Accepted" but the precision rating is "Not Accepted"

### 2.3 Evaluation parameters calculated for intercomparison analyte values

#### 2.3.1 Z-Score

The  $z$  score provides information on the trueness of the reported value in relation to the standard deviation for proficiency assessment  $\sigma_{PT}$ , which is assigned based on fitness for purpose.

$$z = \frac{Value_{reported} - Value_{target}}{\sigma_{PT}}$$

The following criteria apply for performance ratings based on obtained  $z$  scores

- $|z| \leq 2$  ... accepted (A)
- $2 < |z| < 3$  ... questionable (Q)
- $|z| \geq 3$  ... not accepted (N)

### 3 Data Evaluation

A total of 99 laboratories successfully reported data in the IAEA-TERC-2023-02 ALMERA proficiency test exercise.

For each of the analytes evaluated, the target value, target uncertainty and the MARB are listed. A pie chart showing the distribution of accepted, warning, not acceptable and not reported results, the s-shape graph, and a detailed table listing all evaluation results for the analyte (sorted by the laboratory code) are provided. The data points are coloured in blue, yellow and red, corresponding to a result of "Accepted", "Warning", and "Not Accepted", respectively.

#### 3.1 Evaluation of activity concentrations of radionuclides

##### Reported Results for H-3 Determination in Sample 1

TABLE 1. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	29.0
Uncertainty [ Bq/kg ]	1.5
Maximum Acceptable Relative Bias, [%]	30

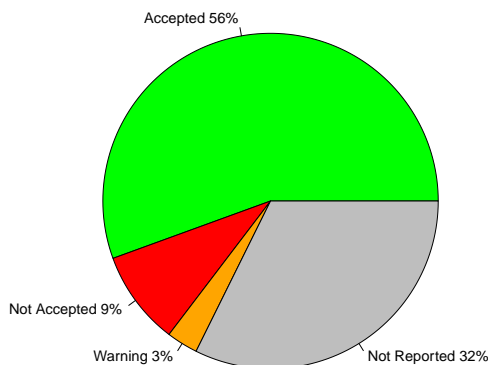


FIGURE 1. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

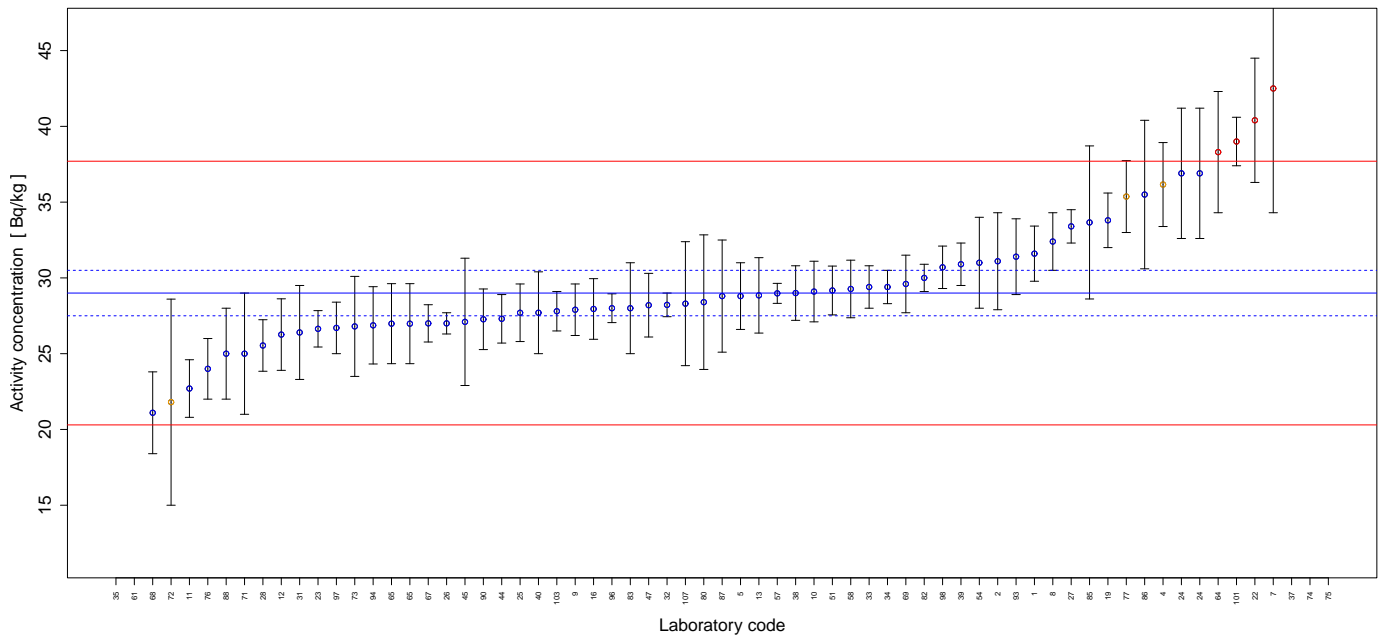


FIGURE 2. Reported results and evaluation parameters for H-3. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 2. Evaluation Results for H-3 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by beta

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	31.6	1.82	8.97	7.74	A	A	A
2	31.1	3.2	7.24	11.52	A	A	A
4	36.16	2.77	24.69	9.24	A	N	W
5	28.8	2.2	-0.69	9.23	A	A	A
7	42.5	8.2	46.55	19.98	N	A	N
8	32.4	1.9	11.72	7.82	A	A	A
9	27.9	1.7	-3.79	7.99	A	A	A
10	29.1	2.0	0.34	8.60	A	A	A
11	22.7	1.9	-21.72	9.84	A	A	A
12	26.26	2.36	-9.45	10.37	A	A	A
13	28.847	2.488	-0.53	10.06	A	A	A
16	27.95	2	-3.62	8.83	A	A	A
19	33.8	1.8	16.55	7.42	A	A	A
22	40.4	4.1	39.31	11.39	N	N	N
23	26.64	1.2	-8.14	6.86	A	A	A
24	36.9	4.30	27.24	12.75	A	A	A
25	27.7	1.9	-4.48	8.59	A	A	A
26	27	0.7	-6.90	5.79	A	A	A
27	33.4	1.1	15.17	6.13	A	A	A
28	25.54	1.7	-11.93	8.43	A	A	A
31	26.4	3.1	-8.97	12.83	A	A	A
32	28.22	0.78	-2.69	5.86	A	A	A
33	29.4	1.4	1.38	7.03	A	A	A
34	29.4	1.1	1.38	6.38	A	A	A
35	7.07	0.37	-75.62	7.36	N	N	N
37	67.78	9.4	133.72	14.80	N	N	N
38	29.0	1.8	0.00	8.08	A	A	A
39	30.9	1.4	6.55	6.88	A	A	A
40	27.7	2.7	-4.48	11.03	A	A	A
44	27.3	1.6	-5.86	7.82	A	A	A
45	27.1	4.2	-6.55	16.34	A	A	A
47	28.2	2.1	-2.76	9.07	A	A	A
51	29.17	1.61	0.59	7.56	A	A	A
54	31	3	6.90	10.97	A	A	A

TABLE 2. Evaluation Results for H-3 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by beta

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
57	28.98	0.66	-0.07	5.65	A	A	A
58	29.27	1.9	0.93	8.30	A	A	A
61	7.76	0.39	-73.24	7.21	N	N	N
64	38.3	4.0	32.07	11.65	N	N	N
65	26.98	2.64	-6.97	11.07	A	A	A
67	27.00	1.23	-6.90	6.89	A	A	A
68	21.1	2.7	-27.24	13.80	A	A	A
69	29.6	1.9	2.07	8.24	A	A	A
71	25	4	-13.79	16.82	A	A	A
72	21.8	6.8	-24.83	31.62	A	N	W
73	26.8	3.3	-7.59	13.36	A	A	A
74	73.4	9.8	153.10	14.32	N	N	N
75	76.9	14.2	165.17	19.18	N	N	N
76	24	2	-17.24	9.81	A	A	A
77	35.367	2.372	21.96	8.47	A	N	W
80	28.40	4.44	-2.07	16.47	A	A	A
82	30.0	0.9	3.45	5.98	A	A	A
83	28	3	-3.45	11.90	A	A	A
85	33.66	5.05	16.07	15.87	A	A	A
86	35.5	4.9	22.41	14.74	A	A	A
87	28.8	3.7	-0.69	13.85	A	A	A
88	25	3	-13.79	13.07	A	A	A
90	27.27	2	-5.97	8.97	A	A	A
93	31.4	2.5	8.28	9.49	A	A	A
94	26.87	2.55	-7.34	10.81	A	A	A
96	28.0	0.95	-3.45	6.19	A	A	A
97	26.7	1.7	-7.93	8.20	A	A	A
98	30.7	1.4	5.86	6.90	A	A	A
101	39	1.6	34.48	6.60	N	N	N
103	27.8	1.3	-4.14	6.97	A	A	A
107	28.3	4.09	-2.41	15.35	A	A	A

# Reported Results for Co-60 Determination in Sample 1

TABLE 3. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	14.7
Uncertainty [ Bq/kg ]	0.7
Maximum Acceptable Relative Bias, [%]	20

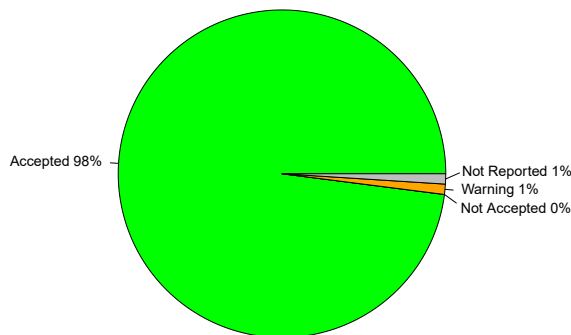


FIGURE 3. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

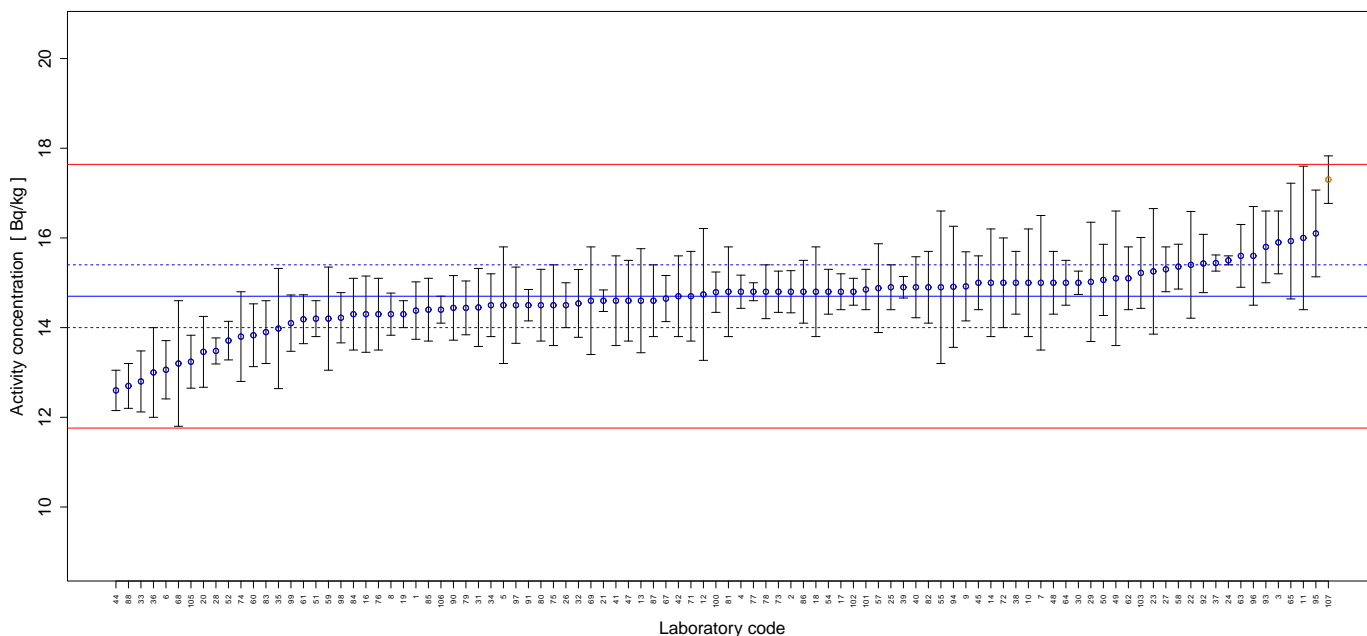


FIGURE 4. Reported results and evaluation parameters for Co-60. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 4. Evaluation Results for Co-60 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
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TABLE 4. Evaluation Results for Co-60 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	14.38	0.64	-2.18	6.52	A	A	A
2	14.8	0.47	0.68	5.72	A	A	A
3	15.9	0.7	8.16	6.49	A	A	A
4	14.80	0.37	0.68	5.38	A	A	A
5	14.5	1.3	-1.36	10.15	A	A	A
6	13.06	0.65	-11.16	6.89	A	A	A
7	15	1.5	2.04	11.08	A	A	A
8	14.3	0.47	-2.72	5.79	A	A	A
9	14.92	0.77	1.50	7.02	A	A	A
10	15.0	1.2	2.04	9.31	A	A	A
11	16	1.6	8.84	11.08	A	A	A
12	14.74	1.47	0.27	11.05	A	A	A
13	14.6	1.16	-0.68	9.26	A	A	A
14	15.0	1.2	2.04	9.31	A	A	A
16	14.30	0.85	-2.72	7.62	A	A	A
17	14.8	0.4	0.68	5.48	A	A	A
18	14.8	1.0	0.68	8.27	A	A	A
19	14.3	0.3	-2.72	5.20	A	A	A
20	13.46	0.79	-8.44	7.56	A	A	A
21	14.6	0.24	-0.68	5.04	A	A	A
22	15.4	1.19	4.76	9.08	A	A	A
23	15.25474	1.4	3.77	10.34	A	A	A
24	15.5	0.10	5.44	4.81	A	A	A
25	14.9	0.5	1.36	5.83	A	A	A
26	14.5	0.5	-1.36	5.88	A	A	A
27	15.3	0.5	4.08	5.78	A	A	A
28	13.48	0.29	-8.30	5.23	A	A	A
29	15.02	1.33	2.18	10.05	A	A	A
30	15.00	0.26	2.04	5.07	A	A	A
31	14.45	0.87	-1.70	7.68	A	A	A
32	14.54	0.756	-1.09	7.05	A	A	A
33	12.80	0.68	-12.93	7.13	A	A	A
34	14.5	0.7	-1.36	6.78	A	A	A
35	13.98	1.34	-4.90	10.70	A	A	A
36	13	1	-11.56	9.05	A	A	A
37	15.44	0.18	5.03	4.90	A	A	A
38	15.0	0.7	2.04	6.67	A	A	A
39	14.9	0.24	1.36	5.03	A	A	A
40	14.9	0.68	1.36	6.60	A	A	A
41	14.6	1.0	-0.68	8.34	A	A	A
42	14.7	0.9	0.00	7.76	A	A	A
44	12.6	0.45	-14.29	5.95	A	A	A
45	15.00	0.60	2.04	6.22	A	A	A
47	14.6	0.9	-0.68	7.79	A	A	A
48	15.0	0.7	2.04	6.67	A	A	A
49	15.1	1.5	2.72	11.02	A	A	A
50	15.064	0.794	2.48	7.10	A	A	A
51	14.2	0.4	-3.40	5.53	A	A	A
52	13.71	0.43	-6.73	5.70	A	A	A
54	14.8	0.5	0.68	5.84	A	A	A
55	14.9	1.7	1.36	12.36	A	A	A
57	14.88	0.99	1.22	8.18	A	A	A
58	15.36	0.50	4.49	5.77	A	A	A
59	14.20	1.15	-3.40	9.39	A	A	A
60	13.83	0.7	-5.92	6.95	A	A	A
61	14.187	0.545	-3.49	6.12	A	A	A
62	15.1	0.7	2.72	6.65	A	A	A
63	15.6	0.7	6.12	6.54	A	A	A
64	15.0	0.5	2.04	5.81	A	A	A
65	15.93	1.29	8.37	9.39	A	A	A

TABLE 4. Evaluation Results for Co-60 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
67	14.648	0.514	-0.35	5.92	A	A	A
68	13.2	1.4	-10.20	11.63	A	A	A
69	14.6	1.2	-0.68	9.50	A	A	A
71	14.7	1.0	0.00	8.30	A	A	A
72	15.0	1.0	2.04	8.19	A	A	A
73	14.8	0.46	0.68	5.69	A	A	A
74	13.8	1.0	-6.12	8.67	A	A	A
75	14.5	0.9	-1.36	7.82	A	A	A
76	14.3	0.8	-2.72	7.35	A	A	A
77	14.8	0.2	0.68	4.95	A	A	A
78	14.8	0.6	0.68	6.25	A	A	A
79	14.44	0.6	-1.77	6.32	A	A	A
80	14.50	0.8	-1.36	7.29	A	A	A
81	14.8	1.0	0.68	8.27	A	A	A
82	14.9	0.8	1.36	7.18	A	A	A
83	13.90	0.70	-5.44	6.93	A	A	A
84	14.3	0.8	-2.72	7.35	A	A	A
85	14.4	0.7	-2.04	6.80	A	A	A
86	14.8	0.7	0.68	6.71	A	A	A
87	14.6	0.8	-0.68	7.26	A	A	A
88	12.7	0.5	-13.61	6.18	A	A	A
90	14.44	0.72	-1.77	6.89	A	A	A
91	14.5	0.35	-1.36	5.34	A	A	A
92	15.43	0.65	4.97	6.36	A	A	A
93	15.8	0.8	7.48	6.95	A	A	A
94	14.91	1.35	1.43	10.23	A	A	A
95	16.1	0.967	9.52	7.66	A	A	A
96	15.6	1.1	6.12	8.51	A	A	A
97	14.50	0.85	-1.36	7.55	A	A	A
98	14.22	0.56	-3.27	6.18	A	A	A
99	14.1	0.628	-4.08	6.52	A	A	A
100	14.79	0.45	0.61	5.65	A	A	A
101	14.85	0.45	1.02	5.64	A	A	A
102	14.8	0.3	0.68	5.18	A	A	A
103	15.22	0.79	3.54	7.04	A	A	A
105	13.24	0.59	-9.93	6.52	A	A	A
106	14.4	0.3	-2.04	5.20	A	A	A
107	17.3	0.53	17.69	5.66	A	N	W

# Reported Results for U-234 Determination in Sample 1

TABLE 5. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	5.44
Uncertainty [ Bq/kg ]	0.27
Maximum Acceptable Relative Bias, [%]	30

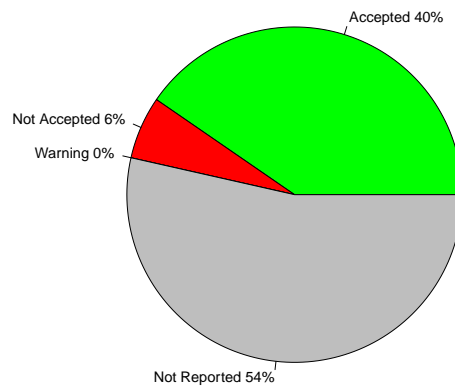


FIGURE 5. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

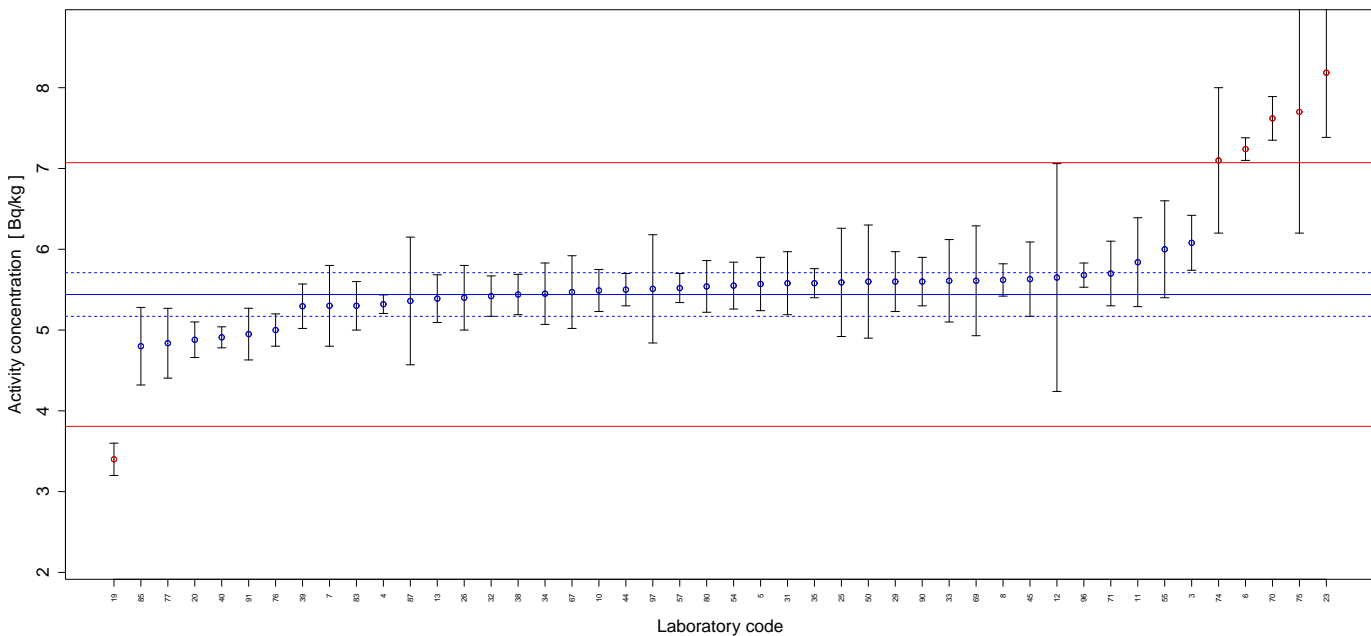


FIGURE 6. Reported results and evaluation parameters for U-234. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 6. Evaluation Results for U-234 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by alpha

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	6.08	0.34	11.76	7.48	A	A	A
4	5.320	0.115	-2.21	5.41	A	A	A
5	5.57	0.33	2.39	7.73	A	A	A
6	7.24	0.14	33.09	5.33	N	N	N
7	5.3	0.5	-2.57	10.66	A	A	A
8	5.62	0.20	3.31	6.11	A	A	A
10	5.49	0.26	0.92	6.86	A	A	A
11	5.84	0.55	7.35	10.65	A	A	A
12	5.65	1.41	3.86	25.44	A	A	A
13	5.389	0.295	-0.94	7.39	A	A	A
19	3.4	0.2	-37.50	7.70	N	N	N
20	4.88	0.22	-10.29	6.71	A	A	A
23	8.185	0.8	50.46	10.96	N	N	N
25	5.59	0.67	2.76	12.97	A	A	A
26	5.4	0.4	-0.74	8.92	A	A	A
29	5.600	0.370	2.94	8.26	A	A	A
31	5.58	0.39	2.57	8.57	A	A	A
32	5.42	0.25	-0.37	6.78	A	A	A
33	5.61	0.51	3.12	10.36	A	A	A
34	5.45	0.38	0.18	8.56	A	A	A
35	5.58	0.18	2.57	5.92	A	A	A
38	5.44	0.25	0.00	6.76	A	A	A
39	5.295	0.275	-2.67	7.18	A	A	A
40	4.91	0.13	-9.74	5.63	A	A	A
44	5.5	0.2	1.10	6.15	A	A	A
45	5.63	0.46	3.49	9.56	A	A	A
50	5.6	0.7	2.94	13.45	A	A	A
54	5.55	0.29	2.02	7.21	A	A	A
55	6.0	0.60	10.29	11.16	A	A	A
57	5.52	0.18	1.47	5.94	A	A	A
67	5.47	0.45	0.55	9.61	A	A	A
69	5.61	0.68	3.12	13.10	A	A	A
70	7.62	0.27	40.07	6.10	N	N	N
71	5.7	0.4	4.78	8.60	A	A	A
74	7.1	0.9	30.51	13.61	N	A	N
75	7.7	1.5	41.54	20.10	N	A	N
76	5.0	0.2	-8.09	6.37	A	A	A
77	4.837	0.432	-11.08	10.22	A	A	A
80	5.54	0.32	1.84	7.62	A	A	A
83	5.3	0.3	-2.57	7.53	A	A	A
85	4.80	0.48	-11.76	11.16	A	A	A
87	5.36	0.79	-1.47	15.55	A	A	A
90	5.6	0.3	2.94	7.30	A	A	A
91	4.95	0.32	-9.01	8.15	A	A	A
96	5.68	0.15	4.41	5.62	A	A	A
97	5.51	0.67	1.29	13.13	A	A	A

# Reported Results for U-235 Determination in Sample 1

TABLE 7. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	0.26
Uncertainty [ Bq/kg ]	0.01
Maximum Acceptable Relative Bias, [%]	30

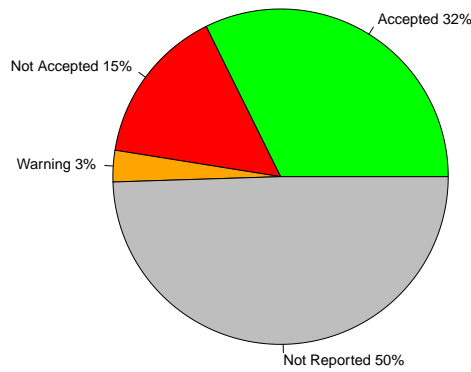


FIGURE 7. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

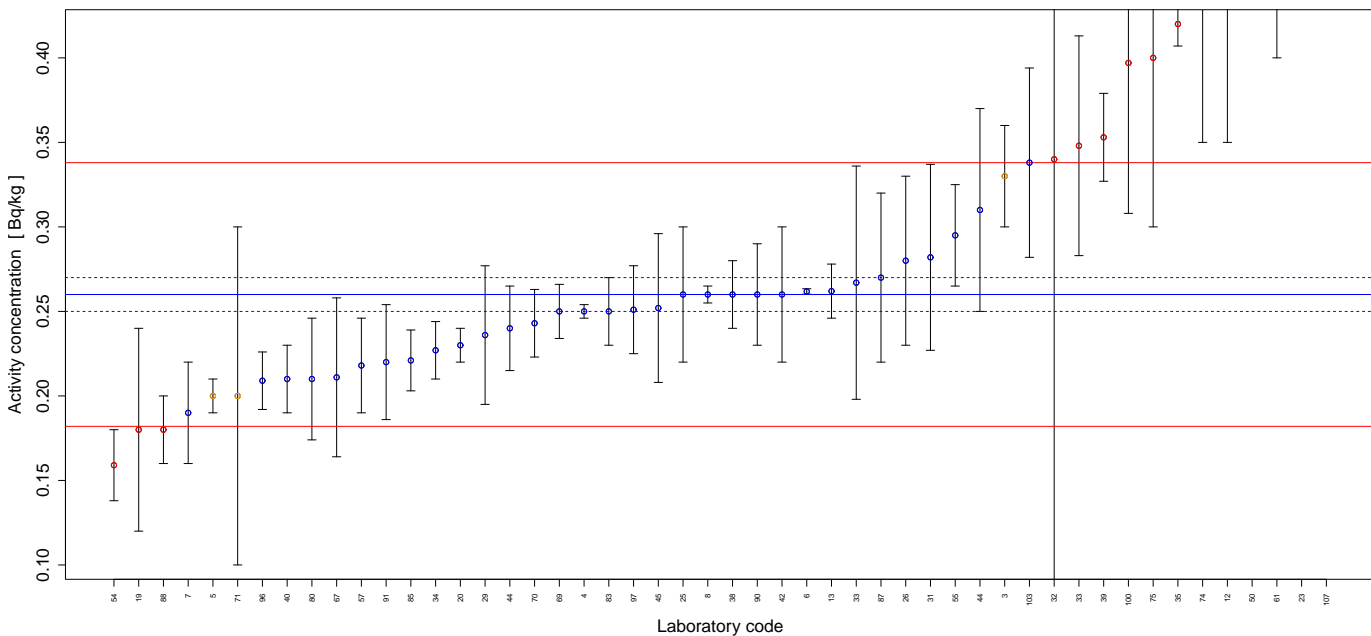


FIGURE 8. Reported results and evaluation parameters for U-235. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 8. Evaluation Results for U-235 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by alpha

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	0.33	0.03	26.92	9.87	A	N	W
4	0.250	0.004	-3.85	4.17	A	A	A
5	0.20	0.01	-23.08	6.31	A	N	W
6	0.2618	0.0016	0.69	3.89	A	A	A
7	0.190	0.03	-26.92	16.25	A	A	A
8	0.26	0.005	0.00	4.30	A	A	A
12	0.47	0.12	80.77	25.82	N	N	N
13	0.262	0.016	0.77	7.22	A	A	A
19	0.18	0.06	-30.77	33.55	N	N	N
20	0.23	0.01	-11.54	5.80	A	A	A
23	1.513	0.15	481.92	10.63	N	N	N
25	0.26	0.04	0.00	15.86	A	A	A
26	0.28	0.05	7.69	18.27	A	A	A
29	0.236	0.041	-9.23	17.79	A	A	A
31	0.282	0.055	8.46	19.88	A	A	A
32	0.34	0.78	30.77	229.44	N	N	N
33	0.267	0.069	2.69	26.13	A	A	A
34	0.227	0.017	-12.69	8.42	A	A	A
35	0.42	0.013	61.54	4.94	N	N	N
38	0.26	0.02	0.00	8.60	A	A	A
39	0.353	0.026	35.77	8.31	N	N	N
40	0.21	0.02	-19.23	10.27	A	A	A
44	0.24	0.025	-7.69	11.10	A	A	A
45	0.252	0.044	-3.08	17.88	A	A	A
50	0.9	0.12	246.15	13.88	N	N	N
54	0.159	0.021	-38.85	13.76	N	N	N
55	0.295	0.030	13.46	10.87	A	A	A
57	0.218	0.028	-16.15	13.41	A	A	A
67	0.211	0.047	-18.85	22.60	A	A	A
69	0.250	0.016	-3.85	7.47	A	A	A
70	0.243	0.020	-6.54	9.08	A	A	A
71	0.2	0.1	-23.08	50.15	A	N	W
74	0.43	0.08	65.38	19.00	N	N	N
75	0.4	0.1	53.85	25.29	N	A	N
80	0.21	0.036	-19.23	17.57	A	A	A
83	0.25	0.02	-3.85	8.88	A	A	A
85	0.221	0.018	-15.00	9.01	A	A	A
87	0.27	0.05	3.85	18.91	A	A	A
90	0.26	0.03	0.00	12.16	A	A	A
91	0.22	0.034	-15.38	15.93	A	A	A
96	0.209	0.017	-19.62	9.00	A	A	A
97	0.251	0.026	-3.46	11.05	A	A	A

# Reported Results for U-238 Determination in Sample 1

TABLE 9. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	5.60
Uncertainty [ Bq/kg ]	0.28
Maximum Acceptable Relative Bias, [%]	30

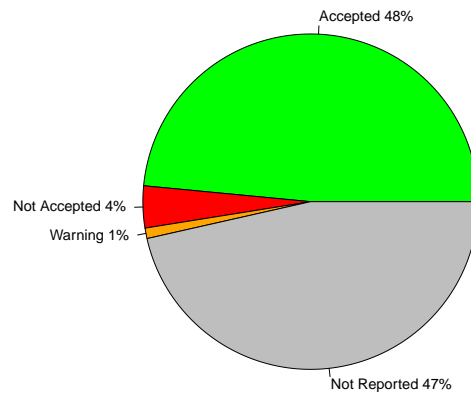


FIGURE 9. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

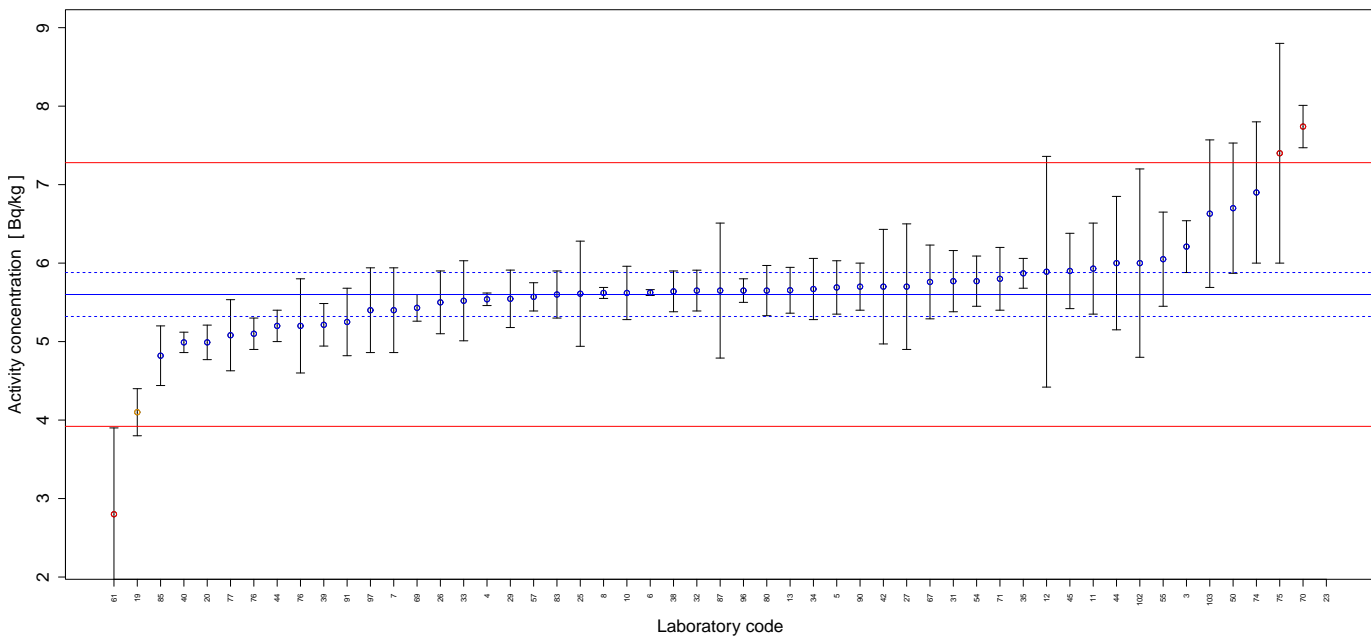


FIGURE 10. Reported results and evaluation parameters for U-238. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 10. Evaluation Results for U-238 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
27	5.7	0.8	1.79	14.90	A	A	A
42	5.70	0.73	1.79	13.75	A	A	A
44	6	0.85	7.14	15.02	A	A	A
61	2.8	1.1	-50.00	39.60	N	N	N
76	5.2	0.6	-7.14	12.58	A	A	A
102	6.0	1.2	7.14	20.62	A	A	A
103	6.63	0.94	18.39	15.03	A	A	A



# Reported Results for U-238 Determination in Sample 1

TABLE 11. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	5.60
Uncertainty [ Bq/kg ]	0.28
Maximum Acceptable Relative Bias, [%]	30

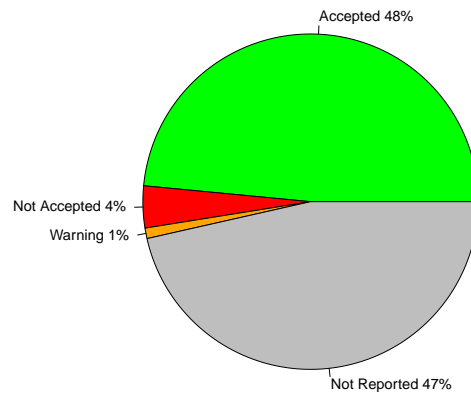


FIGURE 11. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

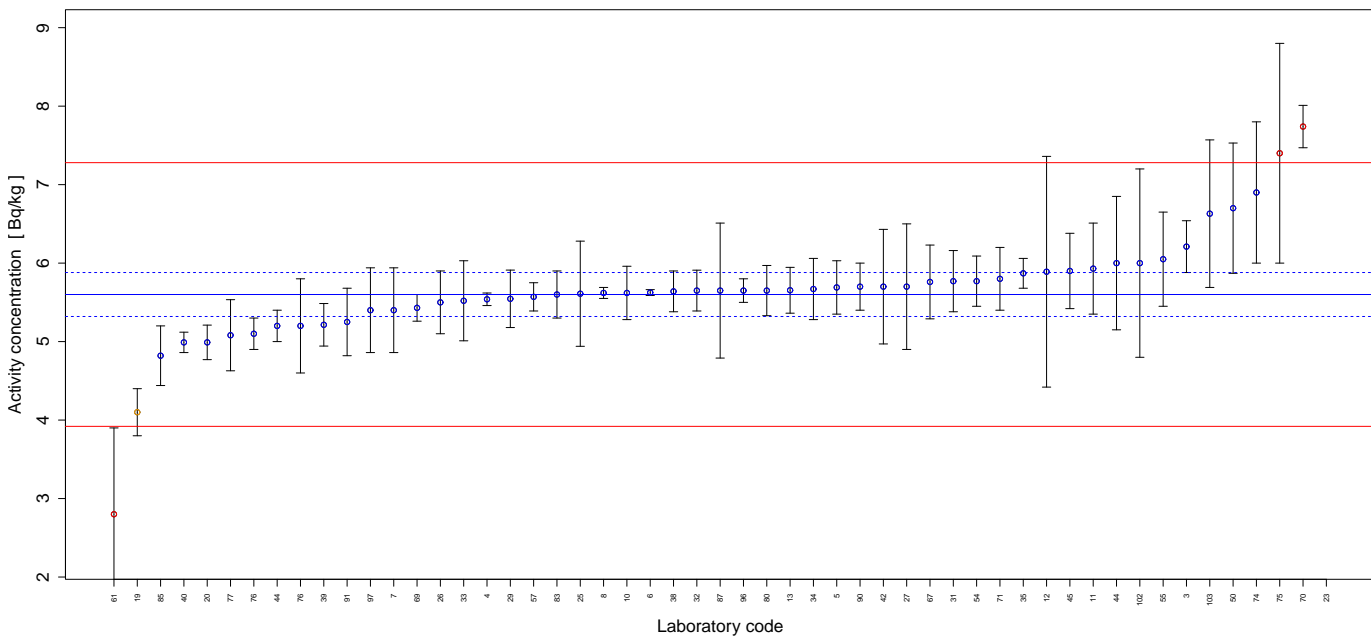


FIGURE 12. Reported results and evaluation parameters for U-238. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 12. Evaluation Results for U-238 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by alpha

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	6.21	0.33	10.89	7.30	A	A	A
4	5.539	0.080	-1.09	5.20	A	A	A
5	5.69	0.34	1.61	7.79	A	A	A
6	5.625	0.037	0.45	5.04	A	A	A
7	5.4	0.54	-3.57	11.18	A	A	A
8	5.62	0.07	0.36	5.15	A	A	A
10	5.62	0.34	0.36	7.85	A	A	A
11	5.93	0.58	5.89	10.98	A	A	A
12	5.89	1.47	5.18	25.45	A	A	A
13	5.654	0.292	0.96	7.19	A	A	A
19	4.1	0.3	-26.79	8.86	A	N	W
20	4.99	0.22	-10.89	6.67	A	A	A
23	13.031	1.12	132.70	9.94	N	N	N
25	5.61	0.67	0.18	12.95	A	A	A
26	5.5	0.4	-1.79	8.83	A	A	A
29	5.545	0.366	-0.98	8.28	A	A	A
31	5.77	0.39	3.04	8.41	A	A	A
32	5.65	0.26	0.89	6.80	A	A	A
33	5.52	0.51	-1.43	10.51	A	A	A
34	5.67	0.39	1.25	8.50	A	A	A
35	5.87	0.19	4.82	5.96	A	A	A
38	5.64	0.26	0.71	6.80	A	A	A
39	5.214	0.271	-6.89	7.21	A	A	A
40	4.99	0.13	-10.89	5.64	A	A	A
44	5.2	0.2	-7.14	6.31	A	A	A
45	5.90	0.48	5.36	9.55	A	A	A
50	6.7	0.83	19.64	13.36	A	A	A
54	5.77	0.32	3.04	7.47	A	A	A
55	6.05	0.60	8.04	11.11	A	A	A
57	5.57	0.18	-0.54	5.95	A	A	A
67	5.76	0.47	2.86	9.57	A	A	A
69	5.43	0.17	-3.04	5.90	A	A	A
70	7.74	0.27	38.21	6.10	N	N	N
71	5.8	0.4	3.57	8.52	A	A	A
74	6.9	0.9	23.21	13.97	A	A	A
75	7.4	1.4	32.14	19.57	N	A	N
76	5.1	0.2	-8.93	6.35	A	A	A
77	5.081	0.453	-9.27	10.22	A	A	A
80	5.65	0.32	0.89	7.55	A	A	A
83	5.6	0.3	0.00	7.33	A	A	A
85	4.82	0.38	-13.93	9.34	A	A	A
87	5.65	0.86	0.89	16.02	A	A	A
90	5.7	0.3	1.79	7.26	A	A	A
91	5.25	0.43	-6.25	9.60	A	A	A
96	5.65	0.15	0.89	5.66	A	A	A
97	5.40	0.54	-3.57	11.18	A	A	A

# Reported Results for Am-241 Determination in Sample 1

TABLE 13. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	22.3
Uncertainty [ Bq/kg ]	1.1
Maximum Acceptable Relative Bias, [%]	20

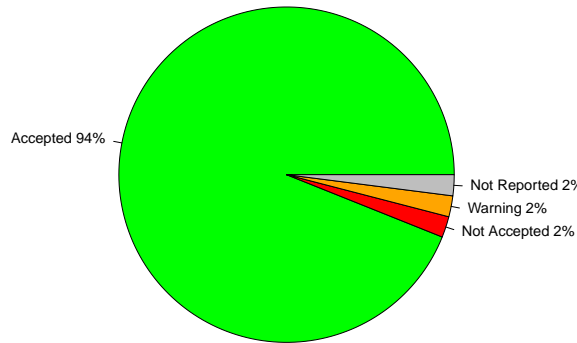


FIGURE 13. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

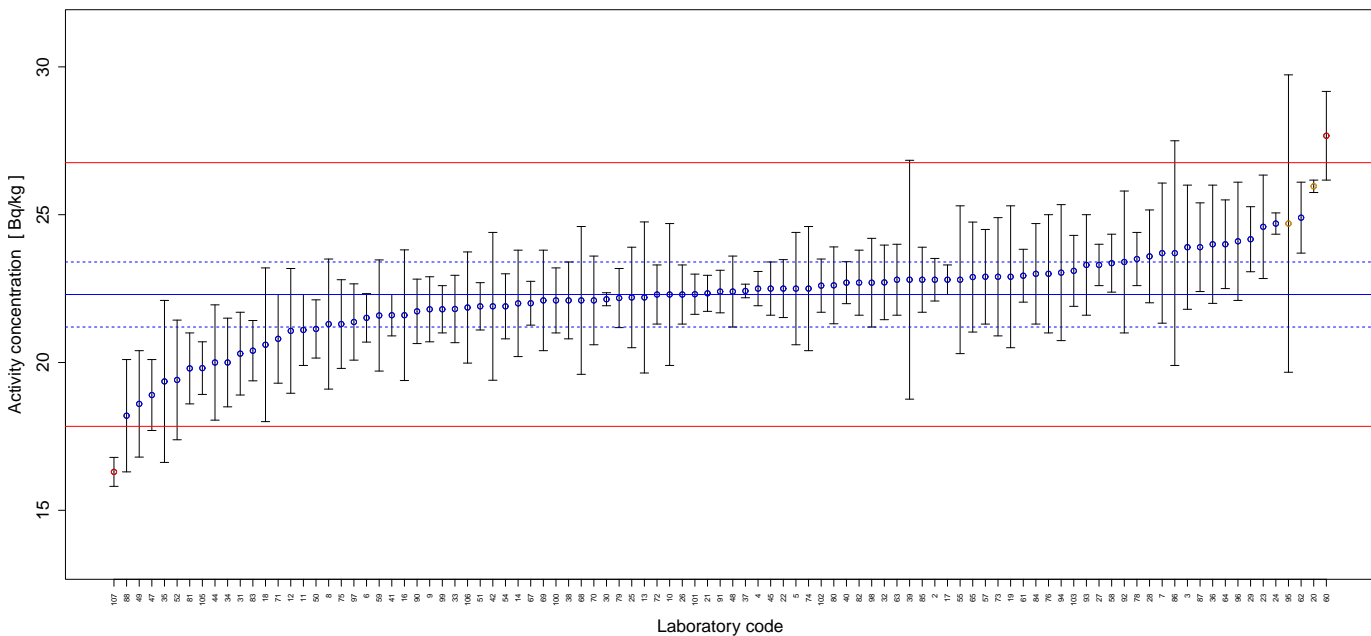


FIGURE 14. Reported results and evaluation parameters for Am-241. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 14. Evaluation Results for Am-241 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
2	22.8	0.72	2.24	5.86	A	A	A
3	23.9	2.1	7.17	10.08	A	A	A
4	22.50	0.58	0.90	5.57	A	A	A
5	22.5	1.9	0.90	9.78	A	A	A
6	21.51	0.82	-3.54	6.23	A	A	A
7	23.7	2.37	6.28	11.15	A	A	A
8	21.3	2.2	-4.48	11.45	A	A	A
9	21.8	1.1	-2.24	7.06	A	A	A
10	22.3	2.4	0.00	11.84	A	A	A
11	21.1	1.2	-5.38	7.53	A	A	A
12	21.07	2.11	-5.52	11.16	A	A	A
13	22.2	2.555	-0.45	12.52	A	A	A
14	22.0	1.8	-1.35	9.55	A	A	A
16	21.6	2.21	-3.14	11.36	A	A	A
17	22.8	0.5	2.24	5.40	A	A	A
18	20.6	2.6	-7.62	13.55	A	A	A
19	22.9	2.4	2.69	11.58	A	A	A
20	25.96	0.21	16.41	5.00	A	N	W
21	22.34	0.61	0.18	5.64	A	A	A
22	22.5	0.98	0.90	6.58	A	A	A
23	24.59	1.75	10.27	8.66	A	A	A
24	24.7	0.36	10.76	5.14	A	A	A
25	22.2	1.7	-0.45	9.11	A	A	A
26	22.3	1	0.00	6.67	A	A	A
27	23.3	0.7	4.48	5.78	A	A	A
28	23.59	1.57	5.78	8.28	A	A	A
29	24.17	1.10	8.39	6.71	A	A	A
30	22.14	0.22	-0.72	5.03	A	A	A
31	20.3	1.4	-8.97	8.48	A	A	A
32	22.71	1.262	1.84	7.43	A	A	A
33	21.81	1.14	-2.20	7.19	A	A	A
34	20.0	1.5	-10.31	8.98	A	A	A
35	19.36	2.74	-13.18	14.99	A	A	A
36	24	2.0	7.62	9.68	A	A	A
37	22.42	0.23	0.54	5.04	A	A	A
38	22.1	1.3	-0.90	7.68	A	A	A
39	22.8	4.04	2.24	18.39	A	A	A
40	22.7	0.71	1.79	5.84	A	A	A
41	21.6	0.7	-3.14	5.90	A	A	A
42	21.9	2.5	-1.79	12.44	A	A	A
44	20	1.95	-10.31	10.93	A	A	A
45	22.50	0.90	0.90	6.35	A	A	A
47	18.9	1.2	-15.25	8.04	A	A	A
48	22.4	1.2	0.45	7.28	A	A	A
49	18.6	1.8	-16.59	10.86	A	A	A
50	21.135	0.985	-5.22	6.79	A	A	A
51	21.9	0.8	-1.79	6.14	A	A	A
52	19.41	2.024	-12.96	11.54	A	A	A
54	21.9	1.1	-1.79	7.04	A	A	A
55	22.8	2.5	2.24	12.02	A	A	A
57	22.9	1.6	2.69	8.55	A	A	A
58	23.36	0.98	4.75	6.48	A	A	A
59	21.59	1.88	-3.18	10.01	A	A	A
60	27.67	1.5	24.08	7.33	N	N	N
61	22.936	0.894	2.85	6.29	A	A	A
62	24.9	1.2	11.66	6.90	A	A	A
63	22.8	1.2	2.24	7.21	A	A	A
64	24.0	1.5	7.62	7.96	A	A	A
65	22.89	1.86	2.65	9.51	A	A	A
67	22.005	0.741	-1.32	5.97	A	A	A

TABLE 14. Evaluation Results for Am-241 in Sample 1, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
68	22.1	2.5	-0.90	12.34	A	A	A
69	22.1	1.7	-0.90	9.14	A	A	A
70	22.1	1.5	-0.90	8.39	A	A	A
71	20.8	1.5	-6.73	8.74	A	A	A
72	22.3	1.0	0.00	6.67	A	A	A
73	22.9	2.0	2.69	10.03	A	A	A
74	22.5	2.1	0.90	10.56	A	A	A
75	21.3	1.50	-4.48	8.60	A	A	A
76	23	2	3.14	10.00	A	A	A
78	23.5	0.9	5.38	6.24	A	A	A
79	22.18	1	-0.54	6.68	A	A	A
80	22.61	1.30	1.39	7.58	A	A	A
81	19.8	1.2	-11.21	7.81	A	A	A
82	22.7	1.1	1.79	6.91	A	A	A
83	20.40	1.02	-8.52	7.02	A	A	A
84	23.0	1.7	3.14	8.89	A	A	A
85	22.8	1.1	2.24	6.90	A	A	A
86	23.7	3.8	6.28	16.78	A	A	A
87	23.9	1.5	7.17	7.98	A	A	A
88	18.2	1.9	-18.39	11.55	A	A	A
90	21.73	1.09	-2.56	7.04	A	A	A
91	22.4	0.72	0.45	5.89	A	A	A
92	23.4	2.4	4.93	11.38	A	A	A
93	23.3	1.7	4.48	8.81	A	A	A
94	23.04	2.30	3.32	11.13	A	A	A
95	24.7	5.03	10.76	20.95	A	N	W
96	24.1	2.0	8.07	9.65	A	A	A
97	21.37	1.29	-4.17	7.80	A	A	A
98	22.7	1.5	1.79	8.25	A	A	A
99	21.8	0.799	-2.24	6.15	A	A	A
100	22.1	1.1	-0.90	7.01	A	A	A
101	22.31	0.68	0.04	5.80	A	A	A
102	22.6	0.9	1.35	6.34	A	A	A
103	23.1	1.2	3.59	7.16	A	A	A
105	19.81	0.89	-11.17	6.67	A	A	A
106	21.86	1.88	-1.97	9.91	A	A	A
107	16.3	0.49	-26.91	5.78	N	N	N

## Reported Results for Sr-90 Determination in Sample 2

TABLE 15. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	14.2
Uncertainty [ Bq/kg ]	0.7
Maximum Acceptable Relative Bias, [%]	30

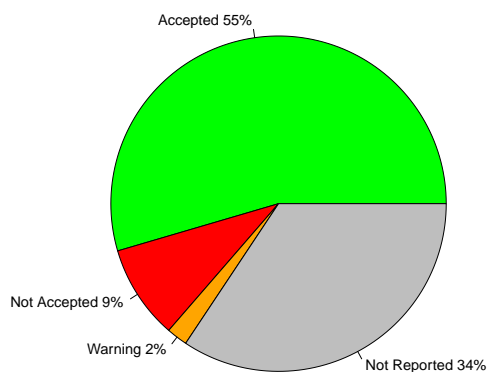


FIGURE 15. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

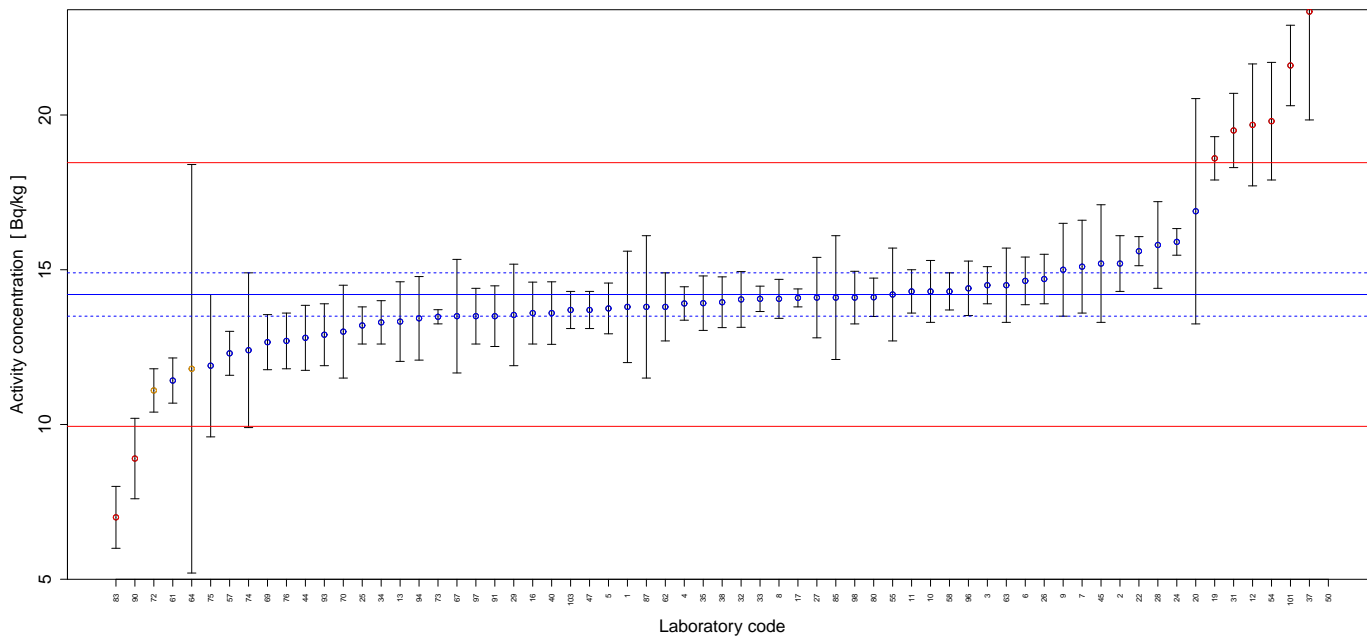


FIGURE 16. Reported results and evaluation parameters for Sr-90. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 16. Evaluation Results for Sr-90 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by beta

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	13.8	1.8	-2.82	13.94	A	A	A
2	15.2	0.9	7.04	7.70	A	A	A
3	14.5	0.6	2.11	6.44	A	A	A
4	13.91	0.54	-2.04	6.27	A	A	A
5	13.75	0.82	-3.17	7.74	A	A	A
6	14.64	0.77	3.10	7.21	A	A	A
7	15.1	1.5	6.34	11.09	A	A	A
8	14.06	0.63	-0.99	6.66	A	A	A
9	15.0	1.5	5.63	11.15	A	A	A
10	14.3	1.0	0.70	8.56	A	A	A
11	14.3	0.7	0.70	6.95	A	A	A
12	19.68	1.97	38.59	11.16	N	N	N
13	13.325	1.286	-6.16	10.84	A	A	A
16	13.60	1	-4.23	8.85	A	A	A
17	14.09	0.29	-0.77	5.34	A	A	A
19	18.6	0.7	30.99	6.20	N	N	N
20	16.89	3.64	18.94	22.11	A	A	A
22	15.6	0.47	9.86	5.78	A	A	A
24	15.9	0.43	11.97	5.62	A	A	A
25	13.2	0.6	-7.04	6.71	A	A	A
26	14.7	0.8	3.52	7.34	A	A	A
27	14.1	1.3	-0.70	10.45	A	A	A
28	15.8	1.4	11.27	10.14	A	A	A
29	13.54	1.64	-4.65	13.08	A	A	A
31	19.5	1.2	37.32	7.88	N	N	N
32	14.04	0.90	-1.13	8.09	A	A	A
33	14.06	0.41	-0.99	5.73	A	A	A
34	13.3	0.7	-6.34	7.21	A	A	A
35	13.92	0.88	-1.97	8.02	A	A	A
37	23.34	3.5	64.37	15.79	N	N	N
38	13.95	0.82	-1.76	7.67	A	A	A
40	13.6	1.01	-4.23	8.91	A	A	A
44	12.8	1.05	-9.86	9.57	A	A	A
45	15.2	1.9	7.04	13.44	A	A	A
47	13.7	0.6	-3.52	6.59	A	A	A
50	28.526	1.059	100.89	6.17	N	N	N
54	19.8	1.9	39.44	10.79	N	N	N
55	14.2	1.5	0.00	11.66	A	A	A
57	12.30	0.71	-13.38	7.59	A	A	A
58	14.3	0.6	0.70	6.47	A	A	A
61	11.42	0.73	-19.58	8.07	A	A	A
62	13.8	1.1	-2.82	9.37	A	A	A
63	14.5	1.2	2.11	9.63	A	A	A
64	11.8	6.6	-16.90	56.15	A	N	W
67	13.500	1.835	-4.93	14.46	A	A	A
69	12.66	0.89	-10.85	8.59	A	A	A
70	13.0	1.5	-8.45	12.55	A	A	A
72	11.1	0.7	-21.83	8.00	A	N	W
73	13.48	0.229	-5.07	5.21	A	A	A
74	12.4	2.5	-12.68	20.76	A	A	A
75	11.9	2.3	-16.20	19.95	A	A	A
76	12.7	0.9	-10.56	8.63	A	A	A
80	14.11	0.62	-0.63	6.60	A	A	A
83	7	1	-50.70	15.11	N	N	N
85	14.1	2.0	-0.70	15.02	A	A	A
87	13.8	2.3	-2.82	17.38	A	A	A
90	8.9	1.3	-37.32	15.42	N	A	N
91	13.5	0.98	-4.93	8.77	A	A	A
93	12.9	1.0	-9.15	9.19	A	A	A
94	13.43	1.35	-5.42	11.20	A	A	A

TABLE 16. Evaluation Results for Sr-90 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by beta

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
96	14.4	0.88	1.41	7.85	A	A	A
97	13.5	0.90	-4.93	8.29	A	A	A
98	14.10	0.85	-0.70	7.79	A	A	A
101	21.6	1.3	52.11	7.78	N	N	N
103	13.7	0.6	-3.52	6.59	A	A	A



## Reported Results for Sb-125 Determination in Sample 2

TABLE 17. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	73.0
Uncertainty [ Bq/kg ]	3.6
Maximum Acceptable Relative Bias, [%]	20

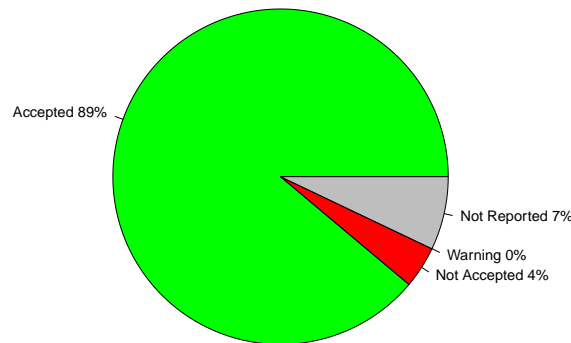


FIGURE 17. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

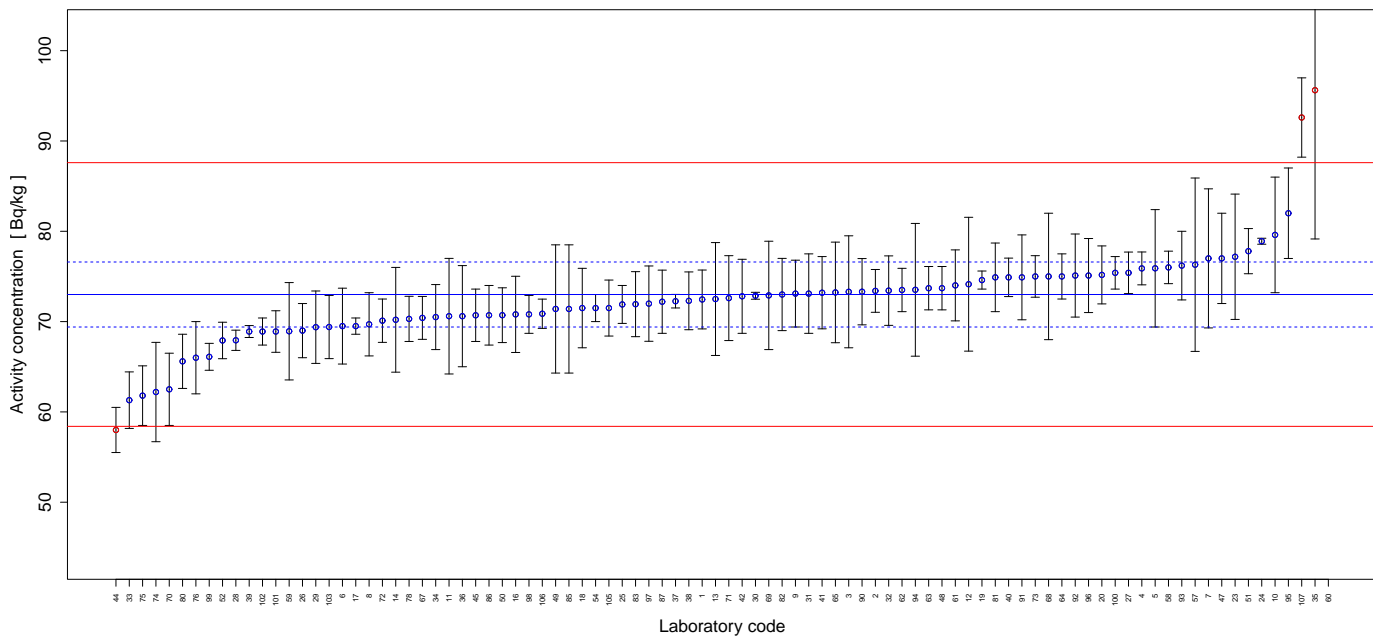


FIGURE 18. Reported results and evaluation parameters for Sb-125. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 18. Evaluation Results for Sb-125 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	72.45	3.26	-0.75	6.68	A	A	A
2	73.4	2.37	0.55	5.89	A	A	A
3	73.3	6.2	0.41	9.79	A	A	A
4	75.89	1.82	3.96	5.48	A	A	A
5	75.9	6.5	3.97	9.88	A	A	A
6	69.5	4.2	-4.79	7.80	A	A	A
7	77	7.7	5.48	11.15	A	A	A
8	69.7	3.5	-4.52	7.04	A	A	A
9	73.1	3.7	0.14	7.07	A	A	A
10	79.6	6.4	9.04	9.43	A	A	A
11	70.6	6.4	-3.29	10.32	A	A	A
12	74.14	7.41	1.56	11.15	A	A	A
13	72.5	6.25	-0.68	9.93	A	A	A
14	70.2	5.8	-3.84	9.62	A	A	A
16	70.8	4.22	-3.01	7.74	A	A	A
17	69.5	0.9	-4.79	5.10	A	A	A
18	71.5	4.4	-2.05	7.89	A	A	A
19	74.6	1.0	2.19	5.11	A	A	A
20	75.17	3.21	2.97	6.52	A	A	A
23	77.18	6.94	5.73	10.26	A	A	A
24	78.9	0.33	8.08	4.95	A	A	A
25	71.9	2.1	-1.51	5.73	A	A	A
26	69	3	-5.48	6.57	A	A	A
27	75.4	2.3	3.29	5.80	A	A	A
28	67.93	1.12	-6.95	5.20	A	A	A
29	69.38	4.01	-4.96	7.60	A	A	A
30	72.86	0.383	-0.19	4.96	A	A	A
31	73.1	4.4	0.14	7.78	A	A	A
32	73.43	3.847	0.59	7.19	A	A	A
33	61.30	3.13	-16.03	7.10	A	A	A
34	70.5	3.6	-3.42	7.10	A	A	A
35	95.62	16.47	30.99	17.92	N	A	N
36	70.6	5.6	-3.29	9.34	A	A	A
37	72.26	0.75	-1.01	5.04	A	A	A
38	72.3	3.2	-0.96	6.63	A	A	A
39	68.9	0.66	-5.62	5.02	A	A	A
40	74.9	2.13	2.60	5.69	A	A	A
41	73.2	4.0	0.27	7.36	A	A	A
42	72.8	4.1	-0.27	7.49	A	A	A
44	58	2.5	-20.55	6.55	N	N	N
45	70.7	2.9	-3.15	6.41	A	A	A
47	77	5	5.48	8.15	A	A	A
48	73.7	2.4	0.96	5.91	A	A	A
49	71.4	7.1	-2.19	11.10	A	A	A
50	70.709	3.033	-3.14	6.54	A	A	A
51	77.8	2.5	6.58	5.89	A	A	A
52	67.91	2.02	-6.97	5.76	A	A	A
54	71.5	1.5	-2.05	5.36	A	A	A
57	76.3	9.6	4.52	13.51	A	A	A
58	76.0	1.8	4.11	5.47	A	A	A
59	68.93	5.39	-5.58	9.24	A	A	A
60	118.6	4.5	62.47	6.22	N	N	N
61	74.01	3.93	1.38	7.25	A	A	A
62	73.5	2.4	0.68	5.91	A	A	A
63	73.7	2.4	0.96	5.91	A	A	A
64	75.0	2.5	2.74	5.95	A	A	A
65	73.23	5.57	0.32	9.06	A	A	A
67	70.411	2.375	-3.55	5.97	A	A	A
68	75.0	7.0	2.74	10.56	A	A	A
69	72.9	6.0	-0.14	9.59	A	A	A

TABLE 18. Evaluation Results for Sb-125 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
70	62.5	4.0	-14.38	8.08	A	A	A
71	72.6	4.7	-0.55	8.14	A	A	A
72	70.1	2.4	-3.97	6.00	A	A	A
73	75.0	2.3	2.74	5.81	A	A	A
74	62.2	5.5	-14.79	10.12	A	A	A
75	61.8	3.3	-15.34	7.27	A	A	A
76	66	4	-9.59	7.81	A	A	A
78	70.3	2.5	-3.70	6.08	A	A	A
80	65.60	3	-10.14	6.73	A	A	A
81	74.9	3.8	2.60	7.08	A	A	A
82	73	4	0.00	7.37	A	A	A
83	71.93	3.60	-1.47	7.03	A	A	A
85	71.4	7.1	-2.19	11.10	A	A	A
86	70.7	3.3	-3.15	6.79	A	A	A
87	72.2	3.5	-1.10	6.92	A	A	A
90	73.31	3.67	0.42	7.03	A	A	A
91	74.9	4.7	2.60	7.98	A	A	A
92	75.1	4.6	2.88	7.86	A	A	A
93	76.2	3.8	4.38	7.01	A	A	A
94	73.52	7.35	0.71	11.15	A	A	A
95	82.0	5.01	12.33	7.85	A	A	A
96	75.1	4.1	2.88	7.36	A	A	A
97	71.99	4.17	-1.38	7.61	A	A	A
98	70.8	2.1	-3.01	5.75	A	A	A
99	66.1	1.49	-9.45	5.42	A	A	A
100	75.4	1.8	3.29	5.48	A	A	A
101	68.9	2.3	-5.62	5.96	A	A	A
102	68.9	1.5	-5.62	5.39	A	A	A
103	69.4	3.5	-4.93	7.05	A	A	A
105	71.5	3.1	-2.05	6.57	A	A	A
106	70.87	1.62	-2.92	5.44	A	A	A
107	92.6	4.39	26.85	6.84	N	N	N

## Reported Results for Cs-134 Determination in Sample 2

TABLE 19. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	40.0
Uncertainty [ Bq/kg ]	2.0
Maximum Acceptable Relative Bias, [%]	20

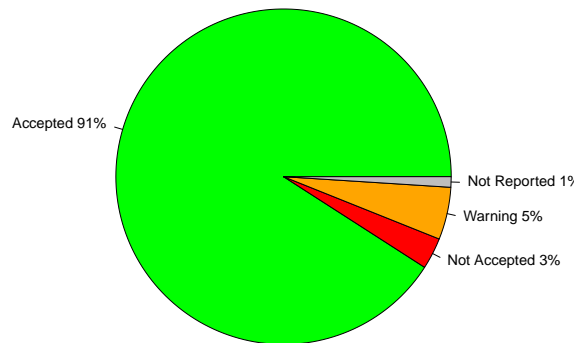


FIGURE 19. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

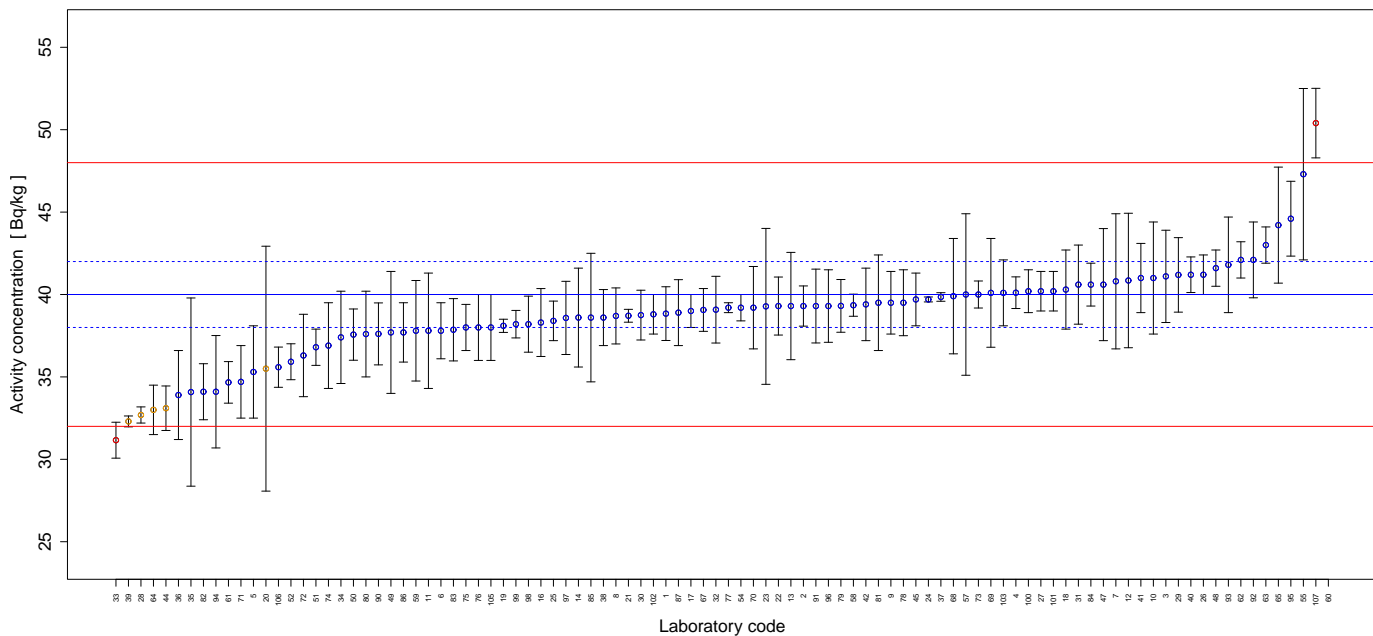


FIGURE 20. Reported results and evaluation parameters for Cs-134. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 20. Evaluation Results for Cs-134 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	38.84	1.63	-2.90	6.53	A	A	A
2	39.3	1.22	-1.75	5.89	A	A	A
3	41.1	2.8	2.75	8.45	A	A	A
4	40.11	0.96	0.27	5.54	A	A	A
5	35.3	2.8	-11.75	9.38	A	A	A
6	37.8	1.7	-5.50	6.73	A	A	A
7	40.8	4.1	2.00	11.22	A	A	A
8	38.7	1.7	-3.25	6.66	A	A	A
9	39.5	1.9	-1.25	6.94	A	A	A
10	41.0	3.4	2.50	9.68	A	A	A
11	37.8	3.5	-5.50	10.52	A	A	A
12	40.85	4.08	2.13	11.17	A	A	A
13	39.3	3.255	-1.75	9.67	A	A	A
14	38.6	3.0	-3.50	9.24	A	A	A
16	38.3	2.06	-4.25	7.34	A	A	A
17	39	1	-2.50	5.62	A	A	A
18	40.3	2.4	0.75	7.78	A	A	A
19	38.1	0.4	-4.75	5.11	A	A	A
20	35.50	7.43	-11.25	21.52	A	N	W
21	38.71	0.39	-3.22	5.10	A	A	A
22	39.3	1.76	-1.75	6.71	A	A	A
23	39.28	4.73	-1.80	13.04	A	A	A
24	39.7	0.15	-0.75	5.01	A	A	A
25	38.4	1.2	-4.00	5.90	A	A	A
26	41.2	1.2	3.00	5.79	A	A	A
27	40.2	1.2	0.50	5.82	A	A	A
28	32.69	0.49	-18.28	5.22	A	N	W
29	41.19	2.26	2.97	7.42	A	A	A
30	38.75	1.51	-3.12	6.34	A	A	A
31	40.6	2.4	1.50	7.74	A	A	A
32	39.08	2.024	-2.30	7.20	A	A	A
33	31.16	1.09	-22.10	6.10	N	N	N
34	37.4	2.8	-6.50	9.00	A	A	A
35	34.08	5.71	-14.80	17.48	A	A	A
36	33.9	2.7	-15.25	9.40	A	A	A
37	39.85	0.26	-0.37	5.04	A	A	A
38	38.6	1.7	-3.50	6.66	A	A	A
39	32.3	0.33	-19.25	5.10	A	N	W
40	41.2	1.08	3.00	5.65	A	A	A
41	41.0	2.1	2.50	7.16	A	A	A
42	39.4	2.2	-1.50	7.50	A	A	A
44	33.1	1.35	-17.25	6.45	A	N	W
45	39.7	1.6	-0.75	6.42	A	A	A
47	40.6	3.4	1.50	9.75	A	A	A
48	41.6	1.1	4.00	5.66	A	A	A
49	37.7	3.7	-5.75	11.01	A	A	A
50	37.567	1.555	-6.08	6.49	A	A	A
51	36.8	1.1	-8.00	5.83	A	A	A
52	35.92	1.09	-10.20	5.85	A	A	A
54	39.2	0.8	-2.00	5.40	A	A	A
55	47.3	5.2	18.25	12.08	A	A	A
57	40.0	4.9	0.00	13.23	A	A	A
58	39.35	0.67	-1.62	5.28	A	A	A
59	37.80	3.05	-5.50	9.49	A	A	A
60	60.39	1.5	50.98	5.58	N	N	N
61	34.668	1.261	-13.33	6.18	A	A	A
62	42.1	1.1	5.25	5.64	A	A	A
63	43.0	1.1	7.50	5.62	A	A	A
64	33.0	1.5	-17.50	6.76	A	N	W
65	44.21	3.52	10.53	9.40	A	A	A

TABLE 20. Evaluation Results for Cs-134 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
67	39.063	1.298	-2.34	6.00	A	A	A
68	39.9	3.5	-0.25	10.10	A	A	A
69	40.1	3.3	0.25	9.63	A	A	A
70	39.2	2.5	-2.00	8.10	A	A	A
71	34.7	2.2	-13.25	8.07	A	A	A
72	36.3	2.5	-9.25	8.51	A	A	A
73	40.0	0.82	0.00	5.40	A	A	A
74	36.9	2.6	-7.75	8.64	A	A	A
75	38.0	1.4	-5.00	6.21	A	A	A
76	38	2	-5.00	7.26	A	A	A
77	39.2	0.3	-2.00	5.06	A	A	A
78	39.5	2	-1.25	7.12	A	A	A
79	39.31	1.6	-1.72	6.45	A	A	A
80	37.60	2.6	-6.00	8.53	A	A	A
81	39.5	2.9	-1.25	8.88	A	A	A
82	34.1	1.7	-14.75	7.06	A	A	A
83	37.86	1.89	-5.35	7.07	A	A	A
84	40.6	1.3	1.50	5.94	A	A	A
85	38.6	3.9	-3.50	11.27	A	A	A
86	37.7	1.8	-5.75	6.91	A	A	A
87	38.9	2.0	-2.75	7.17	A	A	A
90	37.61	1.88	-5.98	7.07	A	A	A
91	39.3	2.24	-1.75	7.58	A	A	A
92	42.1	2.3	5.25	7.41	A	A	A
93	41.8	2.9	4.50	8.55	A	A	A
94	34.10	3.41	-14.75	11.18	A	A	A
95	44.6	2.27	11.50	7.13	A	A	A
96	39.3	2.2	-1.75	7.51	A	A	A
97	38.58	2.22	-3.55	7.62	A	A	A
98	38.2	1.7	-4.50	6.69	A	A	A
99	38.2	0.834	-4.50	5.46	A	A	A
100	40.2	1.3	0.50	5.95	A	A	A
101	40.2	1.2	0.50	5.82	A	A	A
102	38.8	1.2	-3.00	5.88	A	A	A
103	40.1	2.0	0.25	7.06	A	A	A
105	38.0	2.0	-5.00	7.26	A	A	A
106	35.59	1.22	-11.02	6.06	A	A	A
107	50.4	2.11	26.00	6.52	N	N	N

## Reported Results for Cs-137 Determination in Sample 2

TABLE 21. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	44.1
Uncertainty [ Bq/kg ]	2.2
Maximum Acceptable Relative Bias, [%]	20

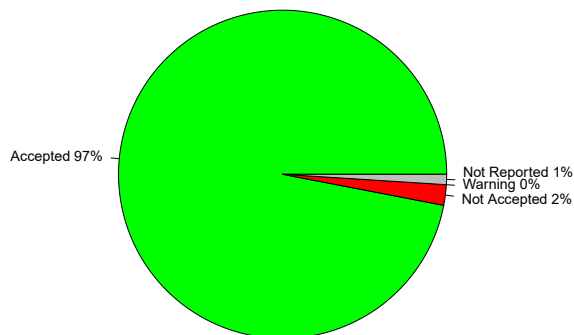


FIGURE 21. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

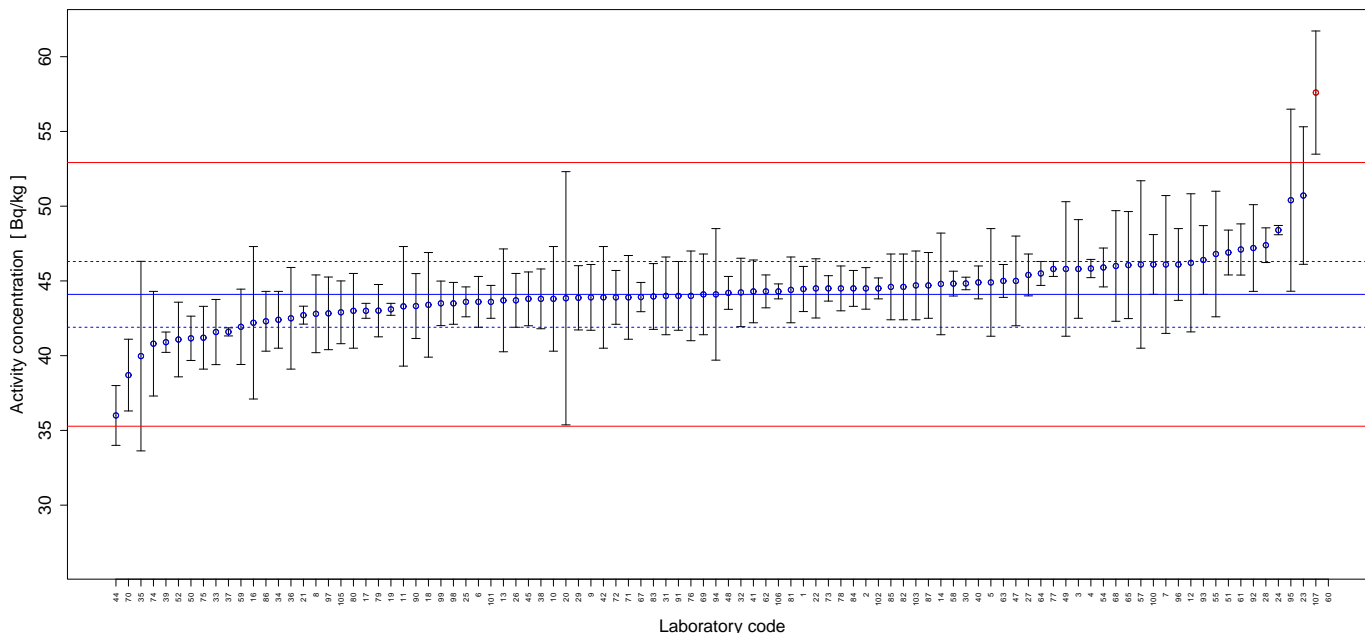


FIGURE 22. Reported results and evaluation parameters for Cs-137. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 22. Evaluation Results for Cs-137 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
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TABLE 22. Evaluation Results for Cs-137 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	44.46	1.51	0.82	6.04	A	A	A
2	44.5	1.39	0.91	5.89	A	A	A
3	45.8	3.3	3.85	8.76	A	A	A
4	45.83	0.61	3.92	5.16	A	A	A
5	44.9	3.6	1.81	9.44	A	A	A
6	43.6	1.7	-1.13	6.33	A	A	A
7	46.1	4.61	4.54	11.18	A	A	A
8	42.8	2.6	-2.95	7.86	A	A	A
9	43.9	2.2	-0.45	7.07	A	A	A
10	43.8	3.5	-0.68	9.42	A	A	A
11	43.3	4.0	-1.81	10.50	A	A	A
12	46.21	4.62	4.78	11.17	A	A	A
13	43.7	3.44	-0.91	9.32	A	A	A
14	44.8	3.4	1.59	9.08	A	A	A
16	42.2	5.1	-4.31	13.07	A	A	A
17	43	0.5	-2.49	5.12	A	A	A
18	43.4	3.5	-1.59	9.48	A	A	A
19	43.1	0.4	-2.27	5.07	A	A	A
20	43.84	8.47	-0.59	19.95	A	A	A
21	42.71	0.6	-3.15	5.18	A	A	A
22	44.5	1.98	0.91	6.68	A	A	A
23	50.711	4.6	14.99	10.35	A	A	A
24	48.4	0.31	9.75	5.03	A	A	A
25	43.6	1.0	-1.13	5.49	A	A	A
26	43.7	1.8	-0.91	6.47	A	A	A
27	45.4	1.4	2.95	5.86	A	A	A
28	47.39	1.16	7.46	5.56	A	A	A
29	43.87	2.15	-0.52	6.99	A	A	A
30	44.83	0.42	1.66	5.08	A	A	A
31	44.0	2.6	-0.23	7.73	A	A	A
32	44.23	2.288	0.29	7.19	A	A	A
33	41.58	2.18	-5.71	7.24	A	A	A
34	42.4	1.9	-3.85	6.71	A	A	A
35	39.97	6.34	-9.37	16.63	A	A	A
36	42.5	3.4	-3.63	9.43	A	A	A
37	41.59	0.27	-5.69	5.03	A	A	A
38	43.8	2.0	-0.68	6.76	A	A	A
39	40.9	0.68	-7.26	5.26	A	A	A
40	44.9	1.10	1.81	5.56	A	A	A
41	44.3	2.1	0.45	6.88	A	A	A
42	43.9	3.4	-0.45	9.21	A	A	A
44	36	2	-18.37	7.47	A	A	A
45	43.8	1.8	-0.68	6.46	A	A	A
47	45.0	3.0	2.04	8.33	A	A	A
48	44.2	1.1	0.23	5.57	A	A	A
49	45.8	4.5	3.85	11.02	A	A	A
50	41.161	1.482	-6.66	6.15	A	A	A
51	46.9	1.5	6.35	5.93	A	A	A
52	41.08	2.497	-6.85	7.86	A	A	A
54	45.9	1.3	4.08	5.74	A	A	A
55	46.8	4.2	6.12	10.27	A	A	A
57	46.1	5.6	4.54	13.13	A	A	A
58	44.82	0.83	1.63	5.32	A	A	A
59	41.93	2.52	-4.92	7.81	A	A	A
60	75.55	1.7	71.32	5.47	N	N	N
61	47.103	1.712	6.81	6.17	A	A	A
62	44.3	1.1	0.45	5.57	A	A	A
63	45.0	1.1	2.04	5.56	A	A	A
64	45.5	0.8	3.17	5.29	A	A	A
65	46.06	3.58	4.44	9.24	A	A	A



TABLE 22. Evaluation Results for Cs-137 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
67	43.920	0.979	-0.41	5.46	A	A	A
68	46	3.7	4.31	9.46	A	A	A
69	44.1	2.7	0.00	7.90	A	A	A
70	38.7	2.4	-12.24	7.96	A	A	A
71	43.9	2.8	-0.45	8.10	A	A	A
72	43.9	1.8	-0.45	6.46	A	A	A
73	44.5	0.85	0.91	5.34	A	A	A
74	40.8	3.5	-7.48	9.92	A	A	A
75	41.2	2.1	-6.58	7.13	A	A	A
76	44	3	-0.23	8.45	A	A	A
77	45.8	0.5	3.85	5.11	A	A	A
78	44.5	1.5	0.91	6.02	A	A	A
79	43.01	1.75	-2.47	6.44	A	A	A
80	43	2.5	-2.49	7.66	A	A	A
81	44.4	2.2	0.68	7.03	A	A	A
82	44.6	2.2	1.13	7.02	A	A	A
83	43.96	2.2	-0.32	7.07	A	A	A
84	44.5	1.2	0.91	5.67	A	A	A
85	44.6	2.2	1.13	7.02	A	A	A
86	42.3	2.0	-4.08	6.87	A	A	A
87	44.7	2.2	1.36	7.01	A	A	A
90	43.32	2.17	-1.77	7.07	A	A	A
91	44	2.3	-0.23	7.23	A	A	A
92	47.2	2.9	7.03	7.91	A	A	A
93	46.4	2.3	5.22	7.03	A	A	A
94	44.10	4.40	0.00	11.15	A	A	A
95	50.4	6.09	14.29	13.07	A	A	A
96	46.1	2.4	4.54	7.21	A	A	A
97	42.83	2.43	-2.88	7.55	A	A	A
98	43.5	1.4	-1.36	5.94	A	A	A
99	43.5	1.49	-1.36	6.05	A	A	A
100	46.1	2.0	4.54	6.61	A	A	A
101	43.6	1.1	-1.13	5.59	A	A	A
102	44.5	0.7	0.91	5.23	A	A	A
103	44.7	2.3	1.36	7.17	A	A	A
105	42.9	2.1	-2.72	6.99	A	A	A
106	44.3	0.5	0.45	5.11	A	A	A
107	57.6	4.12	30.61	8.72	N	N	N

## Reported Results for Po-210 Determination in Sample 2

TABLE 23. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	5.21
Uncertainty [ Bq/kg ]	0.26
Maximum Acceptable Relative Bias, [%]	30

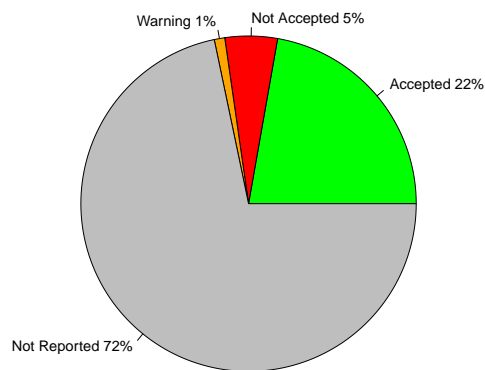


FIGURE 23. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

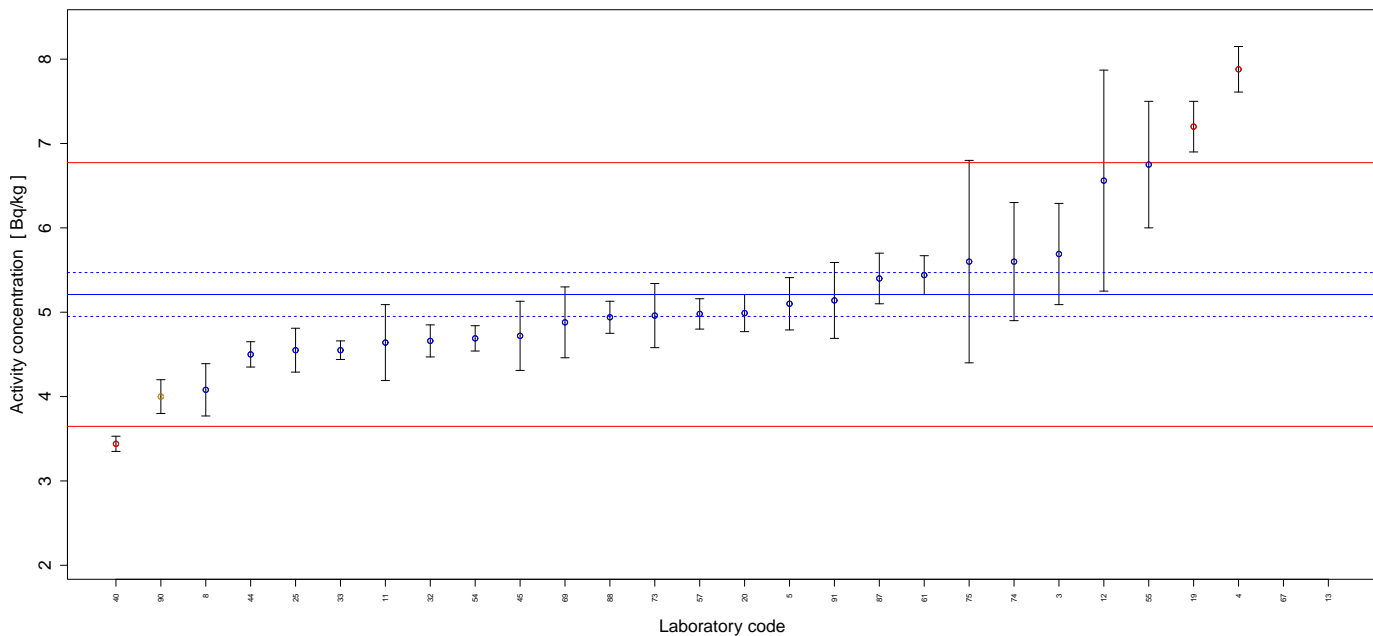


FIGURE 24. Reported results and evaluation parameters for Po-210. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 24. Evaluation Results for Po-210 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by alpha

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	5.69	0.60	9.21	11.67	A	A	A
4	7.88	0.27	51.25	6.05	N	N	N
5	5.10	0.31	-2.11	7.86	A	A	A
8	4.08	0.31	-21.69	9.09	A	A	A
11	4.64	0.45	-10.94	10.91	A	A	A
12	6.56	1.31	25.91	20.58	A	A	A
13	20.991	1.985	302.90	10.69	N	N	N
19	7.2	0.3	38.20	6.50	N	N	N
20	4.99	0.22	-4.22	6.66	A	A	A
25	4.55	0.26	-12.67	7.59	A	A	A
32	4.66	0.19	-10.56	6.44	A	A	A
33	4.55	0.11	-12.67	5.55	A	A	A
40	3.44	0.09	-33.97	5.63	N	N	N
44	4.5	0.15	-13.63	6.00	A	A	A
45	4.72	0.41	-9.40	10.02	A	A	A
54	4.69	0.15	-9.98	5.93	A	A	A
55	6.75	0.75	29.56	12.18	A	A	A
57	4.98	0.18	-4.41	6.16	A	A	A
61	5.44	0.23	4.41	6.54	A	A	A
67	17.33	1.692	232.63	10.96	N	N	N
69	4.88	0.42	-6.33	9.95	A	A	A
73	4.96	0.38	-4.80	9.14	A	A	A
74	5.6	0.7	7.49	13.46	A	A	A
75	5.6	1.2	7.49	22.00	A	A	A
87	5.4	0.3	3.65	7.47	A	A	A
88	4.94	0.19	-5.18	6.30	A	A	A
90	4.0	0.2	-23.22	7.06	A	N	W
91	5.14	0.45	-1.34	10.08	A	A	A

## Reported Results for Pb-210 Determination in Sample 2

TABLE 25. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	5.23
Uncertainty [ Bq/kg ]	0.26
Maximum Acceptable Relative Bias, [%]	30

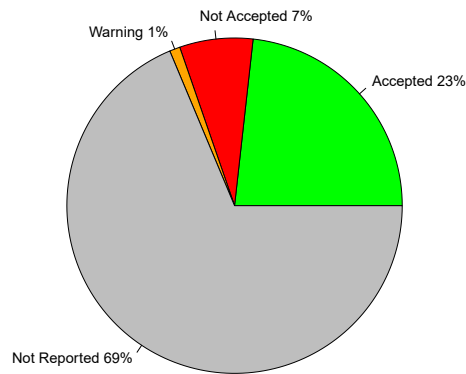


FIGURE 25. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

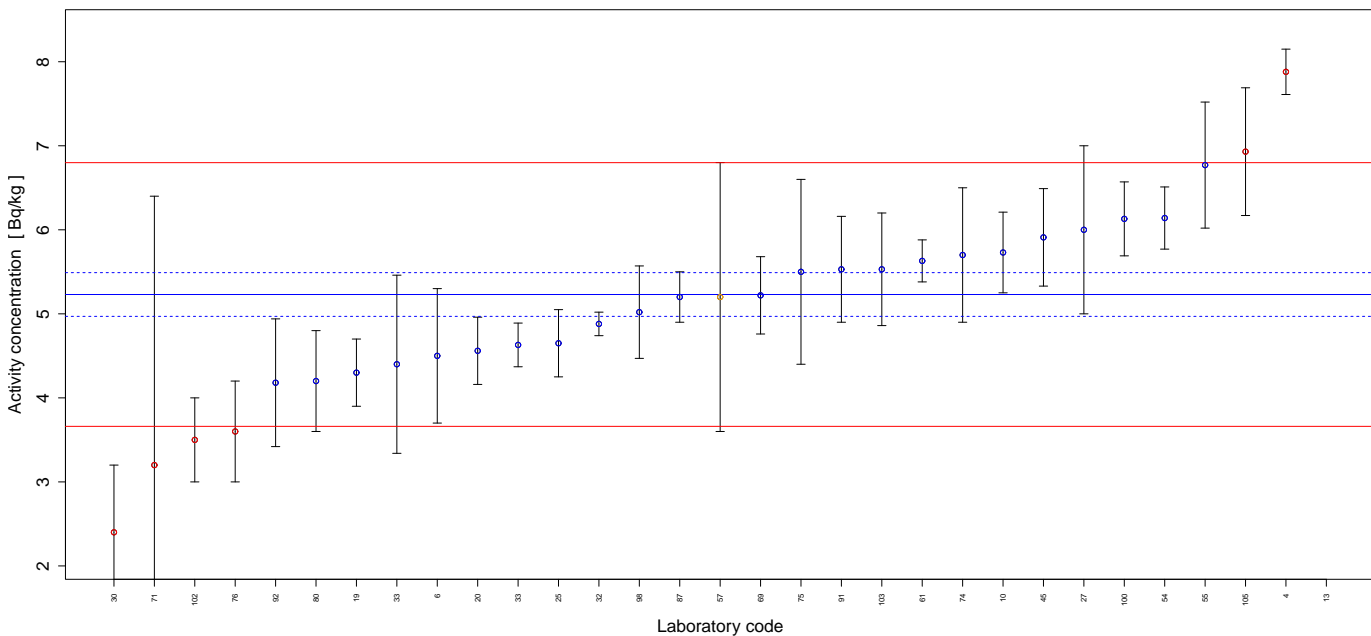


FIGURE 26. Reported results and evaluation parameters for Pb-210. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 26. Evaluation Results for Pb-210 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by beta

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
4	7.88	0.27	50.67	6.04	N	N	N
10	5.73	0.48	9.56	9.74	A	A	A
13	14.3	0.995	173.42	8.55	N	N	N
19	4.3	0.4	-17.78	10.55	A	A	A
20	4.56	0.40	-12.81	10.08	A	A	A
25	4.65	0.40	-11.09	9.94	A	A	A
32	4.88	0.14	-6.69	5.74	A	A	A
33	4.63	0.26	-11.47	7.50	A	A	A
54	6.14	0.37	17.40	7.81	A	A	A
55	6.77	0.75	29.45	12.14	A	A	A
61	5.63	0.25	7.65	6.67	A	A	A
69	5.22	0.46	-0.19	10.12	A	A	A
74	5.7	0.8	8.99	14.89	A	A	A
75	5.5	1.1	5.16	20.61	A	A	A
87	5.2	0.3	-0.57	7.62	A	A	A
91	5.53	0.63	5.74	12.43	A	A	A

TABLE 27. Evaluation Results for Pb-210 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
6	4.5	0.8	-13.96	18.46	A	A	A
27	6	1	14.72	17.39	A	A	A
30	2.40	0.80	-54.11	33.70	N	N	N
33	4.40	1.06	-15.87	24.60	A	A	A
45	5.91	0.58	13.00	11.00	A	A	A
57	5.2	1.6	-0.57	31.17	A	N	W
71	3.2	3.2	-38.81	100.12	N	N	N
76	3.6	0.6	-31.17	17.39	N	A	N
80	4.20	0.6	-19.69	15.13	A	A	A
92	4.18	0.76	-20.08	18.85	A	A	A
98	5.02	0.55	-4.02	12.03	A	A	A
100	6.13	0.44	17.21	8.73	A	A	A
102	3.5	0.5	-33.08	15.13	N	A	N
103	5.53	0.67	5.74	13.10	A	A	A
105	6.93	0.76	32.50	12.04	N	N	N

## Reported Results for Ra-226 Determination in Sample 2

TABLE 28. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	6.32
Uncertainty [ Bq/kg ]	0.32
Maximum Acceptable Relative Bias, [%]	30

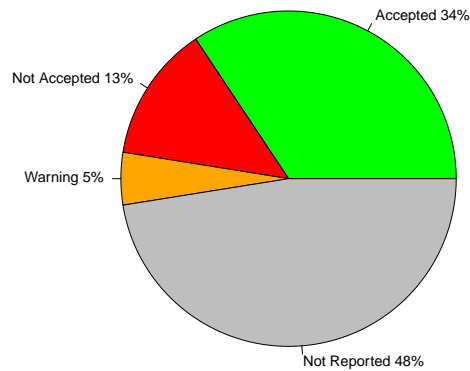


FIGURE 27. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

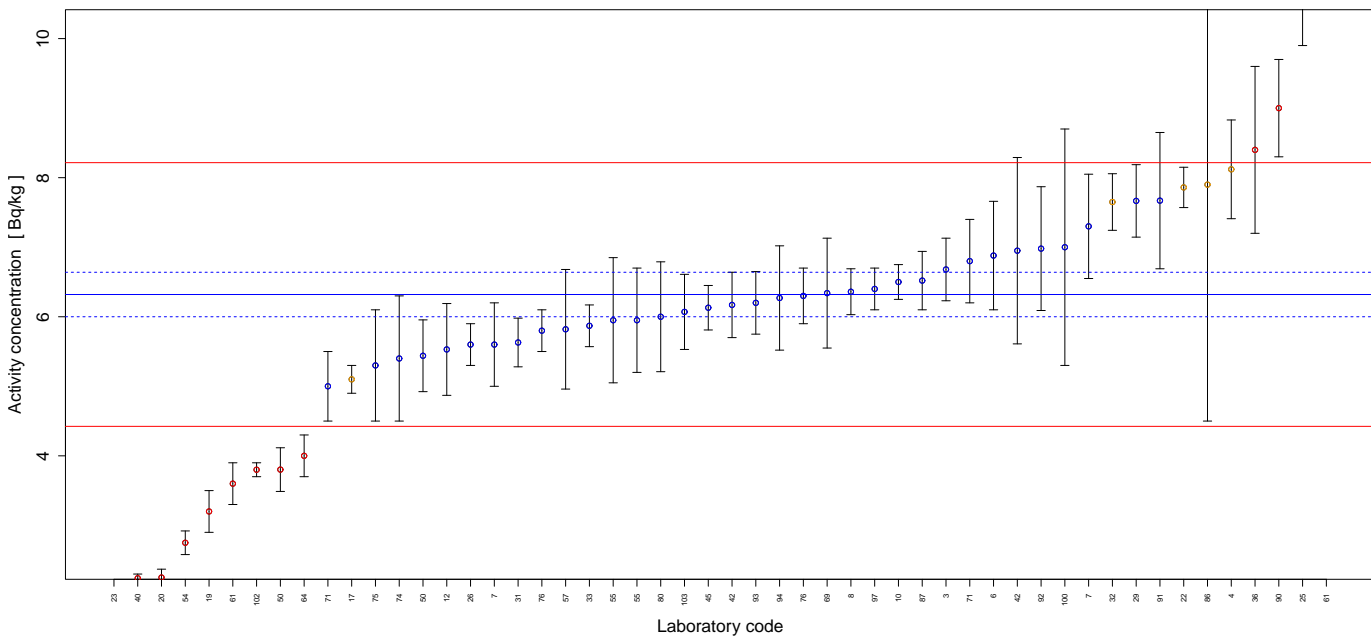


FIGURE 28. Reported results and evaluation parameters for Ra-226. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 29. Evaluation Results for Ra-226 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by alpha

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	6.68	0.45	5.70	8.43	A	A	A
7	7.3	0.75	15.51	11.45	A	A	A
8	6.36	0.33	0.63	7.25	A	A	A
10	6.50	0.25	2.85	6.36	A	A	A
12	5.53	0.66	-12.50	12.96	A	A	A
19	3.2	0.3	-49.37	10.65	N	N	N
20	2.25	0.12	-64.40	7.35	N	N	N
22	7.86	0.29	24.37	6.26	A	N	W
23	0.0463	0.0032	-99.27	8.57	N	N	N
25	10.7	0.8	69.30	9.03	N	N	N
26	5.6	0.3	-11.39	7.37	A	A	A
29	7.666	0.521	21.30	8.48	A	A	A
31	5.63	0.35	-10.92	8.02	A	A	A
32	7.65	0.407	21.04	7.34	A	N	W
33	5.87	0.30	-7.12	7.19	A	A	A
40	2.24	0.06	-64.56	5.73	N	N	N
42	6.17	0.47	-2.37	9.15	A	A	A
45	6.13	0.32	-3.01	7.27	A	A	A
50	3.802	0.314	-39.84	9.69	N	N	N
54	2.75	0.17	-56.49	7.99	N	N	N
55	5.95	0.90	-5.85	15.95	A	A	A
61	14.74	0.24	133.23	5.32	N	N	N
69	6.34	0.79	0.32	13.45	A	A	A
71	6.8	0.6	7.59	10.17	A	A	A
74	5.4	0.9	-14.56	17.42	A	A	A
75	5.3	0.8	-16.14	15.92	A	A	A
76	6.3	0.4	-0.32	8.12	A	A	A
87	6.52	0.42	3.16	8.19	A	A	A
90	9.0	0.7	42.41	9.28	N	N	N
91	7.67	0.98	21.36	13.74	A	A	A
93	6.2	0.45	-1.90	8.85	A	A	A
97	6.4	0.3	1.27	6.90	A	A	A

TABLE 30. Evaluation Results for Ra-226 in Sample 2, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
4	8.12	0.71	28.48	10.10	A	N	W
6	6.88	0.78	8.86	12.42	A	A	A
7	5.6	0.6	-11.39	11.85	A	A	A
17	5.1	0.2	-19.30	6.40	A	N	W
36	8.4	1.2	32.91	15.16	N	A	N
42	6.95	1.34	9.97	19.93	A	A	A
50	5.439	0.516	-13.94	10.75	A	A	A
55	5.95	0.75	-5.85	13.58	A	A	A
57	5.82	0.86	-7.91	15.62	A	A	A
61	3.6	0.3	-43.04	9.75	N	N	N
64	4.0	0.3	-36.71	9.05	N	N	N
71	5.0	0.5	-20.89	11.21	A	A	A
76	5.8	0.3	-8.23	7.24	A	A	A
80	6.0	0.79	-5.06	14.11	A	A	A
86	7.9	3.4	25.00	43.33	A	N	W
92	6.98	0.89	10.44	13.72	A	A	A
94	6.27	0.75	-0.79	12.99	A	A	A
100	7.0	1.7	10.76	24.81	A	A	A
102	3.8	0.1	-39.87	5.71	N	N	N
103	6.07	0.54	-3.96	10.24	A	A	A

# Reported Results for K-40 Determination in Sample 4

TABLE 31. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	584
Uncertainty [ Bq/kg ]	20
Maximum Acceptable Relative Bias, [%]	30

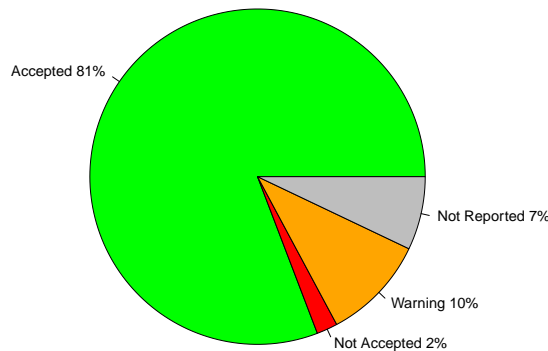


FIGURE 29. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

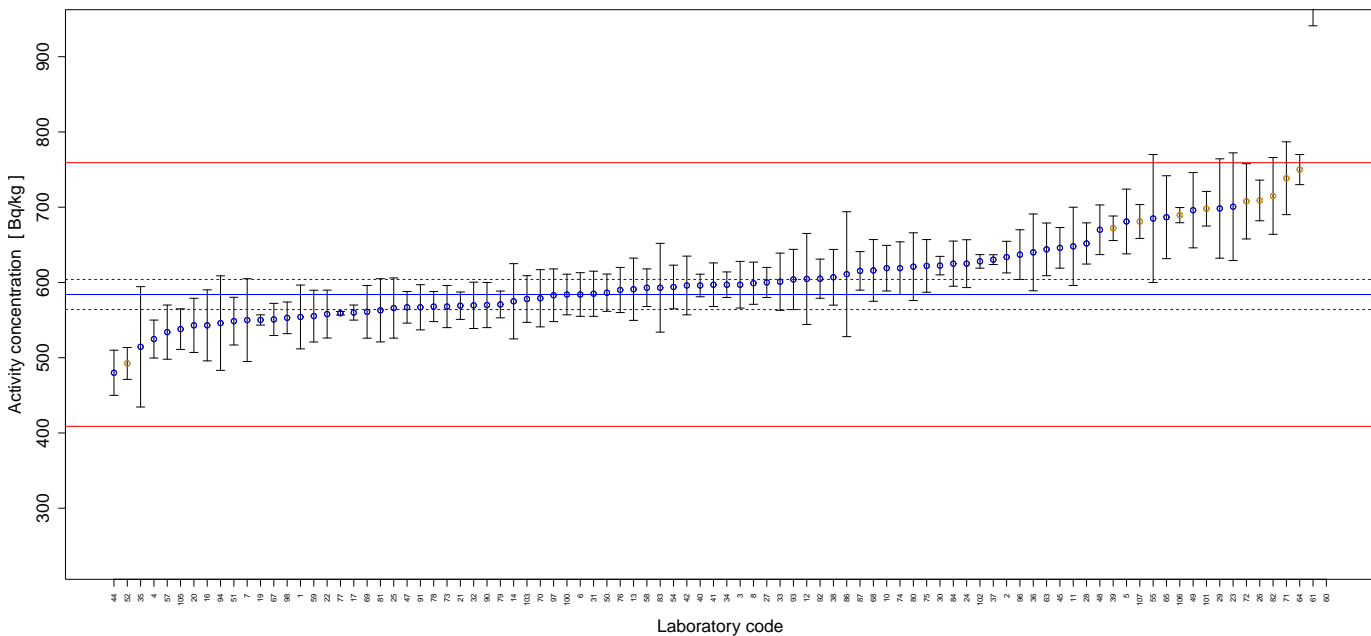


FIGURE 30. Reported results and evaluation parameters for K-40. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.



TABLE 32. Evaluation Results for K-40 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	554.14	42.39	-5.11	8.38	A	A	A
2	633.7	21.0	8.51	4.77	A	A	A
3	597.0	31.0	2.23	6.22	A	A	A
4	524.78	25.23	-10.14	5.90	A	A	A
5	681	43	16.61	7.18	A	A	A
6	584	29	0.00	6.03	A	A	A
7	550	55	-5.82	10.57	A	A	A
8	599	28	2.57	5.79	A	A	A
10	619.0	30.3	5.99	5.97	A	A	A
11	648	52	10.96	8.72	A	A	A
12	604.67	60.47	3.54	10.57	A	A	A
13	591	41.35	1.20	7.79	A	A	A
14	575	50	-1.54	9.35	A	A	A
16	543	47.2	-7.02	9.34	A	A	A
17	560	10	-4.11	3.86	A	A	A
19	550.2	6.8	-5.79	3.64	A	A	A
20	543	36	-7.02	7.46	A	A	A
21	569.11	18.19	-2.55	4.68	A	A	A
22	558.0	31.8	-4.45	6.65	A	A	A
23	700.674	71.54	19.98	10.77	A	A	A
24	625	31.8	7.02	6.13	A	A	A
25	566	40	-3.08	7.85	A	A	A
26	709	27	21.40	5.12	A	N	W
27	600	20	2.74	4.78	A	A	A
28	651.84	27.36	11.62	5.42	A	A	A
29	698.30	66.00	19.57	10.05	A	A	A
30	622.40	12.29	6.58	3.95	A	A	A
31	585	30	0.17	6.17	A	A	A
32	569.6	30.77	-2.47	6.40	A	A	A
33	601	38	2.91	7.19	A	A	A
34	597	17	2.23	4.45	A	A	A
35	514.48	79.97	-11.90	15.92	A	A	A
36	640	51	9.59	8.67	A	A	A
37	630.32	6.5	7.93	3.58	A	A	A
38	606.9	37.0	3.92	6.99	A	A	A
39	672	16.3	15.07	4.20	A	N	W
40	596	15	2.05	4.25	A	A	A
41	597	29	2.23	5.94	A	A	A
42	596	39	2.05	7.39	A	A	A
44	480	30	-17.81	7.13	A	A	A
45	646	27	10.62	5.40	A	A	A
47	567	21	-2.91	5.04	A	A	A
48	670	33	14.73	6.00	A	A	A
49	696	50	19.18	7.96	A	A	A
50	586.403	24.746	0.41	5.43	A	A	A
51	548.6	31.7	-6.06	6.72	A	A	A
52	492.4	21.2	-15.68	5.50	A	N	W
54	594	29	1.71	5.96	A	A	A
55	685	85	17.29	12.87	A	A	A
57	534	36	-8.56	7.56	A	A	A
58	593	25	1.54	5.43	A	A	A
59	555.3	34.4	-4.91	7.08	A	A	A
60	1095	15.2	87.50	3.70	N	N	N
61	994.5	53.4	70.29	6.37	N	N	N
63	644.0	35.0	10.27	6.42	A	A	A
64	750	20	28.42	4.34	A	N	W
65	686.7	55.1	17.59	8.72	A	A	A
67	550.89	21.35	-5.67	5.17	A	A	A
68	616	41	5.48	7.49	A	A	A
69	561	35	-3.94	7.12	A	A	A

TABLE 32. Evaluation Results for K-40 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
70	579	38	-0.86	7.40	A	A	A
71	738.5	48.4	26.46	7.39	A	N	W
72	707.8	50.0	21.20	7.85	A	N	W
73	568	28	-2.74	6.00	A	A	A
74	619	35	5.99	6.61	A	A	A
75	622	35	6.51	6.59	A	A	A
76	590	30	1.03	6.13	A	A	A
77	559.1	2.4	-4.26	3.45	A	A	A
78	568	20	-2.74	4.91	A	A	A
79	570.8	17.8	-2.26	4.63	A	A	A
80	621	45	6.34	8.01	A	A	A
81	563	42	-3.60	8.21	A	A	A
82	715	51	22.43	7.91	A	N	W
83	593	59	1.54	10.52	A	A	A
84	625.0	30.0	7.02	5.90	A	A	A
86	611	83	4.62	14.01	A	A	A
87	615.4	25.6	5.38	5.39	A	A	A
90	570	30	-2.40	6.28	A	A	A
91	567	30	-2.91	6.30	A	A	A
92	605	26	3.60	5.50	A	A	A
93	604	40	3.42	7.46	A	A	A
94	546.00	62.80	-6.51	12.00	A	A	A
96	637	33	9.08	6.21	A	A	A
97	583	35	-0.17	6.91	A	A	A
98	553	21	-5.31	5.11	A	A	A
100	584	27	0.00	5.75	A	A	A
101	698	23	19.52	4.75	A	N	W
102	628	9	7.53	3.71	A	A	A
103	578	31	-1.03	6.36	A	A	A
105	538	27	-7.88	6.08	A	A	A
106	689.45	10.09	18.06	3.72	A	N	W
107	681	22.5	16.61	4.76	A	N	W

# Reported Results for Cs-134 Determination in Sample 4

TABLE 33. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	6.93
Uncertainty [ Bq/kg ]	0.50
Maximum Acceptable Relative Bias, [%]	30

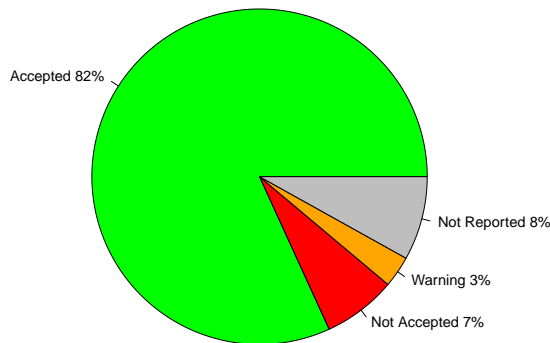


FIGURE 31. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

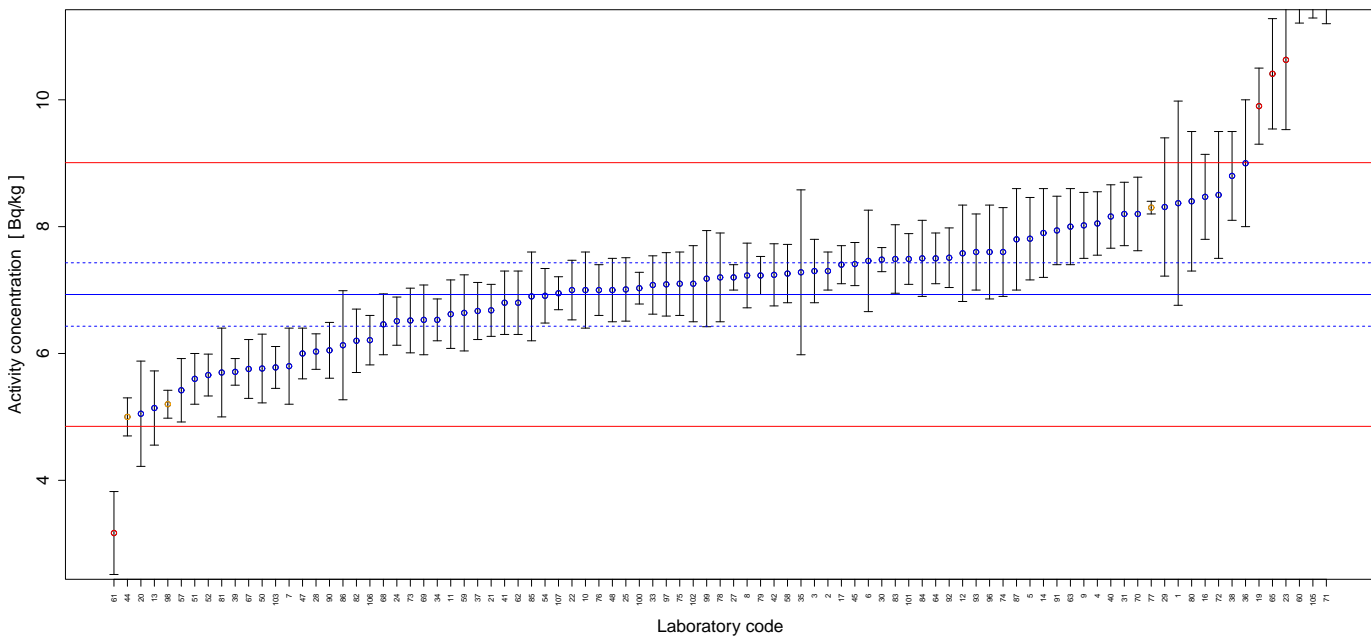


FIGURE 32. Reported results and evaluation parameters for Cs-134. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 34. Evaluation Results for Cs-134 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	8.37	1.61	20.78	20.54	A	A	A
2	7.3	0.3	5.34	8.30	A	A	A
3	7.3	0.5	5.34	9.95	A	A	A
4	8.05	0.50	16.16	9.52	A	A	A
5	7.81	0.65	12.70	11.01	A	A	A
6	7.46	0.80	7.65	12.93	A	A	A
7	5.8	0.6	-16.31	12.61	A	A	A
8	7.23	0.51	4.33	10.09	A	A	A
9	8.02	0.52	15.73	9.70	A	A	A
10	7.0	0.6	1.01	11.20	A	A	A
11	6.62	0.54	-4.47	10.89	A	A	A
12	7.58	0.76	9.38	12.35	A	A	A
13	5.14	0.585	-25.83	13.48	A	A	A
14	7.9	0.7	14.00	11.43	A	A	A
16	8.47	0.67	22.22	10.71	A	A	A
17	7.4	0.3	6.78	8.28	A	A	A
19	9.9	0.6	42.86	9.42	N	N	N
20	5.05	0.83	-27.13	17.95	A	A	A
21	6.68	0.41	-3.61	9.47	A	A	A
22	7.0	0.47	1.01	9.86	A	A	A
23	10.63	1.1	53.39	12.62	N	N	N
24	6.51	0.38	-6.06	9.28	A	A	A
25	7.01	0.50	1.15	10.15	A	A	A
27	7.2	0.2	3.90	7.73	A	A	A
28	6.03	0.28	-12.99	8.58	A	A	A
29	8.31	1.09	19.91	14.97	A	A	A
30	7.48	0.19	7.94	7.65	A	A	A
31	8.2	0.5	18.33	9.45	A	A	A
33	7.08	0.46	2.16	9.71	A	A	A
34	6.53	0.33	-5.77	8.81	A	A	A
35	7.28	1.30	5.05	19.26	A	A	A
36	9	1	29.87	13.25	A	A	A
37	6.67	0.45	-3.75	9.88	A	A	A
38	8.8	0.7	26.98	10.74	A	A	A
39	5.71	0.21	-17.60	8.10	A	A	A
40	8.16	0.50	17.75	9.47	A	A	A
41	6.8	0.5	-1.88	10.30	A	A	A
42	7.24	0.49	4.47	9.89	A	A	A
44	5	0.3	-27.85	9.38	A	N	W
45	7.41	0.34	6.93	8.55	A	A	A
47	6.0	0.4	-13.42	9.82	A	A	A
48	7.0	0.5	1.01	10.15	A	A	A
50	5.763	0.542	-16.84	11.85	A	A	A
51	5.6	0.4	-19.19	10.15	A	A	A
52	5.66	0.33	-18.33	9.28	A	A	A
54	6.91	0.43	-0.29	9.53	A	A	A
57	5.42	0.50	-21.79	11.71	A	A	A
58	7.26	0.46	4.76	9.60	A	A	A
59	6.64	0.60	-4.18	11.56	A	A	A
60	11.71	0.5	68.98	8.38	N	N	N
61	3.169	0.654	-54.27	21.86	N	A	N
62	6.8	0.5	-1.88	10.30	A	A	A
63	8.0	0.6	15.44	10.41	A	A	A
64	7.5	0.4	8.23	8.97	A	A	A
65	10.41	0.87	50.22	11.04	N	N	N
67	5.756	0.464	-16.94	10.82	A	A	A
68	6.46	0.48	-6.78	10.36	A	A	A
69	6.53	0.55	-5.77	11.09	A	A	A
70	8.20	0.58	18.33	10.10	A	A	A
71	12.3	1.1	77.49	11.49	N	N	N

TABLE 34. Evaluation Results for Cs-134 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
72	8.5	1.0	22.66	13.80	A	A	A
73	6.52	0.51	-5.92	10.64	A	A	A
74	7.6	0.7	9.67	11.70	A	A	A
75	7.1	0.5	2.45	10.08	A	A	A
76	7	0.4	1.01	9.20	A	A	A
77	8.3	0.1	19.77	7.31	A	N	W
78	7.2	0.7	3.90	12.11	A	A	A
79	7.23	0.3	4.33	8.32	A	A	A
80	8.4	1.1	21.21	14.95	A	A	A
81	5.7	0.7	-17.75	14.24	A	A	A
82	6.2	0.5	-10.53	10.82	A	A	A
83	7.49	0.54	8.08	10.20	A	A	A
84	7.5	0.6	8.23	10.77	A	A	A
85	6.9	0.7	-0.43	12.45	A	A	A
86	6.13	0.86	-11.54	15.78	A	A	A
87	7.8	0.8	12.55	12.54	A	A	A
90	6.05	0.44	-12.70	10.24	A	A	A
91	7.94	0.54	14.57	9.92	A	A	A
92	7.51	0.47	8.37	9.55	A	A	A
93	7.6	0.6	9.67	10.70	A	A	A
96	7.60	0.74	9.67	12.12	A	A	A
97	7.09	0.50	2.31	10.09	A	A	A
98	5.2	0.22	-24.96	8.36	A	N	W
99	7.18	0.758	3.61	12.79	A	A	A
100	7.03	0.25	1.44	8.04	A	A	A
101	7.49	0.40	8.08	8.98	A	A	A
102	7.1	0.6	2.45	11.11	A	A	A
103	5.78	0.33	-16.59	9.20	A	A	A
105	12.03	0.74	73.59	9.48	N	N	N
106	6.21	0.39	-10.39	9.57	A	A	A
107	6.95	0.26	0.29	8.13	A	A	A

# Reported Results for Cs-137 Determination in Sample 4

TABLE 35. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	270
Uncertainty [ Bq/kg ]	17
Maximum Acceptable Relative Bias, [%]	30

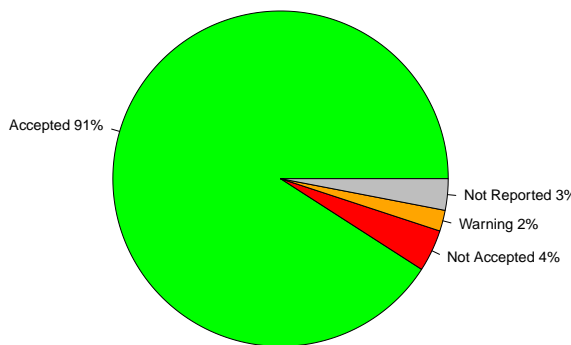


FIGURE 33. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

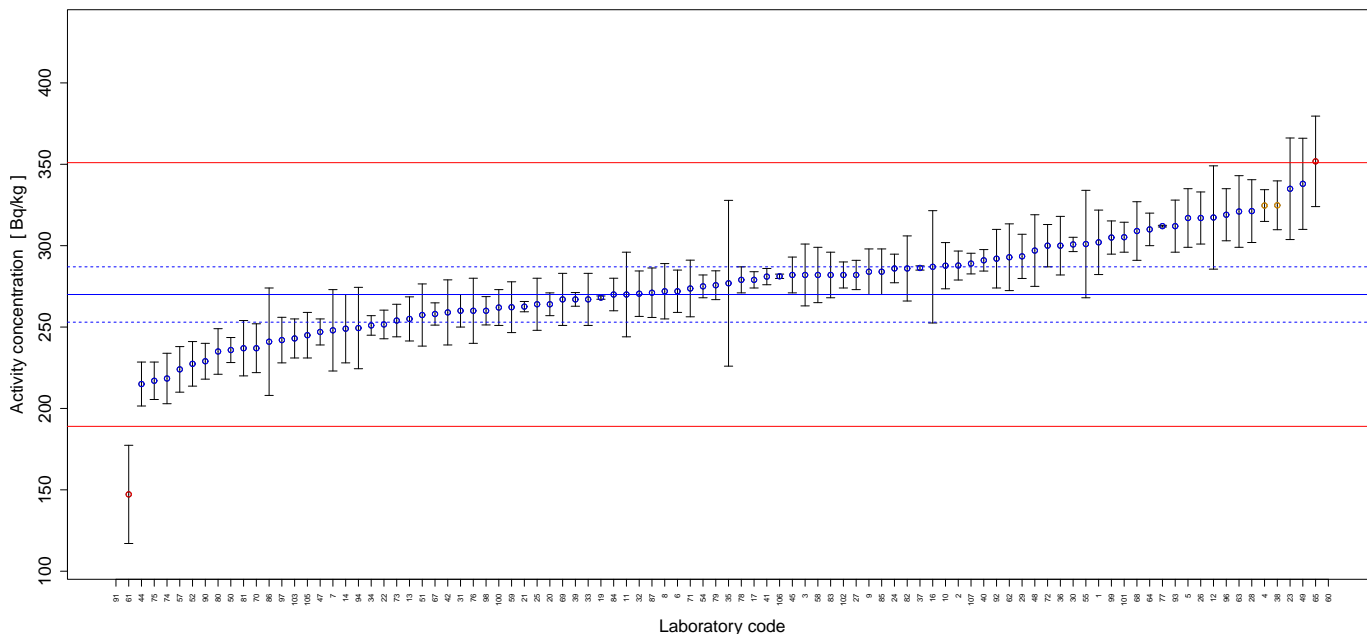


FIGURE 34. Reported results and evaluation parameters for Cs-137. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 36. Evaluation Results for Cs-137 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	302.06	19.80	11.87	9.09	A	A	A
2	287.8	8.9	6.59	7.01	A	A	A
3	282.0	19.0	4.44	9.22	A	A	A
4	324.65	9.75	20.24	6.98	A	N	W
5	317	18	17.41	8.48	A	A	A
6	272	13	0.74	7.90	A	A	A
7	248	25	-8.15	11.89	A	A	A
8	272	17	0.74	8.87	A	A	A
9	284	14	5.19	8.00	A	A	A
10	287.7	14.2	6.56	8.00	A	A	A
11	270	26	0.00	11.51	A	A	A
12	317.31	31.73	17.52	11.82	A	A	A
13	255	13.55	-5.56	8.24	A	A	A
14	249	21	-7.78	10.52	A	A	A
16	287	34.5	6.30	13.57	A	A	A
17	279	5	3.33	6.55	A	A	A
19	268.1	1.0	-0.70	6.31	A	A	A
20	264	7	-2.22	6.83	A	A	A
21	262.55	3.17	-2.76	6.41	A	A	A
22	251.6	8.8	-6.81	7.20	A	A	A
23	334.955	31.2	24.06	11.24	A	A	A
24	286	8.79	5.93	7.01	A	A	A
25	264	16	-2.22	8.74	A	A	A
26	317.0	16.0	17.41	8.07	A	A	A
27	282	9	4.44	7.06	A	A	A
28	321.24	19.29	18.98	8.70	A	A	A
29	293.43	13.58	8.68	7.81	A	A	A
30	300.76	4.40	11.39	6.46	A	A	A
31	260	10	-3.70	7.38	A	A	A
32	270.5	13.96	0.19	8.14	A	A	A
33	267	16	-1.11	8.69	A	A	A
34	251	6	-7.04	6.73	A	A	A
35	276.91	50.93	2.56	19.44	A	A	A
36	300	18	11.11	8.70	A	A	A
37	286.3	1.3	6.04	6.31	A	A	A
38	324.8	15.0	20.30	7.81	A	N	W
39	267	4.20	-1.11	6.49	A	A	A
40	291	6.6	7.78	6.69	A	A	A
41	281	5	4.07	6.54	A	A	A
42	259	20	-4.07	9.96	A	A	A
44	215	13.5	-20.37	8.89	A	A	A
45	282	11	4.44	7.41	A	A	A
47	247	8	-8.52	7.08	A	A	A
48	297	22	10.00	9.72	A	A	A
49	338	28	25.19	10.41	A	A	A
50	235.883	7.690	-12.64	7.09	A	A	A
51	257.4	19.1	-4.67	9.73	A	A	A
52	227.4	13.69	-15.78	8.71	A	A	A
54	275	7	1.85	6.79	A	A	A
55	301	33	11.48	12.64	A	A	A
57	224	14	-17.04	8.87	A	A	A
58	282	17	4.44	8.72	A	A	A
59	262.2	15.6	-2.89	8.66	A	A	A
60	503.5	15.2	86.48	6.98	N	N	N
61	147.20	30.17	-45.48	21.44	N	A	N
62	292.9	20.5	8.48	9.41	A	A	A
63	321.0	22.0	18.89	9.31	A	A	A
64	310	10	14.81	7.07	A	A	A
65	351.8	27.8	30.30	10.10	N	N	N
67	258.03	6.84	-4.43	6.83	A	A	A

TABLE 36. Evaluation Results for Cs-137 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
68	309	18	14.44	8.58	A	A	A
69	267	16	-1.11	8.69	A	A	A
70	237	15	-12.22	8.93	A	A	A
71	273.7	17.4	1.37	8.95	A	A	A
72	300.0	13.0	11.11	7.64	A	A	A
73	254	10	-5.93	7.43	A	A	A
74	218.4	15.5	-19.11	9.49	A	A	A
75	217	11.5	-19.63	8.23	A	A	A
76	260	20	-3.70	9.94	A	A	A
77	312.0	0.5	15.56	6.30	A	A	A
78	279	8	3.33	6.92	A	A	A
79	275.7	8.85	2.11	7.07	A	A	A
80	235	14	-12.96	8.67	A	A	A
81	237	17	-12.22	9.54	A	A	A
82	286	20	5.93	9.41	A	A	A
83	282	14	4.44	8.02	A	A	A
84	270.0	10.0	0.00	7.30	A	A	A
85	284	14	5.19	8.00	A	A	A
86	241	33	-10.74	15.07	A	A	A
87	271.1	15.2	0.41	8.43	A	A	A
90	229	11	-15.19	7.92	A	A	A
91	27.8	1.32	-89.70	7.89	N	N	N
92	292	18	8.15	8.81	A	A	A
93	312	16	15.56	8.12	A	A	A
94	249.40	25.00	-7.63	11.84	A	A	A
96	319	16	18.15	8.05	A	A	A
97	242	14	-10.37	8.55	A	A	A
98	260	8.7	-3.70	7.13	A	A	A
99	305	10.2	12.96	7.13	A	A	A
100	262	11	-2.96	7.57	A	A	A
101	305.2	9.2	13.04	6.98	A	A	A
102	282	8	4.44	6.91	A	A	A
103	243	12	-10.00	8.00	A	A	A
105	245	14	-9.26	8.50	A	A	A
106	281.20	1.33	4.15	6.31	A	A	A
107	289	6.35	7.04	6.67	A	A	A



## Reported Results for Tl-208 Determination in Sample 4

TABLE 37. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	11.8
Uncertainty [ Bq/kg ]	0.8
Maximum Acceptable Relative Bias, [%]	30

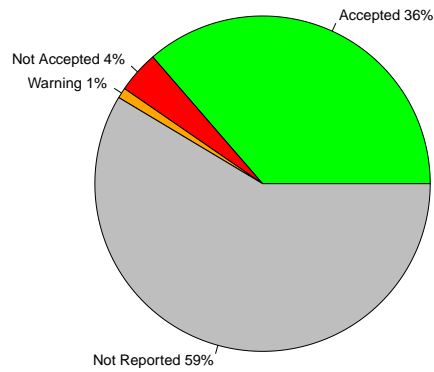


FIGURE 35. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

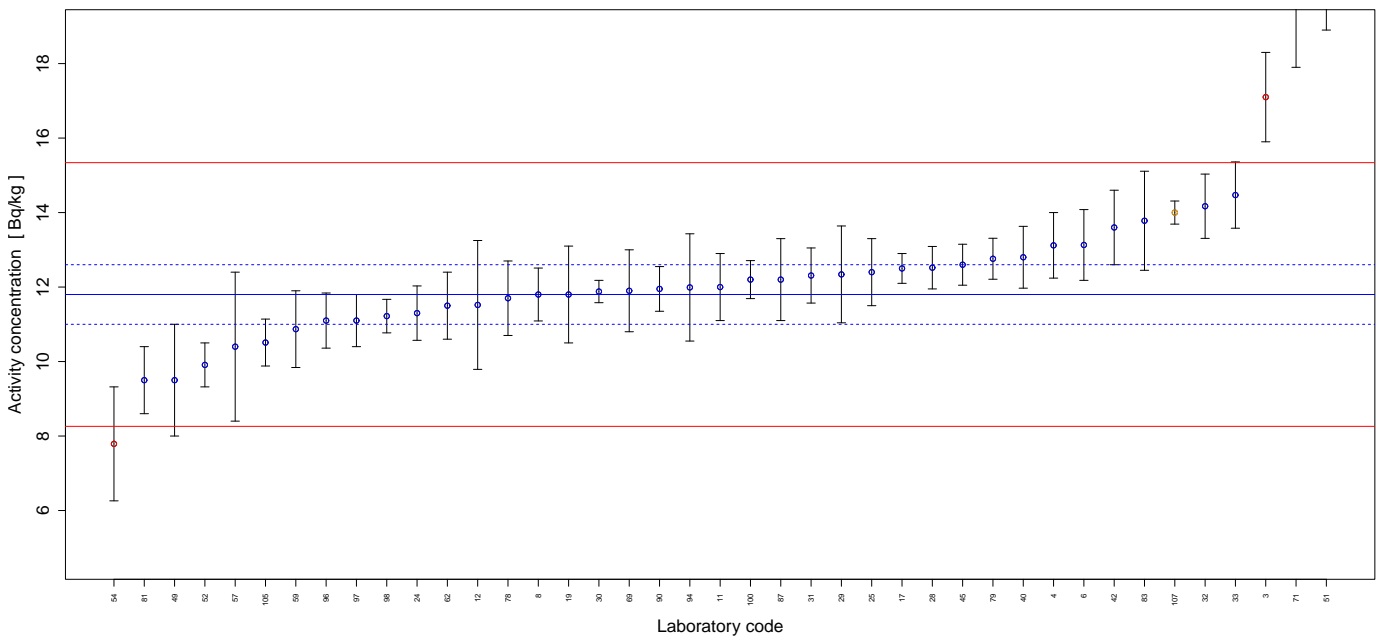


FIGURE 36. Reported results and evaluation parameters for Tl-208. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 38. Evaluation Results for Tl-208 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	17.1	1.2	44.92	9.76	N	N	N
4	13.12	0.88	11.19	9.54	A	A	A
6	13.13	0.95	11.27	9.92	A	A	A
8	11.8	0.71	0.00	9.06	A	A	A
11	12.0	0.9	1.69	10.11	A	A	A
12	11.52	1.73	-2.37	16.48	A	A	A
17	12.5	0.4	5.93	7.50	A	A	A
19	11.8	1.3	0.00	12.94	A	A	A
24	11.3	0.73	-4.24	9.36	A	A	A
25	12.4	0.9	5.08	9.93	A	A	A
28	12.52	0.57	6.10	8.17	A	A	A
29	12.34	1.30	4.58	12.53	A	A	A
30	11.88	0.30	0.68	7.23	A	A	A
31	12.31	0.74	4.32	9.06	A	A	A
32	14.17	0.863	20.08	9.11	A	A	A
33	14.47	0.89	22.63	9.15	A	A	A
40	12.8	0.83	8.47	9.38	A	A	A
42	13.6	1.0	15.25	10.00	A	A	A
45	12.60	0.55	6.78	8.06	A	A	A
49	9.5	1.5	-19.49	17.18	A	A	A
51	20.4	1.5	72.88	10.00	N	N	N
52	9.91	0.59	-16.02	9.02	A	A	A
54	7.79	1.53	-33.98	20.78	N	A	N
57	10.4	2.0	-11.86	20.39	A	A	A
59	10.87	1.03	-7.88	11.65	A	A	A
62	11.5	0.9	-2.54	10.35	A	A	A
69	11.9	1.1	0.85	11.46	A	A	A
71	20.0	2.1	69.49	12.50	N	N	N
78	11.7	1.0	-0.85	10.91	A	A	A
79	12.76	0.55	8.14	8.03	A	A	A
81	9.5	0.9	-19.49	11.65	A	A	A
83	13.78	1.33	16.78	11.79	A	A	A
87	12.2	1.1	3.39	11.28	A	A	A
90	11.95	0.60	1.27	8.44	A	A	A
94	11.99	1.44	1.61	13.79	A	A	A
96	11.1	0.74	-5.93	9.51	A	A	A
97	11.1	0.7	-5.93	9.26	A	A	A
98	11.22	0.45	-4.92	7.88	A	A	A
100	12.2	0.51	3.39	7.96	A	A	A
105	10.51	0.63	-10.93	9.05	A	A	A
107	14.0	0.31	18.64	7.13	A	N	W

## Reported Results for Pb-210 Determination in Sample 4

TABLE 39. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	26.6
Uncertainty [ Bq/kg ]	1.8
Maximum Acceptable Relative Bias, [%]	30

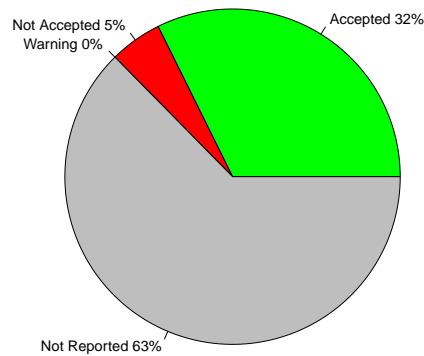


FIGURE 37. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

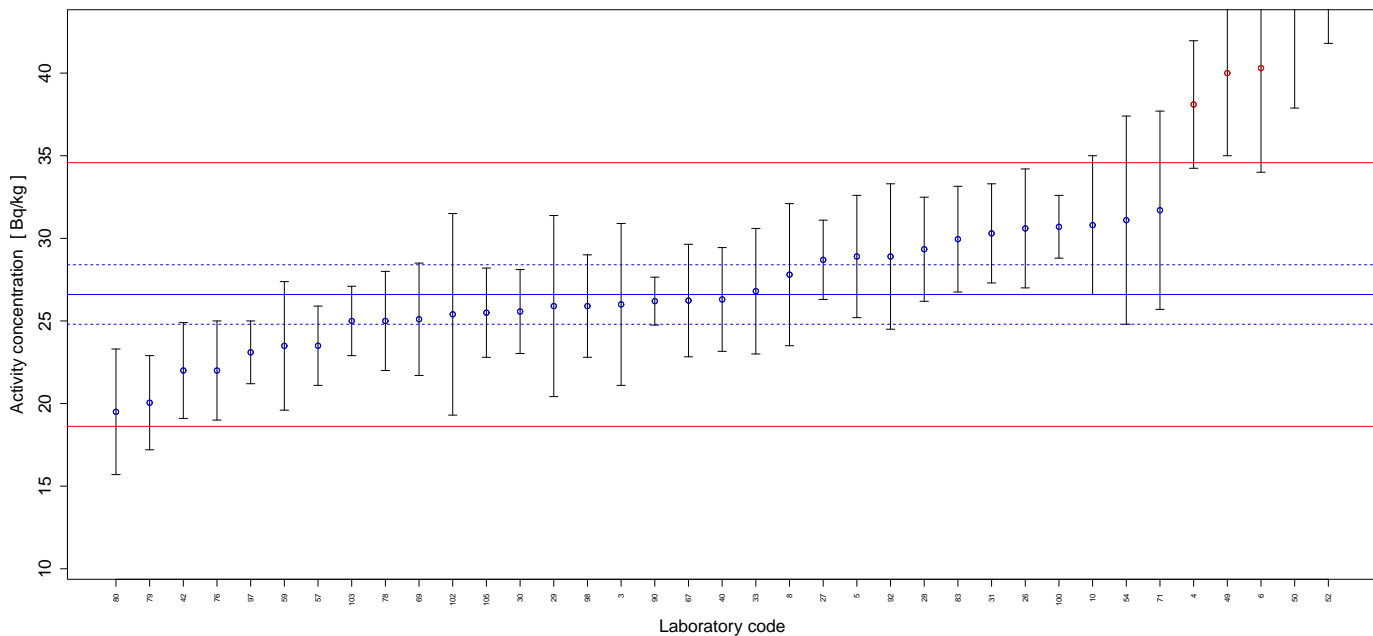


FIGURE 38. Reported results and evaluation parameters for Pb-210. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 40. Evaluation Results for Pb-210 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	26.0	4.9	-2.26	20.02	A	A	A
4	38.10	3.86	43.23	12.18	N	N	N
5	28.9	3.7	8.65	14.48	A	A	A
6	40.3	6.3	51.50	17.03	N	N	N
8	27.8	4.3	4.51	16.88	A	A	A
10	30.8	4.2	15.79	15.22	A	A	A
26	30.6	3.6	15.04	13.57	A	A	A
27	28.7	2.4	7.89	10.76	A	A	A
28	29.34	3.15	10.30	12.69	A	A	A
29	25.90	5.48	-2.63	22.21	A	A	A
30	25.57	2.54	-3.87	12.02	A	A	A
31	30.3	3.0	13.91	11.99	A	A	A
33	26.8	3.8	0.75	15.71	A	A	A
40	26.3	3.14	-1.13	13.72	A	A	A
42	22.0	2.9	-17.29	14.82	A	A	A
49	40	5	50.38	14.21	N	N	N
50	45.675	7.791	71.71	18.35	N	N	N
52	54.68	12.88	105.56	24.51	N	N	N
54	31.1	6.3	16.92	21.36	A	A	A
57	23.5	2.4	-11.65	12.25	A	A	A
59	23.49	3.89	-11.69	17.89	A	A	A
67	26.234	3.405	-1.38	14.64	A	A	A
69	25.1	3.4	-5.64	15.14	A	A	A
71	31.7	6.0	19.17	20.10	A	A	A
76	22	3	-17.29	15.22	A	A	A
78	25	3	-6.02	13.78	A	A	A
79	20.05	2.85	-24.62	15.74	A	A	A
80	19.5	3.8	-26.69	20.63	A	A	A
83	29.95	3.20	12.59	12.65	A	A	A
90	26.20	1.45	-1.50	8.74	A	A	A
92	28.9	4.4	8.65	16.66	A	A	A
97	23.1	1.9	-13.16	10.65	A	A	A
98	25.9	3.1	-2.63	13.75	A	A	A
100	30.7	1.9	15.41	9.17	A	A	A
102	25.4	6.1	-4.51	24.95	A	A	A
103	25.0	2.1	-6.02	10.79	A	A	A
105	25.5	2.7	-4.14	12.57	A	A	A

# Reported Results for Bi-212 Determination in Sample 4

TABLE 41. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	32.9
Uncertainty [ Bq/kg ]	1.9
Maximum Acceptable Relative Bias, [%]	30

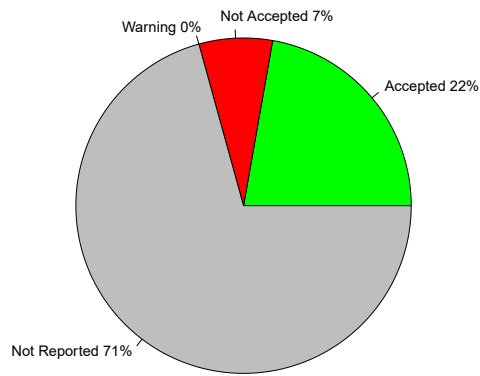


FIGURE 39. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

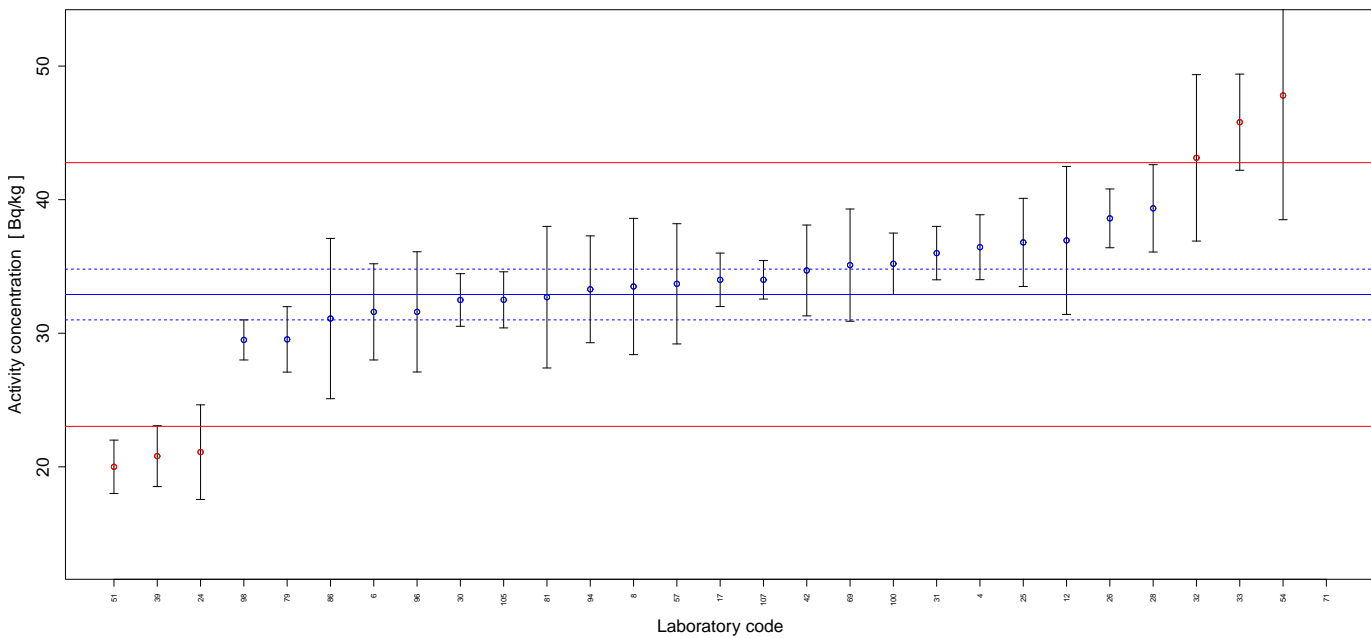


FIGURE 40. Reported results and evaluation parameters for Bi-212. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 42. Evaluation Results for Bi-212 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
4	36.44	2.43	10.76	8.82	A	A	A
6	31.6	3.6	-3.95	12.77	A	A	A
8	33.5	5.1	1.82	16.28	A	A	A
12	36.95	5.54	12.31	16.07	A	A	A
17	34	2	3.34	8.24	A	A	A
24	21.1	3.54	-35.87	17.74	N	A	N
25	36.8	3.3	11.85	10.67	A	A	A
26	38.6	2.2	17.33	8.11	A	A	A
28	39.35	3.27	19.60	10.12	A	A	A
30	32.49	1.97	-1.25	8.37	A	A	A
31	36.0	2.0	9.42	8.01	A	A	A
32	43.13	6.23	31.09	15.56	N	A	N
33	45.8	3.6	39.21	9.75	N	N	N
39	20.8	2.28	-36.78	12.39	N	N	N
42	34.7	3.4	5.47	11.37	A	A	A
51	20.0	2.0	-39.21	11.55	N	N	N
54	47.8	9.3	45.29	20.30	N	A	N
57	33.7	4.5	2.43	14.55	A	A	A
69	35.1	4.2	6.69	13.29	A	A	A
71	65.1	8.4	97.87	14.14	N	N	N
79	29.54	2.45	-10.21	10.11	A	A	A
81	32.7	5.3	-0.61	17.21	A	A	A
86	31.1	6	-5.47	20.14	A	A	A
94	33.29	4.00	1.19	13.33	A	A	A
96	31.6	4.5	-3.95	15.37	A	A	A
98	29.5	1.5	-10.33	7.69	A	A	A
100	35.2	2.3	6.99	8.72	A	A	A
105	32.5	2.1	-1.22	8.67	A	A	A
107	34.0	1.44	3.34	7.16	A	A	A

# Reported Results for Pb-212 Determination in Sample 4

TABLE 43. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	32.9
Uncertainty [ Bq/kg ]	1.9
Maximum Acceptable Relative Bias, [%]	30

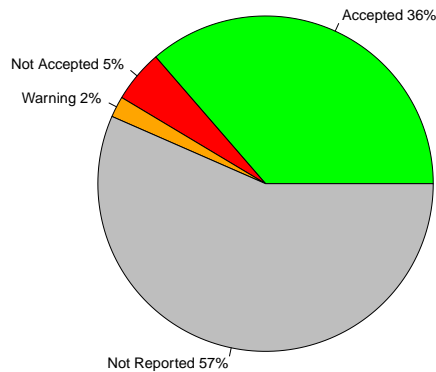


FIGURE 41. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

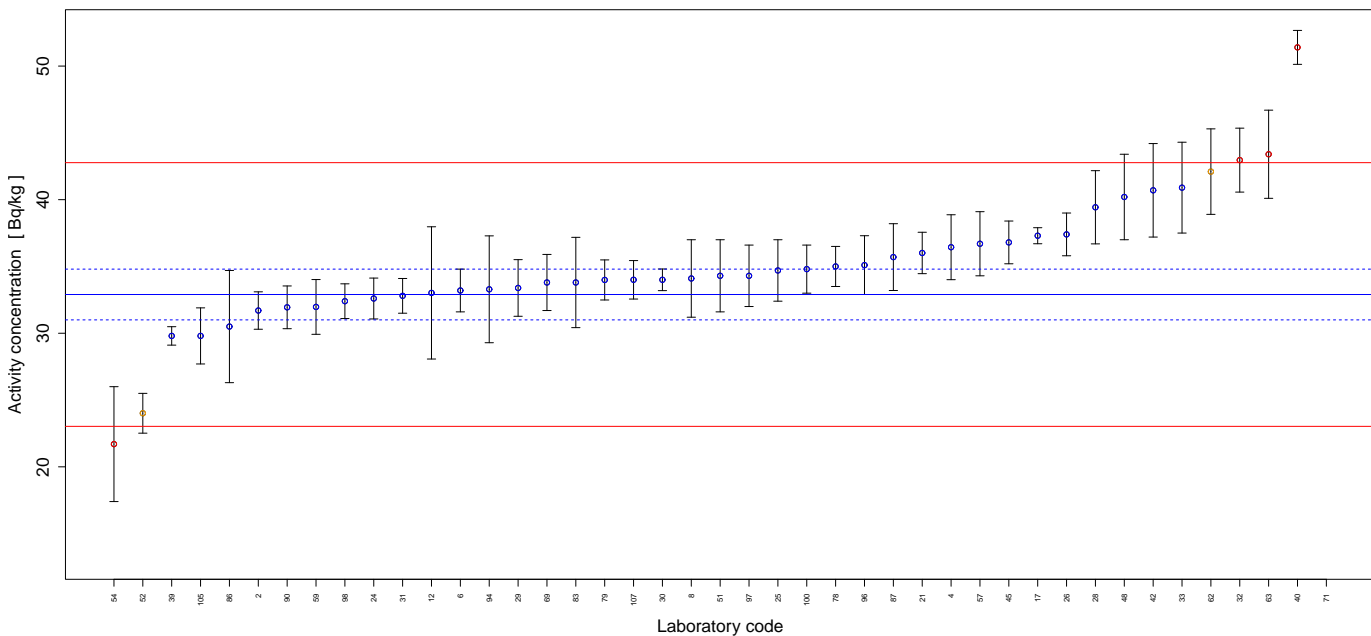


FIGURE 42. Reported results and evaluation parameters for Pb-212. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 44. Evaluation Results for Pb-212 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
2	31.7	1.4	-3.65	7.27	A	A	A
4	36.44	2.43	10.76	8.82	A	A	A
6	33.2	1.6	0.91	7.52	A	A	A
8	34.1	2.9	3.65	10.28	A	A	A
12	33.02	4.95	0.36	16.06	A	A	A
17	37.3	0.6	13.37	5.99	A	A	A
21	36.01	1.55	9.45	7.20	A	A	A
24	32.6	1.53	-0.91	7.44	A	A	A
25	34.7	2.3	5.47	8.79	A	A	A
26	37.4	1.6	13.68	7.19	A	A	A
28	39.43	2.74	19.85	9.04	A	A	A
29	33.39	2.12	1.49	8.58	A	A	A
30	34.00	0.81	3.34	6.25	A	A	A
31	32.8	1.3	-0.30	7.00	A	A	A
32	42.96	2.393	30.58	8.02	N	N	N
33	40.9	3.4	24.32	10.12	A	A	A
39	29.8	0.69	-9.42	6.22	A	A	A
40	51.4	1.27	56.23	6.28	N	N	N
42	40.7	3.5	23.71	10.36	A	A	A
45	36.8	1.6	11.85	7.23	A	A	A
48	40.2	3.2	22.19	9.83	A	A	A
51	34.3	2.7	4.26	9.76	A	A	A
52	24.01	1.49	-27.02	8.48	A	N	W
54	21.7	4.3	-34.04	20.64	N	A	N
57	36.7	2.4	11.55	8.72	A	A	A
59	31.97	2.05	-2.83	8.63	A	A	A
62	42.1	3.2	27.96	9.55	A	N	W
63	43.4	3.3	31.91	9.55	N	N	N
69	33.8	2.1	2.74	8.48	A	A	A
71	59.0	3.9	79.33	8.78	N	N	N
78	35	1.5	6.38	7.19	A	A	A
79	33.99	1.5	3.31	7.27	A	A	A
83	33.80	3.38	2.74	11.55	A	A	A
86	30.5	4.2	-7.29	14.93	A	A	A
87	35.7	2.5	8.51	9.08	A	A	A
90	31.94	1.60	-2.92	7.64	A	A	A
94	33.29	4.00	1.19	13.33	A	A	A
96	35.1	2.2	6.69	8.52	A	A	A
97	34.3	2.3	4.26	8.85	A	A	A
98	32.4	1.3	-1.52	7.03	A	A	A
100	34.8	1.8	5.78	7.75	A	A	A
105	29.8	2.1	-9.42	9.11	A	A	A
107	34.0	1.44	3.34	7.16	A	A	A



# Reported Results for Bi-214 Determination in Sample 4

TABLE 45. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	20.8
Uncertainty [ Bq/kg ]	1.0
Maximum Acceptable Relative Bias, [%]	30

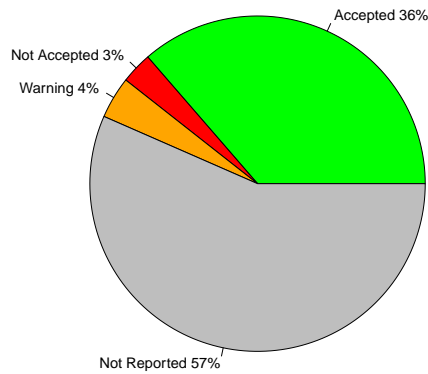


FIGURE 43. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

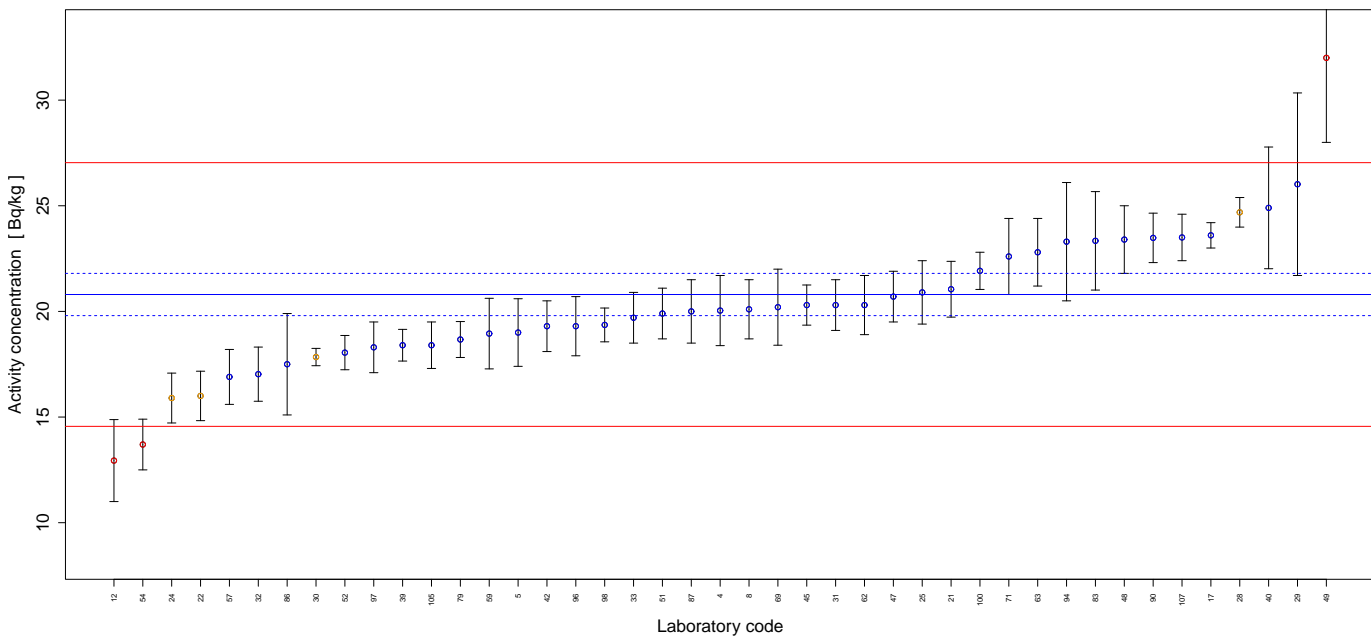


FIGURE 44. Reported results and evaluation parameters for Bi-214. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 46. Evaluation Results for Bi-214 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
4	20.04	1.66	-3.65	9.58	A	A	A
5	19.0	1.6	-8.65	9.70	A	A	A
8	20.1	1.4	-3.37	8.46	A	A	A
12	12.94	1.94	-37.79	15.74	N	A	N
17	23.6	0.6	13.46	5.44	A	A	A
21	21.05	1.32	1.20	7.90	A	A	A
22	16.0	1.17	-23.08	8.75	A	N	W
24	15.9	1.18	-23.56	8.84	A	N	W
25	20.9	1.5	0.48	8.64	A	A	A
28	24.69	0.70	18.70	5.58	A	N	W
29	26.02	4.32	25.10	17.28	A	A	A
30	17.84	0.41	-14.23	5.33	A	N	W
31	20.3	1.2	-2.40	7.62	A	A	A
32	17.03	1.282	-18.12	8.93	A	A	A
33	19.7	1.2	-5.29	7.76	A	A	A
39	18.4	0.75	-11.54	6.30	A	A	A
40	24.9	2.88	19.71	12.53	A	A	A
42	19.3	1.2	-7.21	7.86	A	A	A
45	20.30	0.95	-2.40	6.71	A	A	A
47	20.7	1.2	-0.48	7.53	A	A	A
48	23.4	1.6	12.50	8.36	A	A	A
49	32	4	53.85	13.39	N	N	N
51	19.9	1.2	-4.33	7.71	A	A	A
52	18.05	0.811	-13.22	6.58	A	A	A
54	13.7	1.2	-34.13	9.99	N	N	N
57	16.9	1.3	-18.75	9.07	A	A	A
59	18.95	1.67	-8.89	10.04	A	A	A
62	20.3	1.4	-2.40	8.41	A	A	A
63	22.8	1.6	9.62	8.51	A	A	A
69	20.2	1.8	-2.88	10.13	A	A	A
71	22.6	1.8	8.65	9.30	A	A	A
79	18.67	0.85	-10.24	6.62	A	A	A
83	23.34	2.33	12.21	11.08	A	A	A
86	17.5	2.4	-15.87	14.53	A	A	A
87	20.0	1.5	-3.85	8.91	A	A	A
90	23.48	1.17	12.88	6.92	A	A	A
94	23.30	2.80	12.02	12.94	A	A	A
96	19.3	1.4	-7.21	8.70	A	A	A
97	18.3	1.2	-12.02	8.13	A	A	A
98	19.36	0.8	-6.92	6.34	A	A	A
100	21.92	0.88	5.38	6.26	A	A	A
105	18.4	1.1	-11.54	7.67	A	A	A
107	23.5	1.10	12.98	6.71	A	A	A

## Reported Results for Pb-214 Determination in Sample 4

TABLE 47. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	20.8
Uncertainty [ Bq/kg ]	1.0
Maximum Acceptable Relative Bias, [%]	30

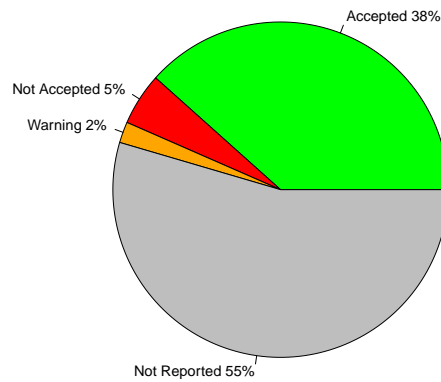


FIGURE 45. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

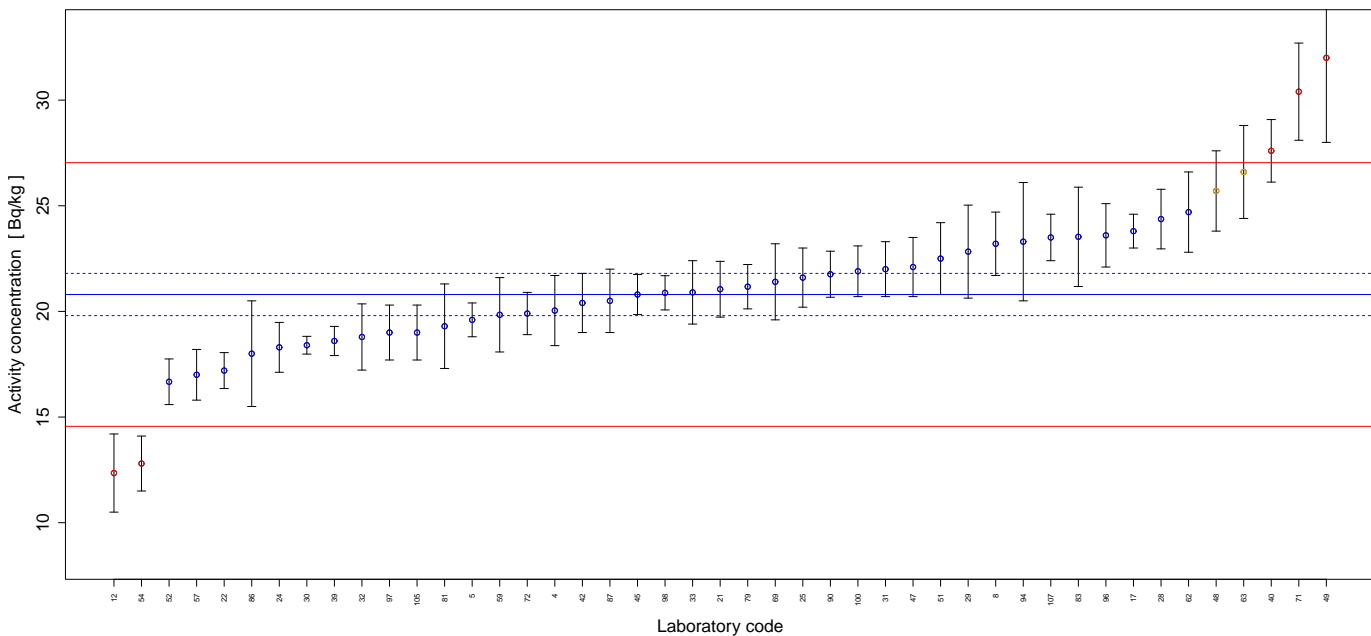


FIGURE 46. Reported results and evaluation parameters for Pb-214. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 48. Evaluation Results for Pb-214 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
4	20.04	1.66	-3.65	9.58	A	A	A
5	19.6	0.8	-5.77	6.31	A	A	A
8	23.2	1.5	11.54	8.06	A	A	A
12	12.35	1.85	-40.63	15.73	N	N	N
17	23.8	0.8	14.42	5.87	A	A	A
21	21.05	1.32	1.20	7.90	A	A	A
22	17.2	0.85	-17.31	6.89	A	A	A
24	18.3	1.18	-12.02	8.04	A	A	A
25	21.6	1.4	3.85	8.07	A	A	A
28	24.37	1.41	17.16	7.52	A	A	A
29	22.83	2.20	9.76	10.77	A	A	A
30	18.40	0.42	-11.54	5.32	A	A	A
31	22.0	1.3	5.77	7.62	A	A	A
32	18.79	1.567	-9.66	9.63	A	A	A
33	20.9	1.5	0.48	8.64	A	A	A
39	18.6	0.69	-10.58	6.07	A	A	A
40	27.6	1.48	32.69	7.20	N	N	N
42	20.4	1.4	-1.92	8.38	A	A	A
45	20.80	0.95	0.00	6.63	A	A	A
47	22.1	1.4	6.25	7.95	A	A	A
48	25.7	1.9	23.56	8.82	A	N	W
49	32	4	53.85	13.39	N	N	N
51	22.5	1.7	8.17	8.96	A	A	A
52	16.67	1.08	-19.86	8.07	A	A	A
54	12.8	1.3	-38.46	11.24	N	N	N
57	17.0	1.2	-18.27	8.54	A	A	A
59	19.84	1.76	-4.62	10.09	A	A	A
62	24.7	1.9	18.75	9.07	A	A	A
63	26.6	2.2	27.88	9.57	A	N	W
69	21.4	1.8	2.88	9.69	A	A	A
71	30.4	2.3	46.15	8.96	N	N	N
72	19.9	1.0	-4.33	6.95	A	A	A
79	21.17	1.05	1.78	6.91	A	A	A
81	19.3	2.0	-7.21	11.42	A	A	A
83	23.53	2.35	13.12	11.08	A	A	A
86	18	2.5	-13.46	14.70	A	A	A
87	20.5	1.5	-1.44	8.76	A	A	A
90	21.76	1.09	4.62	6.94	A	A	A
94	23.30	2.80	12.02	12.94	A	A	A
96	23.6	1.5	13.46	7.97	A	A	A
97	19	1.3	-8.65	8.36	A	A	A
98	20.88	0.81	0.38	6.18	A	A	A
100	21.9	1.2	5.29	7.29	A	A	A
105	19.0	1.3	-8.65	8.36	A	A	A
107	23.5	1.10	12.98	6.71	A	A	A

# Reported Results for Ra-226 Determination in Sample 4

TABLE 49. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	20.8
Uncertainty [ Bq/kg ]	1.0
Maximum Acceptable Relative Bias, [%]	30

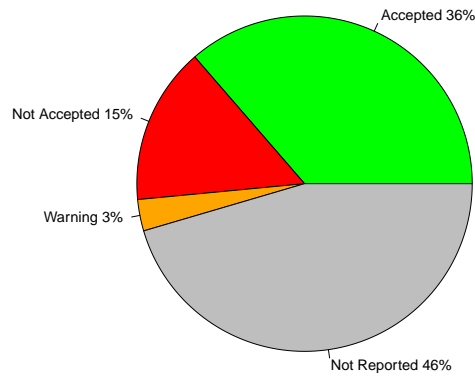


FIGURE 47. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

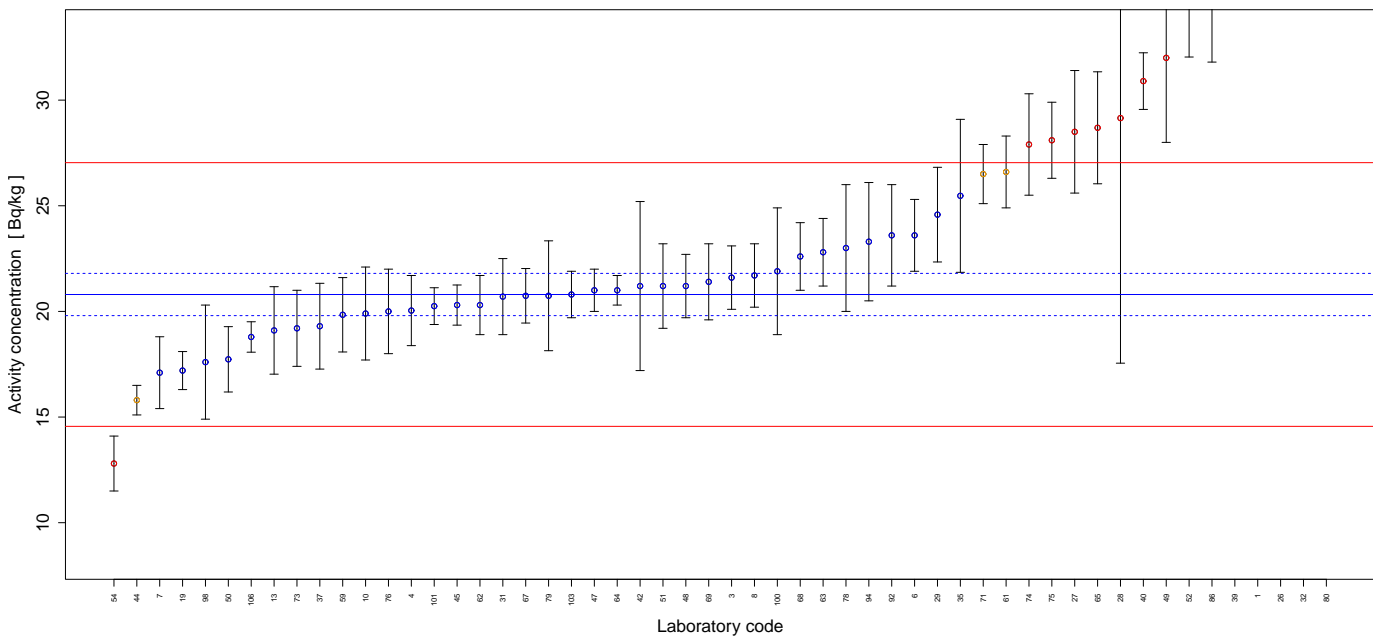


FIGURE 48. Reported results and evaluation parameters for Ra-226. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 50. Evaluation Results for Ra-226 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	45.21	3.19	117.36	8.54	N	N	N
3	21.6	1.5	3.85	8.45	A	A	A
4	20.04	1.66	-3.65	9.58	A	A	A
6	23.6	1.7	13.46	8.66	A	A	A
7	17.1	1.7	-17.79	11.04	A	A	A
8	21.7	1.5	4.33	8.42	A	A	A
10	19.9	2.2	-4.33	12.06	A	A	A
13	19.1	2.07	-8.17	11.86	A	A	A
19	17.2	0.9	-17.31	7.11	A	A	A
26	47.8	3.0	129.81	7.91	N	N	N
27	28.5	2.9	37.02	11.25	N	N	N
28	29.15	11.60	40.14	40.08	N	N	N
29	24.58	2.24	18.17	10.30	A	A	A
31	20.7	1.8	-0.48	9.94	A	A	A
32	48.16	8.535	131.54	18.36	N	N	N
35	25.47	3.62	22.45	15.00	A	A	A
37	19.3	2.03	-7.21	11.56	A	A	A
39	45.2	6.06	117.31	14.24	N	N	N
40	30.9	1.34	48.56	6.47	N	N	N
42	21.2	4.0	1.92	19.47	A	A	A
44	15.8	0.7	-24.04	6.54	A	N	W
45	20.30	0.95	-2.40	6.71	A	A	A
47	21	1	0.96	6.77	A	A	A
48	21.2	1.5	1.92	8.55	A	A	A
49	32	4	53.85	13.39	N	N	N
50	17.732	1.546	-14.75	9.96	A	A	A
51	21.2	2.0	1.92	10.59	A	A	A
52	37.66	5.62	81.06	15.68	N	N	N
54	12.8	1.3	-38.46	11.24	N	N	N
59	19.84	1.76	-4.62	10.09	A	A	A
61	26.6	1.7	27.88	8.00	A	N	W
62	20.3	1.4	-2.40	8.41	A	A	A
63	22.8	1.6	9.62	8.51	A	A	A
64	21.0	0.7	0.96	5.85	A	A	A
65	28.69	2.65	37.93	10.41	N	N	N
67	20.739	1.290	-0.29	7.86	A	A	A
68	22.6	1.6	8.65	8.56	A	A	A
69	21.4	1.8	2.88	9.69	A	A	A
71	26.5	1.4	27.40	7.14	A	N	W
73	19.2	1.8	-7.69	10.54	A	A	A
74	27.9	2.4	34.13	9.85	N	N	N
75	28.1	1.8	35.10	8.01	N	N	N
76	20	2	-3.85	11.10	A	A	A
78	23	3	10.58	13.90	A	A	A
79	20.74	2.6	-0.29	13.43	A	A	A
80	51.8	5.88	149.04	12.33	N	N	N
86	39.6	7.8	90.38	20.28	N	N	N
92	23.6	2.4	13.46	11.25	A	A	A
94	23.30	2.80	12.02	12.94	A	A	A
98	17.6	2.7	-15.38	16.08	A	A	A
100	21.9	3.0	5.29	14.52	A	A	A
101	20.25	0.87	-2.64	6.45	A	A	A
103	20.8	1.1	0.00	7.15	A	A	A
106	18.79	0.72	-9.66	6.15	A	A	A

# Reported Results for Ac-228 Determination in Sample 4

TABLE 51. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	32.9
Uncertainty [ Bq/kg ]	1.9
Maximum Acceptable Relative Bias, [%]	30

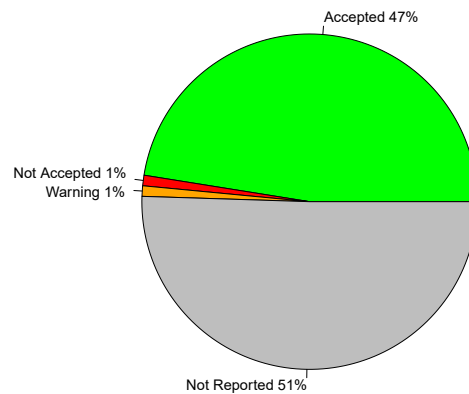


FIGURE 49. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

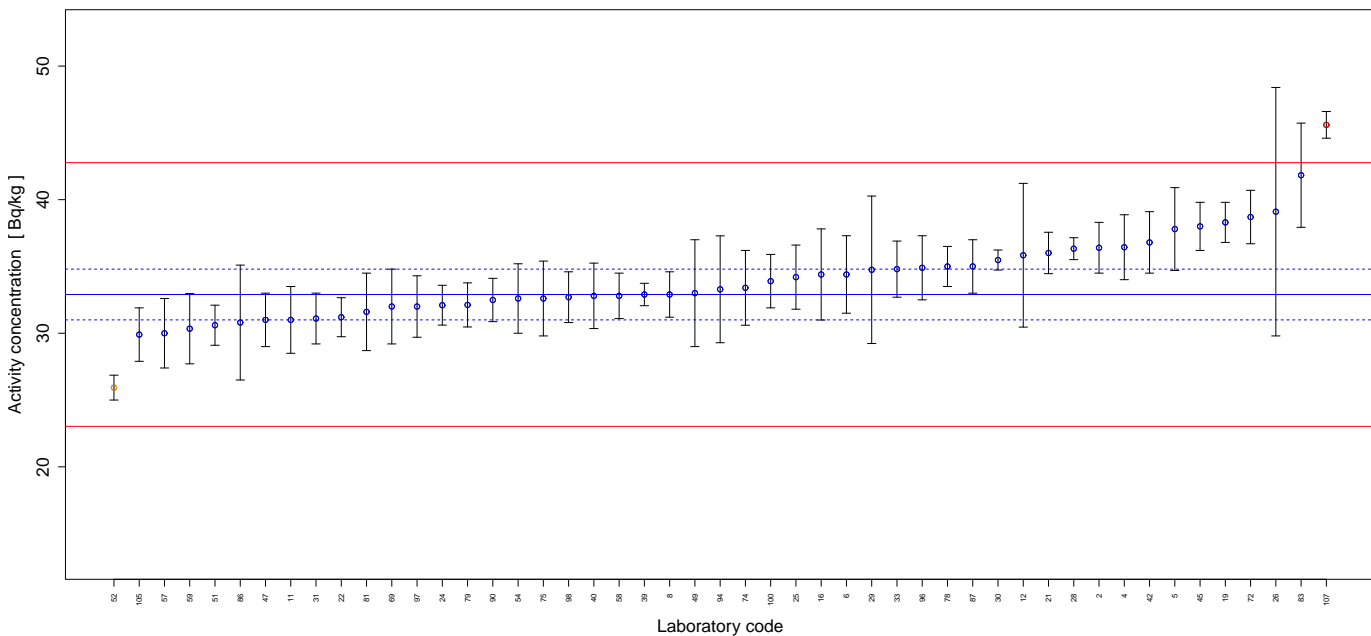


FIGURE 50. Reported results and evaluation parameters for Ac-228. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 52. Evaluation Results for Ac-228 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
2	36.4	1.9	10.64	7.78	A	A	A
4	36.44	2.43	10.76	8.82	A	A	A
5	37.8	3.1	14.89	10.03	A	A	A
6	34.4	2.9	4.56	10.22	A	A	A
8	32.9	1.7	0.00	7.75	A	A	A
11	31.0	2.5	-5.78	9.92	A	A	A
12	35.84	5.38	8.94	16.08	A	A	A
16	34.4	3.41	4.56	11.47	A	A	A
19	38.3	1.5	16.41	6.98	A	A	A
21	36.01	1.55	9.45	7.20	A	A	A
22	31.2	1.46	-5.17	7.43	A	A	A
24	32.1	1.49	-2.43	7.41	A	A	A
25	34.2	2.4	3.95	9.09	A	A	A
26	39.1	9.3	18.84	24.48	A	A	A
28	36.33	0.82	10.43	6.20	A	A	A
29	34.75	5.52	5.62	16.90	A	A	A
30	35.48	0.75	7.84	6.15	A	A	A
31	31.1	1.9	-5.47	8.41	A	A	A
33	34.8	2.1	5.78	8.35	A	A	A
39	32.9	0.84	0.00	6.31	A	A	A
40	32.8	2.45	-0.30	9.44	A	A	A
42	36.8	2.3	11.85	8.51	A	A	A
45	38.0	1.8	15.50	7.47	A	A	A
47	31	2	-5.78	8.66	A	A	A
49	33	4	0.30	13.43	A	A	A
51	30.6	1.5	-6.99	7.58	A	A	A
52	25.93	0.931	-21.19	6.80	A	N	W
54	32.6	2.6	-0.91	9.85	A	A	A
57	30.0	2.6	-8.81	10.41	A	A	A
58	32.8	1.7	-0.30	7.76	A	A	A
59	30.34	2.63	-7.78	10.42	A	A	A
69	32.0	2.8	-2.74	10.48	A	A	A
72	38.7	2.0	17.63	7.75	A	A	A
74	33.4	2.8	1.52	10.18	A	A	A
75	32.6	2.8	-0.91	10.35	A	A	A
78	35	1.5	6.38	7.19	A	A	A
79	32.12	1.65	-2.37	7.73	A	A	A
81	31.6	2.9	-3.95	10.84	A	A	A
83	41.83	3.90	27.14	10.97	A	A	A
86	30.8	4.3	-6.38	15.11	A	A	A
87	35.0	2.0	6.38	8.12	A	A	A
90	32.49	1.62	-1.25	7.63	A	A	A
94	33.29	4.00	1.19	13.33	A	A	A
96	34.9	2.4	6.08	8.98	A	A	A
97	32.0	2.3	-2.74	9.22	A	A	A
98	32.7	1.9	-0.61	8.19	A	A	A
100	33.9	2.0	3.04	8.26	A	A	A
105	29.9	2.0	-9.12	8.84	A	A	A
107	45.6	1.00	38.60	6.18	N	N	N



# Reported Results for Th-234 Determination in Sample 4

TABLE 53. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	23.0
Uncertainty [ Bq/kg ]	1.5
Maximum Acceptable Relative Bias, [%]	30

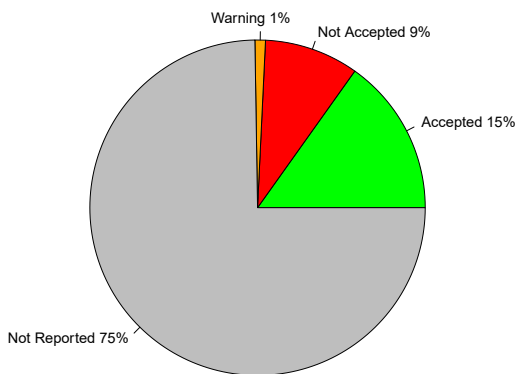


FIGURE 51. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

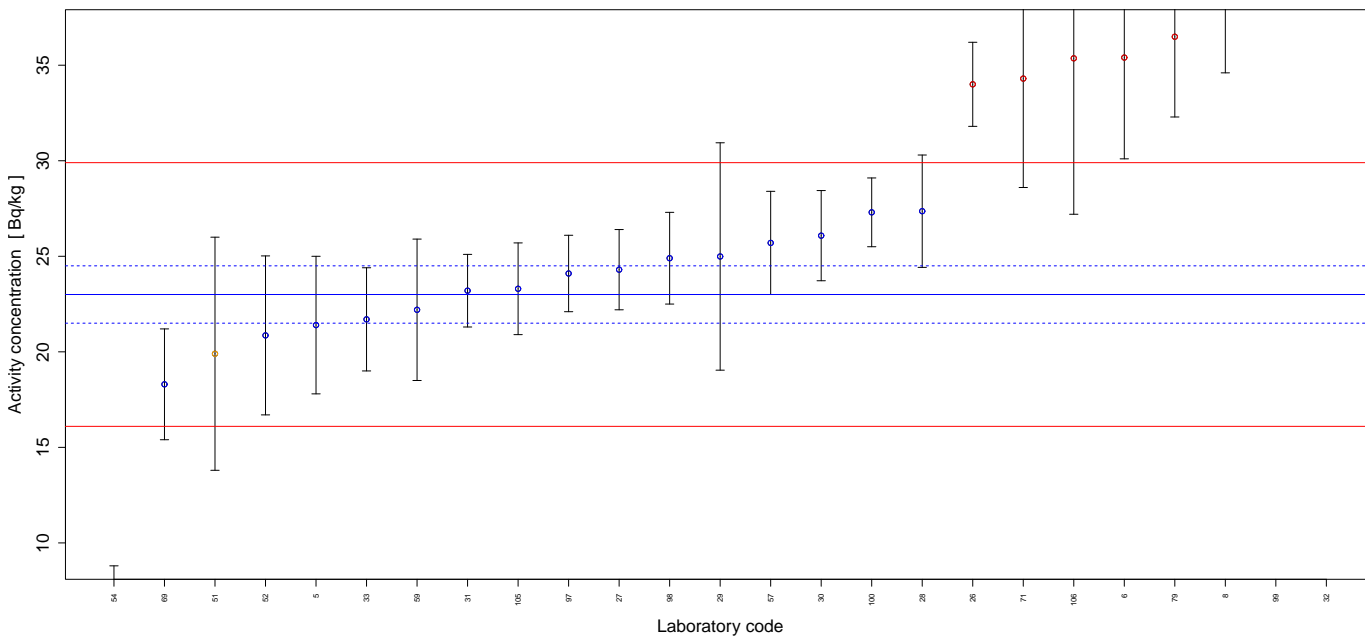


FIGURE 52. Reported results and evaluation parameters for Th-234. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 54. Evaluation Results for Th-234 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
5	21.4	3.6	-6.96	18.04	A	A	A
6	35.4	5.3	53.91	16.33	N	N	N
8	39.9	5.3	73.48	14.80	N	N	N
26	34.0	2.2	47.83	9.19	N	N	N
27	24.3	2.1	5.65	10.83	A	A	A
28	27.36	2.94	18.96	12.57	A	A	A
29	24.99	5.95	8.65	24.69	A	A	A
30	26.08	2.36	13.39	11.15	A	A	A
31	23.2	1.9	0.87	10.47	A	A	A
32	112	33.27	386.96	30.41	N	N	N
33	21.7	2.7	-5.65	14.05	A	A	A
51	19.9	6.1	-13.48	31.34	A	N	W
52	20.86	4.16	-9.30	20.98	A	A	A
54	7.4	1.4	-67.83	20.01	N	N	N
57	25.7	2.7	11.74	12.37	A	A	A
59	22.20	3.70	-3.48	17.90	A	A	A
69	18.3	2.9	-20.43	17.14	A	A	A
71	34.3	5.7	49.13	17.85	N	N	N
79	36.49	4.2	58.65	13.23	N	N	N
97	24.1	2.0	4.78	10.55	A	A	A
98	24.9	2.4	8.26	11.64	A	A	A
99	41.1	1.67	78.70	7.68	N	N	N
100	27.3	1.8	18.70	9.27	A	A	A
105	23.3	2.4	1.30	12.19	A	A	A
106	35.36	8.16	53.74	23.98	N	A	N

## Reported Results for U-235 Determination in Sample 4

TABLE 55. Target values

Parameter	Value
Activity Concentration [ Bq/kg ]	1.22
Uncertainty [ Bq/kg ]	0.15
Maximum Acceptable Relative Bias, [%]	30

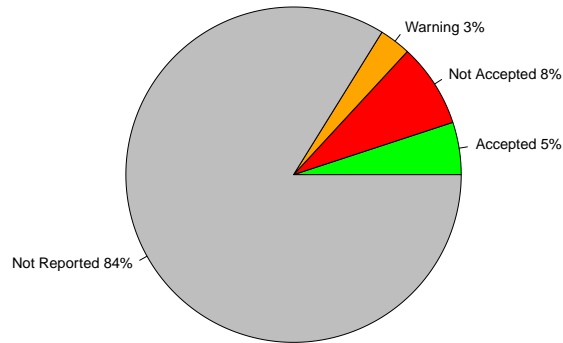


FIGURE 53. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

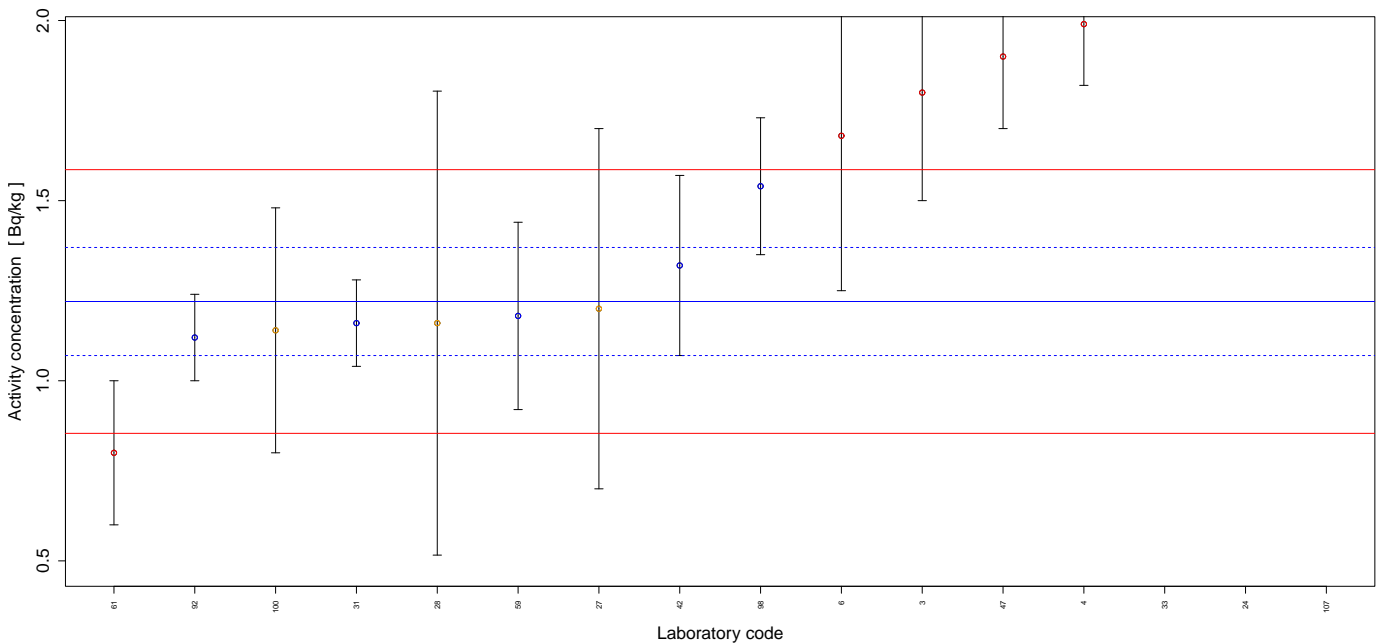


FIGURE 54. Reported results and evaluation parameters for U-235. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 56. Evaluation Results for U-235 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg by gamma

Labcode	Reported value [Bq/kg]	Reported uncertainty ( $k = 1$ ) [Bq/kg]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	1.8	0.3	47.54	20.71	N	A	N
4	1.99	0.17	63.11	14.97	N	N	N
6	1.68	0.43	37.70	28.40	N	A	N
24	3.02	0.35	147.54	16.90	N	N	N
27	1.2	0.5	-1.64	43.44	A	N	W
28	1.16	0.644	-4.92	56.86	A	N	W
31	1.16	0.12	-4.92	16.07	A	A	A
33	2.82	0.59	131.15	24.27	N	N	N
42	1.32	0.25	8.20	22.58	A	A	A
47	1.9	0.2	55.74	16.19	N	N	N
59	1.18	0.26	-3.28	25.23	A	A	A
61	0.8	0.2	-34.43	27.86	N	A	N
92	1.12	0.12	-8.20	16.31	A	A	A
98	1.54	0.19	26.23	17.42	A	A	A
100	1.14	0.34	-6.56	32.26	A	N	W
107	3.57	1.48	192.62	43.24	N	N	N

# Reported Results for Cs-134 Determination in Sample 5

TABLE 57. Target values

Parameter	Value
Activity per sample [ Bq/sample ]	5.40
Uncertainty [ Bq/sample ]	0.21
Maximum Acceptable Relative Bias, [%]	30

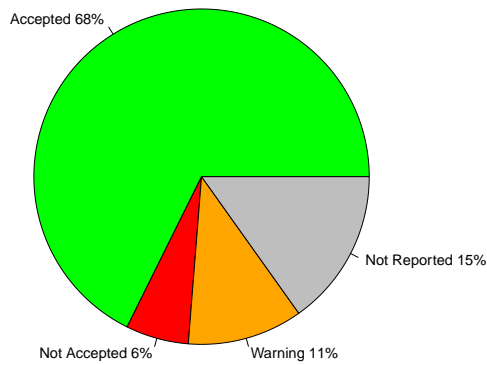


FIGURE 55. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

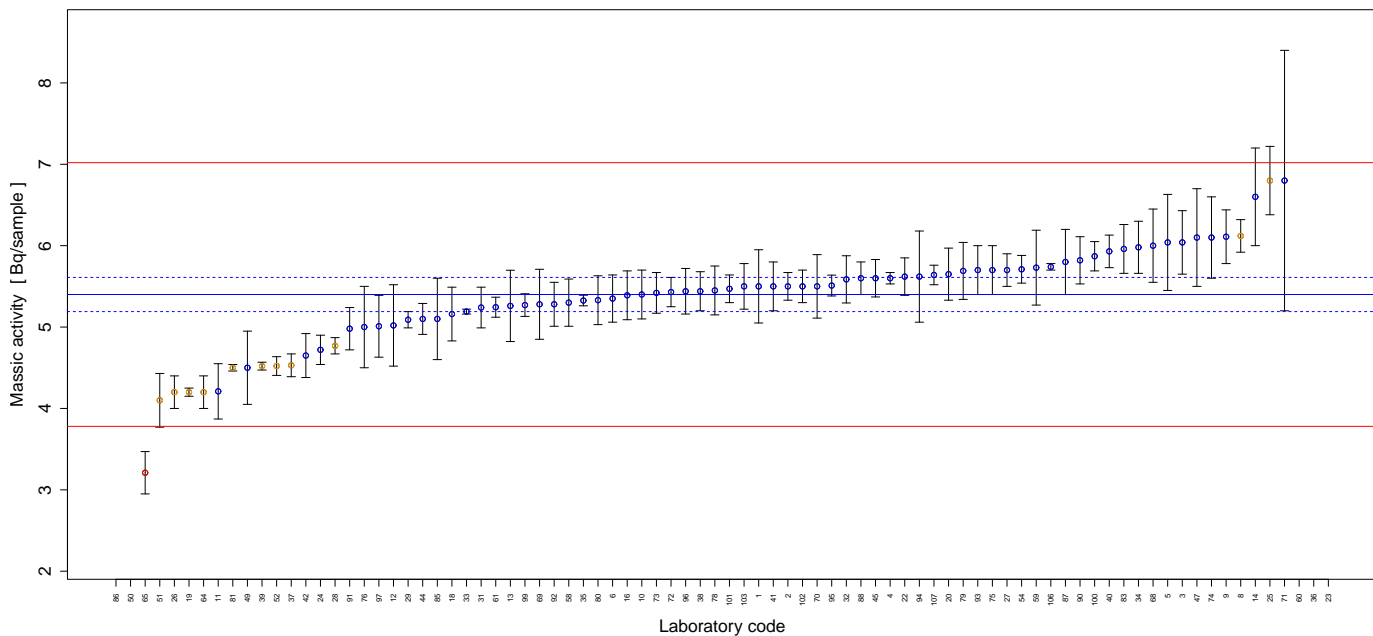


FIGURE 56. Reported results and evaluation parameters for Cs-134. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 58. Evaluation Results for Cs-134 in Sample 5, Rep. Value and Rep. Unc. in Bq/sample by gamma

Labcode	Reported value [Bq/sample ]	Reported uncertainty ( $k = 1$ ) [Bq/sample ]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	5.50	0.45	1.85	9.06	A	A	A
2	5.5	0.17	1.85	4.97	A	A	A
3	6.04	0.39	11.85	7.54	A	A	A
4	5.60	0.07	3.70	4.08	A	A	A
5	6.04	0.59	11.85	10.51	A	A	A
6	5.35	0.29	-0.93	6.67	A	A	A
8	6.12	0.20	13.33	5.08	A	N	W
9	6.11	0.33	13.15	6.66	A	A	A
10	5.4	0.3	0.00	6.78	A	A	A
11	4.21	0.34	-22.04	8.96	A	A	A
12	5.02	0.50	-7.04	10.69	A	A	A
13	5.26	0.438	-2.59	9.19	A	A	A
14	6.6	0.6	22.22	9.89	A	A	A
16	5.39	0.30	-0.19	6.79	A	A	A
18	5.16	0.33	-4.44	7.48	A	A	A
19	4.2	0.05	-22.22	4.07	A	N	W
20	5.65	0.32	4.63	6.87	A	A	A
22	5.62	0.23	4.07	5.65	A	A	A
23	635.213	60.5	11663.20	10.29	N	N	N
24	4.72	0.18	-12.59	5.45	A	A	A
25	6.80	0.42	25.93	7.30	A	N	W
26	4.2	0.2	-22.22	6.15	A	N	W
27	5.7	0.2	5.56	5.24	A	A	A
28	4.77	0.10	-11.67	4.42	A	N	W
29	5.09	0.10	-5.74	4.36	A	A	A
31	5.24	0.25	-2.96	6.16	A	A	A
32	5.586	0.290	3.44	6.49	A	A	A
33	5.19	0.030	-3.89	3.93	A	A	A
34	5.98	0.32	10.74	6.62	A	A	A
35	5.3262	0.0651	-1.37	4.08	A	A	A
36	20.5	1.6	279.63	8.72	N	N	N
37	4.53	0.14	-16.11	4.97	A	N	W
38	5.44	0.24	0.74	5.88	A	A	A
39	4.52	0.048	-16.30	4.03	A	N	W
40	5.93	0.20	9.81	5.15	A	A	A
41	5.5	0.3	1.85	6.70	A	A	A
42	4.65	0.27	-13.89	6.99	A	A	A
44	5.1	0.19	-5.56	5.39	A	A	A
45	5.60	0.23	3.70	5.66	A	A	A
47	6.1	0.6	12.96	10.58	A	A	A
49	4.5	0.45	-16.67	10.73	A	A	A
50	0.298	0.011	-94.48	5.36	N	N	N
51	4.10	0.33	-24.07	8.94	A	N	W
52	4.521	0.115	-16.28	4.65	A	N	W
54	5.71	0.17	5.74	4.90	A	A	A
58	5.30	0.29	-1.85	6.71	A	A	A
59	5.73	0.46	6.11	8.92	A	A	A
60	14	1	159.26	8.13	N	N	N
61	5.244	0.123	-2.89	4.54	A	A	A
64	4.2	0.2	-22.22	6.15	A	N	W
65	3.21	0.26	-40.56	8.98	N	N	N
68	6.00	0.45	11.11	8.45	A	A	A
69	5.28	0.43	-2.22	9.02	A	A	A
70	5.50	0.39	1.85	8.09	A	A	A
71	6.8	1.6	25.93	23.85	A	A	A
72	5.43	0.18	0.56	5.11	A	A	A
73	5.42	0.25	0.37	6.03	A	A	A
74	6.1	0.5	12.96	9.07	A	A	A
75	5.7	0.3	5.56	6.54	A	A	A
76	5.0	0.5	-7.41	10.73	A	A	A

TABLE 58. Evaluation Results for Cs-134 in Sample 5, Rep. Value and Rep. Unc. in Bq/sample by gamma

Labcode	Reported value [Bq/sample ]	Reported uncertainty ( $k = 1$ ) [Bq/sample ]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
78	5.45	0.3	0.93	6.74	A	A	A
79	5.69	0.35	5.37	7.28	A	A	A
80	5.33	0.30	-1.30	6.84	A	A	A
81	4.50	0.04	-16.67	3.99	A	N	W
83	5.96	0.30	10.37	6.36	A	A	A
85	5.1	0.5	-5.56	10.55	A	A	A
86	0.261	0.013	-95.17	6.32	N	N	N
87	5.8	0.4	7.41	7.92	A	A	A
88	5.6	0.2	3.70	5.28	A	A	A
90	5.82	0.29	7.78	6.32	A	A	A
91	4.98	0.26	-7.78	6.51	A	A	A
92	5.28	0.27	-2.22	6.42	A	A	A
93	5.7	0.3	5.56	6.54	A	A	A
94	5.62	0.56	4.07	10.70	A	A	A
95	5.51	0.128	2.04	4.53	A	A	A
96	5.44	0.28	0.74	6.45	A	A	A
97	5.01	0.38	-7.22	8.52	A	A	A
99	5.27	0.139	-2.41	4.70	A	A	A
100	5.87	0.18	8.70	4.95	A	A	A
101	5.47	0.17	1.30	4.98	A	A	A
102	5.5	0.2	1.85	5.32	A	A	A
103	5.50	0.28	1.85	6.41	A	A	A
106	5.74	0.04	6.30	3.95	A	A	A
107	5.64	0.12	4.44	4.43	A	A	A

# Reported Results for Sr-90 Determination in Sample 5

TABLE 59. Target values

Parameter	Value
Activity per sample [ Bq/sample ]	2.25
Uncertainty [ Bq/sample ]	0.10
Maximum Acceptable Relative Bias, [%]	30

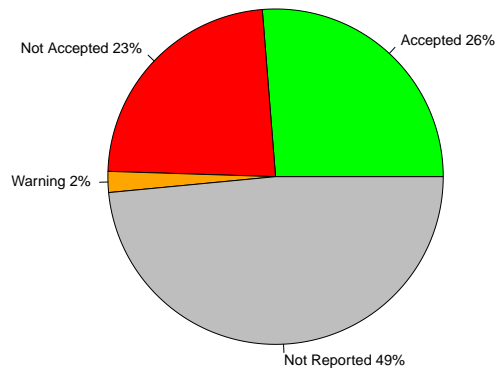


FIGURE 57. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

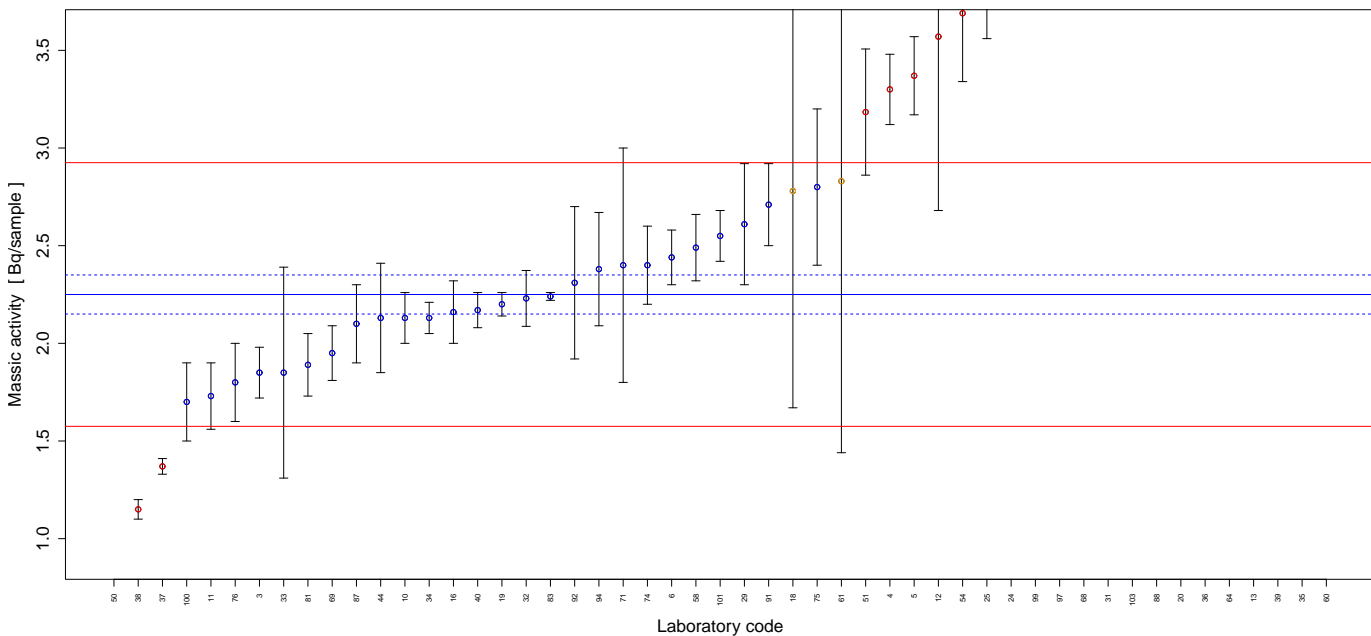


FIGURE 58. Reported results and evaluation parameters for Sr-90. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.



TABLE 60. Evaluation Results for Sr-90 in Sample 5, Rep. Value and Rep. Unc. in Bq/sample by beta

Labcode	Reported value [Bq/sample ]	Reported uncertainty ( $k = 1$ ) [Bq/sample ]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	1.85	0.13	-17.78	8.31	A	A	A
4	3.30	0.18	46.67	7.04	N	N	N
5	3.37	0.20	49.78	7.41	N	N	N
6	2.44	0.14	8.44	7.26	A	A	A
10	2.13	0.13	-5.33	7.55	A	A	A
11	1.73	0.17	-23.11	10.78	A	A	A
12	3.57	0.89	58.67	25.32	N	A	N
13	7.63	0.43	239.11	7.18	N	N	N
16	2.16	0.16	-4.00	8.64	A	A	A
18	2.78	1.11	23.56	40.17	A	N	W
19	2.2	0.06	-2.22	5.21	A	A	A
20	6.86	0.92	204.89	14.13	N	N	N
24	4.47	0.12	98.67	5.19	N	N	N
25	3.96	0.40	76.00	11.04	N	N	N
29	2.61	0.31	16.00	12.68	A	A	A
31	4.79	0.05	112.89	4.57	N	N	N
32	2.230	0.143	-0.89	7.80	A	A	A
33	1.85	0.54	-17.78	29.53	A	A	A
34	2.13	0.08	-5.33	5.82	A	A	A
35	8.37	0.11	272.00	4.63	N	N	N
36	6.9	1.7	206.67	25.04	N	N	N
37	1.37	0.04	-39.11	5.32	N	N	N
38	1.15	0.05	-48.89	6.22	N	N	N
39	8.19	0.03	264.00	4.46	N	N	N
40	2.17	0.09	-3.56	6.08	A	A	A
44	2.13	0.28	-5.33	13.88	A	A	A
50	0.111	0.004	-95.07	5.72	N	N	N
51	3.184	0.323	41.51	11.08	N	N	N
54	3.69	0.35	64.00	10.47	N	N	N
58	2.49	0.17	10.67	8.15	A	A	A
60	479	5	21188.89	4.57	N	N	N
61	2.83	1.39	25.78	49.32	A	N	W
64	6.97	0.82	209.78	12.58	N	N	N
68	4.77	0.22	112.00	6.41	N	N	N
69	1.95	0.14	-13.33	8.44	A	A	A
71	2.4	0.6	6.67	25.39	A	A	A
74	2.4	0.2	6.67	9.44	A	A	A
75	2.8	0.4	24.44	14.96	A	A	A
76	1.8	0.2	-20.00	11.97	A	A	A
81	1.89	0.16	-16.00	9.56	A	A	A
83	2.24	0.02	-0.44	4.53	A	A	A
87	2.1	0.2	-6.67	10.51	A	A	A
88	6.5	0.4	188.89	7.59	N	N	N
91	2.71	0.21	20.44	8.93	A	A	A
92	2.31	0.39	2.67	17.46	A	A	A
94	2.38	0.29	5.78	12.97	A	A	A
97	4.6	0.3	104.44	7.89	N	N	N
99	4.58	0.14	103.56	5.39	N	N	N
100	1.70	0.20	-24.44	12.58	A	A	A
101	2.55	0.13	13.33	6.76	A	A	A
103	5.0	0.6	122.22	12.80	N	N	N

# Reported Results for Cs-134 Determination in Sample 6

TABLE 61. Target values

Parameter	Value
Activity per sample [ Bq/sample ]	7.84
Uncertainty [ Bq/sample ]	0.31
Maximum Acceptable Relative Bias, [%]	30

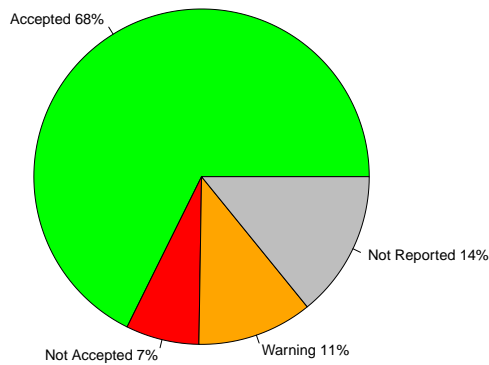


FIGURE 59. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

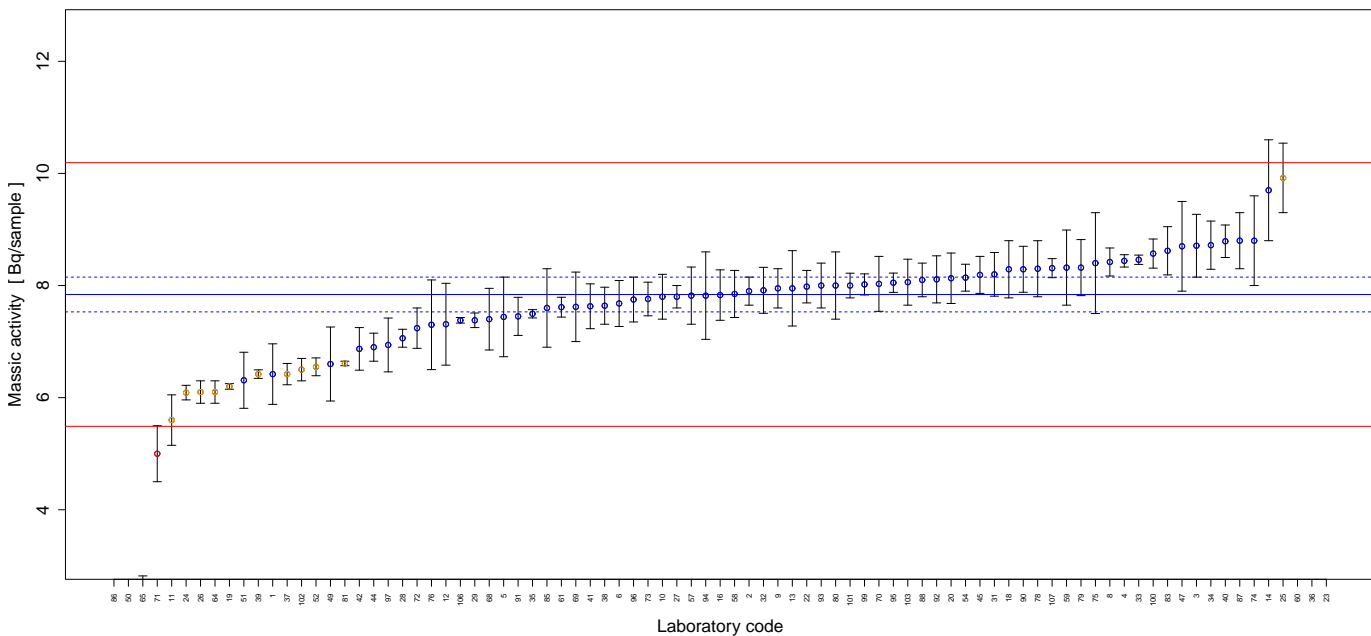


FIGURE 60. Reported results and evaluation parameters for Cs-134. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 62. Evaluation Results for Cs-134 in Sample 6, Rep. Value and Rep. Unc. in Bq/sample by gamma

Labcode	Reported value [Bq/sample ]	Reported uncertainty ( $k = 1$ ) [Bq/sample ]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
1	6.42	0.54	-18.11	9.29	A	A	A
2	7.9	0.25	0.77	5.06	A	A	A
3	8.71	0.56	11.10	7.55	A	A	A
4	8.44	0.11	7.65	4.16	A	A	A
5	7.44	0.71	-5.10	10.33	A	A	A
6	7.68	0.41	-2.04	6.64	A	A	A
8	8.42	0.25	7.40	4.94	A	A	A
9	7.95	0.35	1.40	5.92	A	A	A
10	7.8	0.4	-0.51	6.48	A	A	A
11	5.6	0.45	-28.57	8.96	A	N	W
12	7.31	0.73	-6.76	10.74	A	A	A
13	7.95	0.672	1.40	9.33	A	A	A
14	9.7	0.9	23.72	10.09	A	A	A
16	7.83	0.45	-0.13	6.98	A	A	A
18	8.29	0.51	5.74	7.31	A	A	A
19	6.2	0.05	-20.92	4.04	A	N	W
20	8.13	0.45	3.70	6.80	A	A	A
22	7.98	0.29	1.79	5.37	A	A	A
23	907.28	86.2	11472.45	10.29	N	N	N
24	6.09	0.13	-22.32	4.49	A	N	W
25	9.92	0.62	26.53	7.40	A	N	W
26	6.1	0.2	-22.19	5.14	A	N	W
27	7.8	0.2	-0.51	4.71	A	A	A
28	7.06	0.16	-9.95	4.56	A	A	A
29	7.38	0.13	-5.87	4.33	A	A	A
31	8.20	0.39	4.59	6.19	A	A	A
32	7.915	0.410	0.96	6.52	A	A	A
33	8.46	0.083	7.91	4.07	A	A	A
34	8.72	0.43	11.22	6.32	A	A	A
35	7.4962	0.0742	-4.39	4.08	A	A	A
36	30	4	282.65	13.91	N	N	N
37	6.42	0.19	-18.11	4.94	A	N	W
38	7.64	0.33	-2.55	5.86	A	A	A
39	6.42	0.076	-18.11	4.13	A	N	W
40	8.79	0.29	12.12	5.15	A	A	A
41	7.63	0.40	-2.68	6.57	A	A	A
42	6.87	0.38	-12.37	6.80	A	A	A
44	6.9	0.25	-11.99	5.36	A	A	A
45	8.19	0.33	4.46	5.65	A	A	A
47	8.7	0.8	10.97	10.01	A	A	A
49	6.6	0.66	-15.82	10.75	A	A	A
50	0.461	0.021	-94.12	6.03	N	N	N
51	6.31	0.50	-19.52	8.86	A	A	A
52	6.55	0.159	-16.45	4.64	A	N	W
54	8.14	0.24	3.83	4.93	A	A	A
57	7.82	0.51	-0.26	7.63	A	A	A
58	7.85	0.42	0.13	6.65	A	A	A
59	8.32	0.67	6.12	8.97	A	A	A
60	19.8	1.7	152.55	9.45	N	N	N
61	7.614	0.177	-2.88	4.59	A	A	A
64	6.1	0.2	-22.19	5.14	A	N	W
65	2.61	0.21	-66.71	8.97	N	N	N
68	7.40	0.55	-5.61	8.42	A	A	A
69	7.62	0.62	-2.81	9.05	A	A	A
70	8.03	0.49	2.42	7.27	A	A	A
71	5.0	0.5	-36.22	10.75	N	N	N
72	7.24	0.36	-7.65	6.35	A	A	A
73	7.76	0.30	-1.02	5.53	A	A	A
74	8.8	0.8	12.24	9.91	A	A	A
75	8.4	0.9	7.14	11.42	A	A	A

TABLE 62. Evaluation Results for Cs-134 in Sample 6, Rep. Value and Rep. Unc. in Bq/sample by gamma

Labcode	Reported value [Bq/sample ]	Reported uncertainty ( $k = 1$ ) [Bq/sample ]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
76	7.3	0.8	-6.89	11.65	A	A	A
78	8.3	0.5	5.87	7.21	A	A	A
79	8.32	0.5	6.12	7.19	A	A	A
80	8.0	0.60	2.04	8.48	A	A	A
81	6.61	0.04	-15.69	4.00	A	N	W
83	8.62	0.43	9.95	6.37	A	A	A
85	7.6	0.7	-3.06	10.02	A	A	A
86	0.372	0.017	-95.26	6.04	N	N	N
87	8.8	0.5	12.24	6.92	A	A	A
88	8.1	0.3	3.32	5.42	A	A	A
90	8.29	0.41	5.74	6.33	A	A	A
91	7.45	0.34	-4.97	6.04	A	A	A
92	8.11	0.42	3.44	6.52	A	A	A
93	8.0	0.4	2.04	6.37	A	A	A
94	7.82	0.78	-0.26	10.73	A	A	A
95	8.05	0.172	2.68	4.49	A	A	A
96	7.75	0.40	-1.15	6.50	A	A	A
97	6.94	0.48	-11.48	7.97	A	A	A
99	8.02	0.188	2.30	4.60	A	A	A
100	8.57	0.26	9.31	4.98	A	A	A
101	8.00	0.22	2.04	4.82	A	A	A
102	6.5	0.2	-17.09	5.01	A	N	W
103	8.06	0.41	2.81	6.44	A	A	A
106	7.38	0.05	-5.87	4.01	A	A	A
107	8.31	0.17	5.99	4.45	A	A	A

# Reported Results for Sr-90 Determination in Sample 7

TABLE 63. Target values

Parameter	Value
Activity per sample [ Bq/sample ]	4.52
Uncertainty [ Bq/sample ]	0.22
Maximum Acceptable Relative Bias, [%]	30

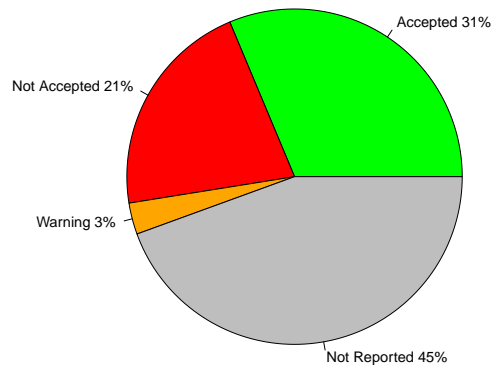


FIGURE 61. Percentage of Accepted vs. Warnings vs. Not Accepted vs. Not Reported results

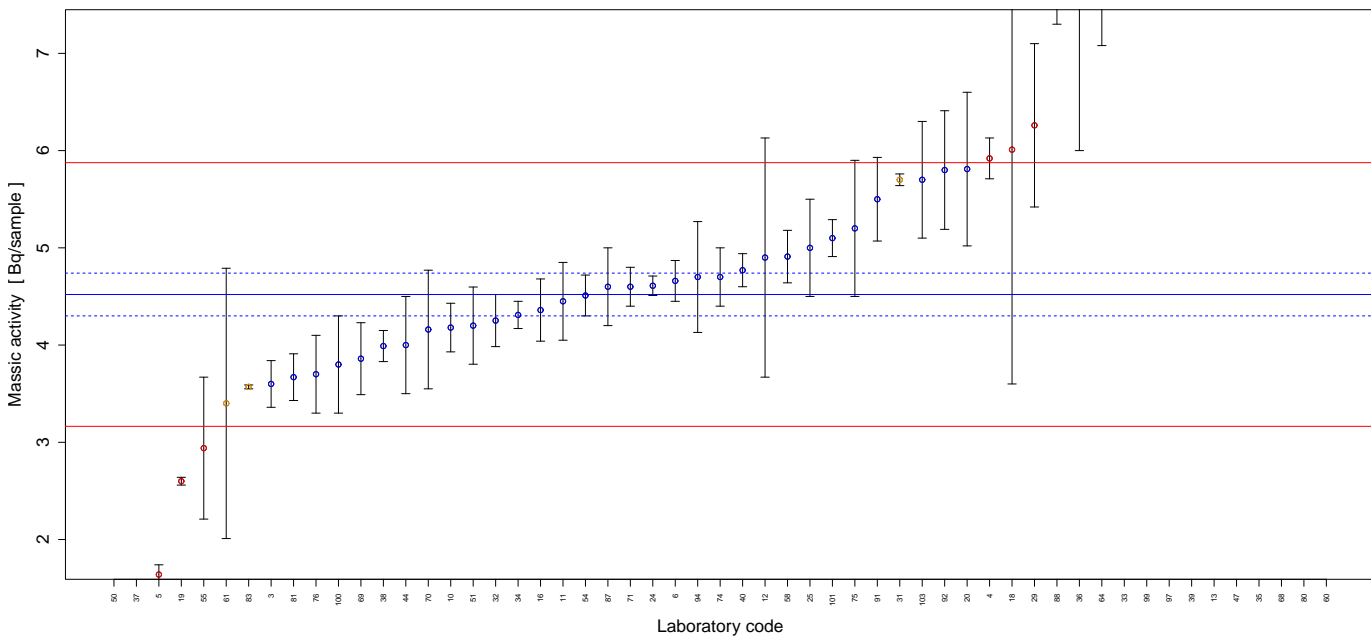


FIGURE 62. Reported results and evaluation parameters for Sr-90. Blue points represent accepted scores, whereas yellow and red represent warning and not accepted scores respectively.

TABLE 64. Evaluation Results for Sr-90 in Sample 7, Rep. Value and Rep. Unc. in Bq/sample by beta

Labcode	Reported value [Bq/sample ]	Reported uncertainty ( $k = 1$ ) [Bq/sample ]	Relative bias [%]	P-Test [%]	Trueness evaluation	Precision evaluation	Final Score
3	3.60	0.24	-20.35	8.25	A	A	A
4	5.92	0.21	30.97	6.02	N	N	N
5	1.64	0.10	-63.72	7.80	N	N	N
6	4.66	0.21	3.10	6.63	A	A	A
10	4.18	0.25	-7.52	7.71	A	A	A
11	4.45	0.40	-1.55	10.22	A	A	A
12	4.90	1.23	8.41	25.57	A	A	A
13	9.37	0.53	107.30	7.46	N	N	N
16	4.36	0.32	-3.54	8.81	A	A	A
18	6.01	2.41	32.96	40.39	N	N	N
19	2.6	0.04	-42.48	5.10	N	N	N
20	5.81	0.79	28.54	14.44	A	A	A
24	4.61	0.10	1.99	5.33	A	A	A
25	5.0	0.5	10.62	11.12	A	A	A
29	6.26	0.84	38.50	14.27	N	N	N
31	5.70	0.06	26.11	4.98	A	N	W
32	4.252	0.268	-5.93	7.96	A	A	A
33	8.18	0.32	80.97	6.24	N	N	N
34	4.31	0.14	-4.65	5.85	A	A	A
35	10.19	0.12	125.44	5.01	N	N	N
36	7.9	1.9	74.78	24.54	N	N	N
37	1.23	0.04	-72.79	5.85	N	N	N
38	3.99	0.16	-11.73	6.31	A	A	A
39	9.19	0.03	103.32	4.88	N	N	N
40	4.77	0.17	5.53	6.03	A	A	A
44	4.0	0.5	-11.50	13.41	A	A	A
47	9.55	0.1	111.28	4.98	N	N	N
50	0.461	0.021	-89.80	6.67	N	N	N
51	4.200	0.397	-7.08	10.63	A	A	A
54	4.51	0.21	-0.22	6.74	A	A	A
55	2.94	0.73	-34.96	25.30	N	A	N
58	4.91	0.27	8.63	7.34	A	A	A
60	843	5	18550.44	4.90	N	N	N
61	3.40	1.39	-24.78	41.17	A	N	W
64	8.03	0.95	77.65	12.79	N	N	N
68	10.5	0.39	132.30	6.12	N	N	N
69	3.86	0.37	-14.60	10.75	A	A	A
70	4.16	0.61	-7.96	15.45	A	A	A
71	4.6	0.2	1.77	6.53	A	A	A
74	4.7	0.3	3.98	8.03	A	A	A
75	5.2	0.7	15.04	14.31	A	A	A
76	3.7	0.4	-18.14	11.86	A	A	A
80	570	24	12510.62	6.44	N	N	N
81	3.67	0.24	-18.81	8.15	A	A	A
83	3.57	0.02	-21.02	4.90	A	N	W
87	4.6	0.4	1.77	9.97	A	A	A
88	7.7	0.4	70.35	7.12	N	N	N
91	5.5	0.43	21.68	9.21	A	A	A
92	5.80	0.61	28.32	11.59	A	A	A
94	4.70	0.57	3.98	13.07	A	A	A
97	8.7	0.6	92.48	8.44	N	N	N
99	8.62	0.16	90.71	5.21	N	N	N
100	3.80	0.50	-15.93	14.03	A	A	A
101	5.10	0.19	12.83	6.13	A	A	A
103	5.7	0.6	26.11	11.60	A	A	A

### 3.2 Display of intercomparison values

#### Reported Results for gross alpha Determination in Sample 1

TABLE 65. Target values

Parameter	Value
Robust Mean, Bq/kg	27.8
Robust SD, Bq/kg	6.4
N	240

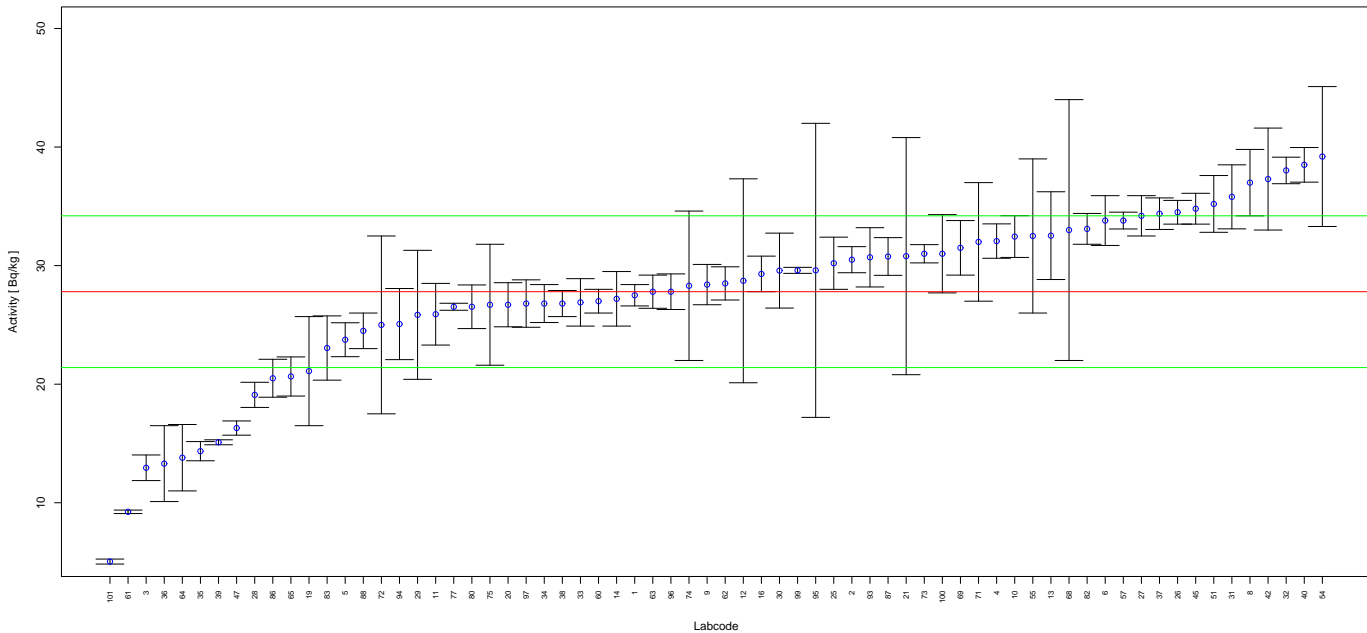


FIGURE 63. Reported results and evaluation parameters for gross alpha in Sample 1.

TABLE 66. IC Evaluation Results for gross alpha in Sample 1, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
1	27.5	0.9	0.05	A
2	30.5	1.1	0.42	A
3	12.95	1.08	2.32	W
4	32.07	1.45	0.67	A
5	23.75	1.43	0.63	A
6	33.8	2.1	0.94	A
8	37.0	2.8	1.44	A
9	28.4	1.7	0.09	A
10	32.45	1.76	0.73	A
11	25.9	2.6	0.30	A
12	28.72	8.60	0.14	A
13	32.528	3.701	0.74	A
14	27.2	2.3	0.09	A
16	29.3	1.5	0.23	A
19	21.1	4.6	1.05	A
20	26.7	1.86	0.17	A
21	30.8	10	0.47	A
25	30.2	2.2	0.37	A
26	34.5	1	1.05	A
27	34.2	1.7	1.00	A
28	19.1	1.06	1.36	A
29	25.85	5.44	0.30	A
30	29.58	3.16	0.28	A
31	35.8	2.7	1.25	A

TABLE 66. IC Evaluation Results for gross alpha in Sample 1, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
32	38.027	1.119	1.60	A
33	26.9	2.0	0.14	A
34	26.8	1.6	0.16	A
35	14.35	0.81	2.10	W
36	13.3	3.2	2.27	W
37	34.38	1.33	1.03	A
38	26.8	1.1	0.16	A
39	15.10	0.21	1.98	A
40	38.5	1.46	1.67	A
42	37.3	4.3	1.48	A
45	34.8	1.3	1.09	A
47	16.3	0.6	1.80	A
51	35.204	2.394	1.16	A
54	39.2	5.9	1.78	A
55	32.5	6.5	0.73	A
57	33.80	0.71	0.94	A
60	27	1	0.13	A
61	9.235	0.146	2.90	W
62	28.5	1.4	0.11	A
63	27.8	1.4	0.00	A
64	13.8	2.8	2.19	W
65	20.65	1.65	1.12	A
68	33	11	0.81	A
69	31.5	2.3	0.58	A
71	32.0	5.0	0.66	A
72	25.0	7.5	0.44	A
73	31.0	0.77	0.50	A
74	28.3	6.3	0.08	A
75	26.7	5.1	0.17	A
77	26.53	0.295	0.20	A
80	26.53	1.84	0.20	A
82	33.1	1.3	0.83	A
83	23.05	2.71	0.74	A
86	20.5	1.6	1.14	A
87	30.77	1.59	0.46	A
88	24.5	1.5	0.52	A
93	30.7	2.5	0.45	A
94	25.07	3.00	0.43	A
95	29.6	12.4	0.28	A
96	27.8	1.5	0.00	A
97	26.8	2.0	0.16	A
99	29.6	0.254	0.28	A
100	31.0	3.3	0.50	A
101	5.04	0.21	3.56	N



# Reported Results for gross beta Determination in Sample 1

TABLE 67. Target values

Parameter	Value
Robust Mean, Bq/kg	17.3
Robust SD, Bq/kg	5.8
N	240

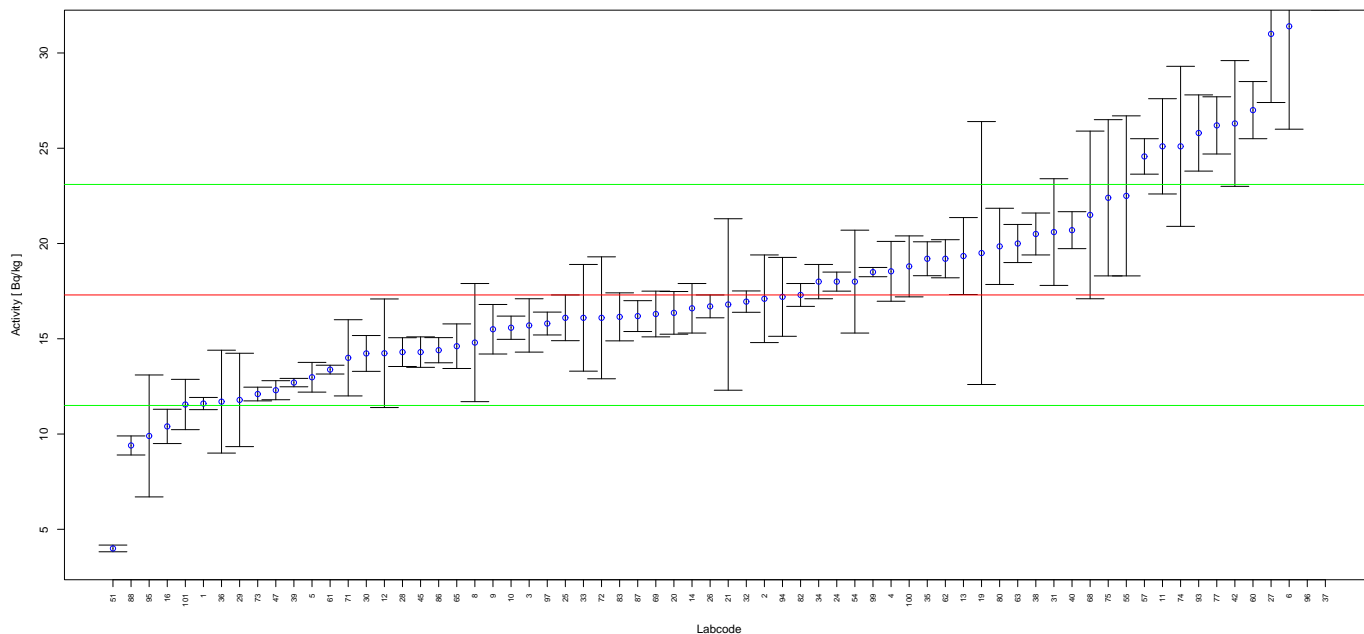


FIGURE 64. Reported results and evaluation parameters for gross beta in Sample 1.

TABLE 68. IC Evaluation Results for gross beta in Sample 1, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
1	11.6	0.32	0.98	A
2	17.1	2.3	0.03	A
3	15.7	1.4	0.28	A
4	18.54	1.57	0.21	A
5	12.98	0.78	0.74	A
6	31.4	5.4	2.43	W
8	14.8	3.1	0.43	A
9	15.5	1.3	0.31	A
10	15.58	0.61	0.30	A
11	25.1	2.5	1.34	A
12	14.24	2.85	0.53	A
13	19.342	2.019	0.35	A
14	16.6	1.3	0.12	A
16	10.4	0.9	1.19	A
19	19.5	6.9	0.38	A
20	16.36	1.12	0.16	A
21	16.8	4.5	0.09	A
24	18.0	0.5	0.12	A
25	16.1	1.2	0.21	A
26	16.7	0.6	0.10	A
27	31.0	3.6	2.36	W
28	14.3	0.755	0.52	A
29	11.79	2.45	0.95	A
30	14.23	0.94	0.53	A
31	20.6	2.8	0.57	A

TABLE 68. IC Evaluation Results for gross beta in Sample 1, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
32	16.95	0.56	0.06	A
33	16.1	2.8	0.21	A
34	18.0	0.9	0.12	A
35	19.20	0.89	0.33	A
36	11.7	2.7	0.97	A
37	43.56	11.3	4.53	N
38	20.5	1.1	0.55	A
39	12.70	0.22	0.79	A
40	20.7	0.97	0.59	A
42	26.3	3.3	1.55	A
45	14.30	0.80	0.52	A
47	12.3	0.5	0.86	A
51	3.996	0.176	2.29	W
54	18.0	2.7	0.12	A
55	22.5	4.2	0.90	A
57	24.57	0.93	1.25	A
60	27	1.5	1.67	A
61	13.381	0.231	0.68	A
62	19.2	1.0	0.33	A
63	20.0	1.0	0.47	A
65	14.61	1.17	0.46	A
68	21.5	4.4	0.72	A
69	16.3	1.2	0.17	A
71	14.0	2.0	0.57	A
72	16.1	3.2	0.21	A
73	12.1	0.36	0.90	A
74	25.1	4.2	1.34	A
75	22.4	4.1	0.88	A
77	26.199	1.501	1.53	A
80	19.85	2.00	0.44	A
82	17.3	0.6	0.00	A
83	16.15	1.26	0.20	A
86	14.4	0.66	0.50	A
87	16.19	0.81	0.19	A
88	9.4	0.5	1.36	A
93	25.8	2.0	1.47	A
94	17.20	2.07	0.02	A
95	9.9	3.2	1.28	A
96	41.5	2.5	4.17	N
97	15.8	0.6	0.26	A
99	18.5	0.243	0.21	A
100	18.8	1.6	0.26	A
101	11.55	1.32	0.99	A

## Reported Results for gross alpha Determination in Sample 2

TABLE 69. Target values

Parameter	Value
Robust Mean, Bq/kg	13.2
Robust SD, Bq/kg	6.1
N	226

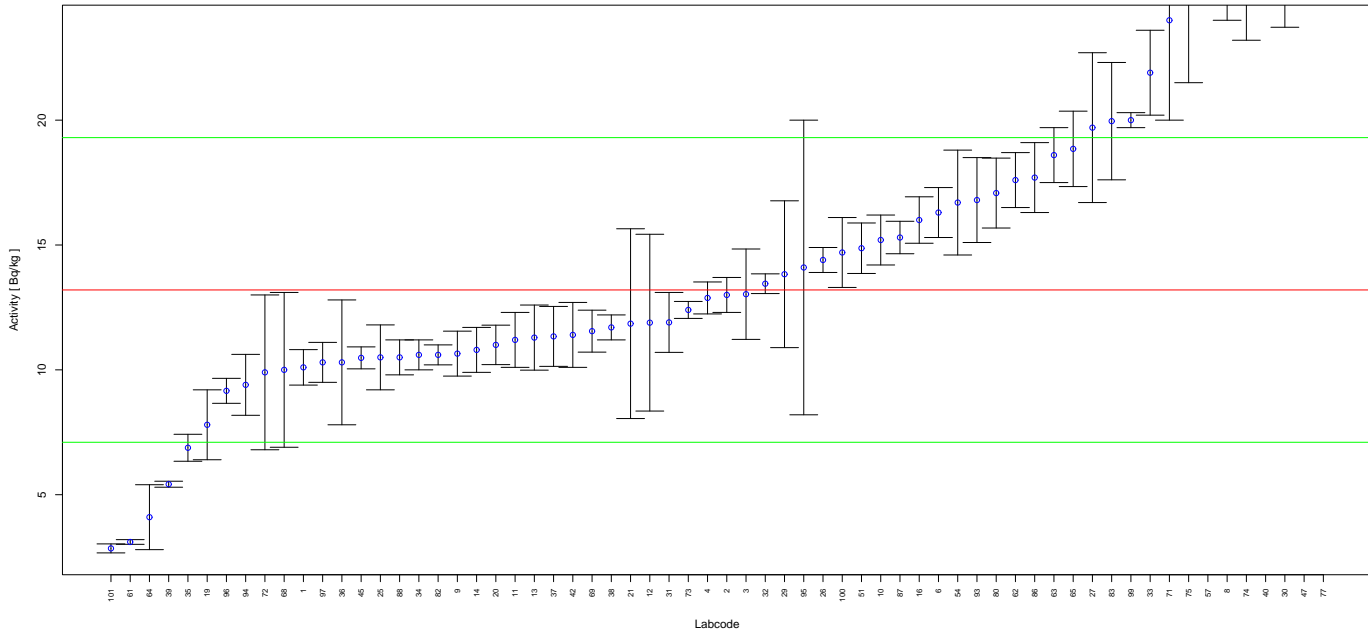


FIGURE 65. Reported results and evaluation parameters for gross alpha in Sample 2.

TABLE 70. IC Evaluation Results for gross alpha in Sample 2, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
1	10.1	0.71	0.51	A
2	13	0.7	0.03	A
3	13.03	1.81	0.03	A
4	12.88	0.64	0.05	A
6	16.3	1.0	0.51	A
8	26.9	2.9	2.25	W
9	10.65	0.90	0.42	A
10	15.20	1.00	0.33	A
11	11.2	1.1	0.33	A
12	11.89	3.54	0.21	A
13	11.292	1.304	0.31	A
14	10.8	0.9	0.39	A
16	16	0.93	0.46	A
19	7.8	1.4	0.89	A
20	11.0	0.79	0.36	A
21	11.85	3.8	0.22	A
25	10.5	1.3	0.44	A
26	14.4	0.5	0.20	A
27	19.7	3.0	1.07	A
29	13.83	2.94	0.10	A
30	28.57	4.85	2.52	W
31	11.9	1.2	0.21	A
32	13.45	0.395	0.04	A
33	21.9	1.7	1.43	A
34	10.6	0.6	0.43	A

TABLE 70. IC Evaluation Results for gross alpha in Sample 2, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
35	6.88	0.54	1.04	A
36	10.3	2.5	0.48	A
37	11.34	1.2	0.30	A
38	11.7	0.5	0.25	A
39	5.42	0.12	1.28	A
40	27.8	1.15	2.39	W
42	11.4	1.3	0.30	A
45	10.48	0.44	0.45	A
47	29.4	0.9	2.66	W
51	14.871	1.011	0.27	A
54	16.7	2.1	0.57	A
57	26.76	0.57	2.22	W
61	3.107	0.094	1.65	A
62	17.6	1.1	0.72	A
63	18.6	1.1	0.89	A
64	4.1	1.3	1.49	A
65	18.85	1.51	0.93	A
68	10.0	3.1	0.52	A
69	11.55	0.84	0.27	A
71	24.0	4.0	1.77	A
72	9.9	3.1	0.54	A
73	12.4	0.34	0.13	A
74	27.3	4.1	2.31	W
75	26.2	4.7	2.13	W
77	33.591	0.438	3.34	N
80	17.08	1.40	0.64	A
82	10.6	0.4	0.43	A
83	19.96	2.35	1.11	A
86	17.7	1.4	0.74	A
87	15.30	0.65	0.34	A
88	10.5	0.7	0.44	A
93	16.8	1.7	0.59	A
94	9.40	1.22	0.62	A
95	14.1	5.9	0.15	A
96	9.16	0.50	0.66	A
97	10.3	0.8	0.48	A
99	20.0	0.30	1.11	A
100	14.7	1.4	0.25	A
101	2.85	0.18	1.70	A

## Reported Results for gross beta Determination in Sample 2

TABLE 71. Target values

Parameter	Value
Robust Mean, Bq/kg	135
Robust SD, Bq/kg	42
N	231

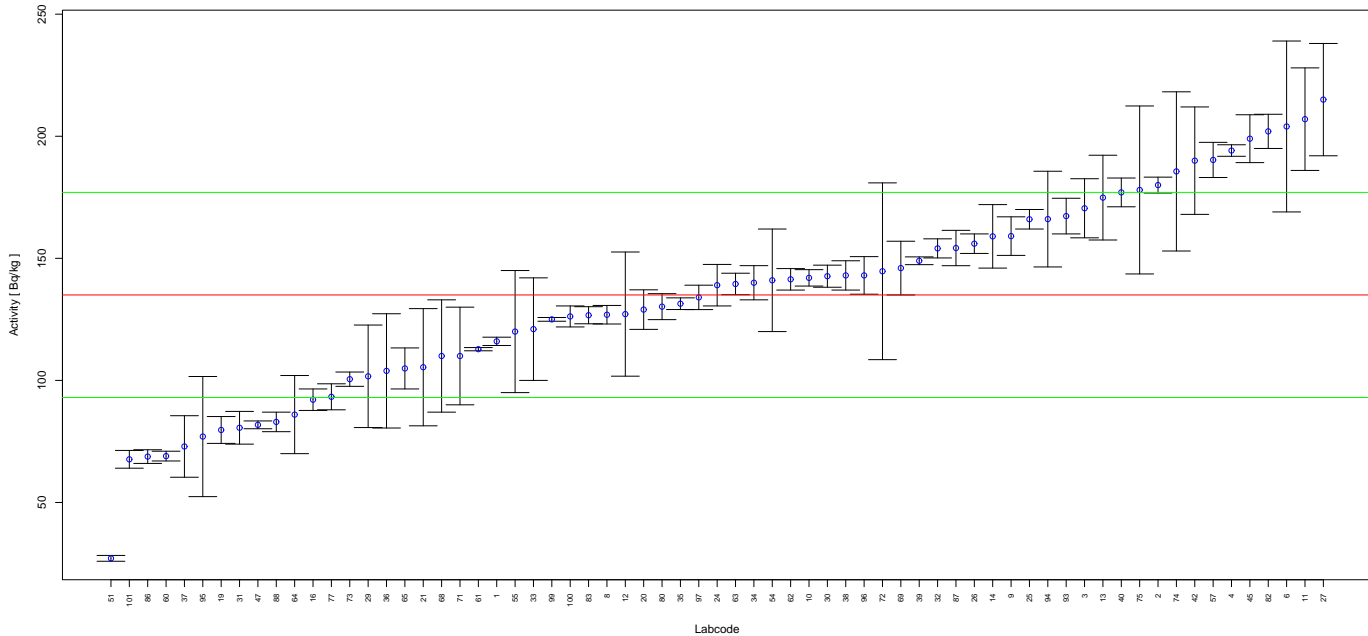


FIGURE 66. Reported results and evaluation parameters for gross beta in Sample 2.

TABLE 72. IC Evaluation Results for gross beta in Sample 2, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
1	116	1.7	0.45	A
2	180	3.25	1.07	A
3	170.5	12.1	0.85	A
4	194.15	2.36	1.41	A
6	204	35	1.64	A
8	126.9	3.8	0.19	A
9	159.1	7.9	0.57	A
10	142.0	3.360	0.17	A
11	207	21	1.71	A
12	127.16	25.43	0.19	A
13	174.865	17.3585	0.95	A
14	159	13	0.57	A
16	92.1	4.4	1.02	A
19	79.7	5.5	1.32	A
20	129	8.1	0.14	A
21	105.4	24	0.70	A
24	139	8.5	0.10	A
25	166	4	0.74	A
26	156.0	4.0	0.50	A
27	215	23	1.90	A
29	101.68	20.99	0.79	A
30	142.68	4.52	0.18	A
31	80.6	6.7	1.30	A
32	154.07	3.91	0.45	A
33	121	21	0.33	A

TABLE 72. IC Evaluation Results for gross beta in Sample 2, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
34	140	7	0.12	A
35	131.42	2.39	0.09	A
36	103.9	23.4	0.74	A
37	72.94	12.6	1.48	A
38	143	6	0.19	A
39	149.0	1.59	0.33	A
40	177	5.89	1.00	A
42	190	22	1.31	A
45	199.0	9.8	1.52	A
47	81.8	1.6	1.27	A
51	27.120	1.193	2.57	W
54	141	21	0.14	A
55	120	25	0.36	A
57	190.3	7.2	1.32	A
60	69	2	1.57	A
61	112.79	0.66	0.53	A
62	141.4	4.4	0.15	A
63	139.5	4.4	0.11	A
64	86	16	1.17	A
65	104.9	8.4	0.72	A
68	110	23	0.60	A
69	146	11	0.26	A
71	110.0	20.0	0.60	A
72	144.7	36.2	0.23	A
73	100.5	2.93	0.82	A
74	185.6	32.6	1.20	A
75	178.0	34.4	1.02	A
77	93.285	5.324	0.99	A
80	130.21	5.32	0.11	A
82	202	7	1.60	A
83	126.69	3.50	0.20	A
86	68.8	2.8	1.58	A
87	154.22	7.24	0.46	A
88	83	4	1.24	A
93	167.3	7.3	0.77	A
94	166.07	19.60	0.74	A
95	77.0	24.6	1.38	A
96	143	7.7	0.19	A
97	134	5	0.02	A
99	125	0.77	0.24	A
100	126.2	4.3	0.21	A
101	67.68	3.64	1.60	A

## Reported Results for Th-232 Determination in Sample 4

TABLE 73. Target values

Parameter	Value
Target value [Bq/kg]	32.9
Uncertainty [Bq/kg]	2.0

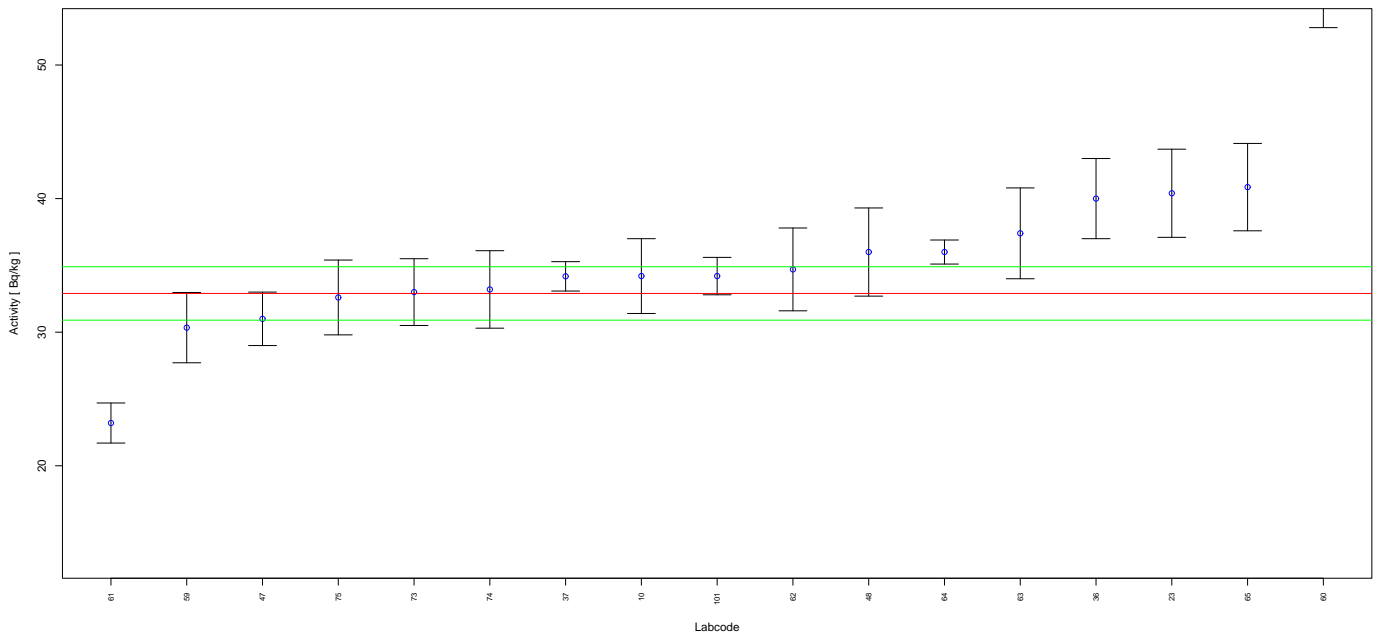


FIGURE 67. Reported results and evaluation parameters for Th-232 in Sample 4.

TABLE 74. IC Evaluation Results for Th-232 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
10	34.2	2.8	0.65	A
23	40.4	3.3	3.75	N
36	40	3	3.55	N
37	34.18	1.1	0.64	A
47	31	2	0.95	A
48	36.0	3.3	1.55	A
59	30.34	2.63	1.28	A
60	57.8	5	12.45	N
61	23.2	1.5	4.85	N
62	34.7	3.1	0.90	A
63	37.4	3.4	2.25	W
64	36	0.9	1.55	A
65	40.86	3.27	3.98	N
73	33.0	2.5	0.05	A
74	33.2	2.9	0.15	A
75	32.6	2.8	0.15	A
101	34.2	1.4	0.65	A

## Reported Results for U-238 Determination in Sample 4

TABLE 75. Target values

Parameter	Value
Target value [Bq/kg]	23.0
Uncertainty [Bq/kg]	1.5

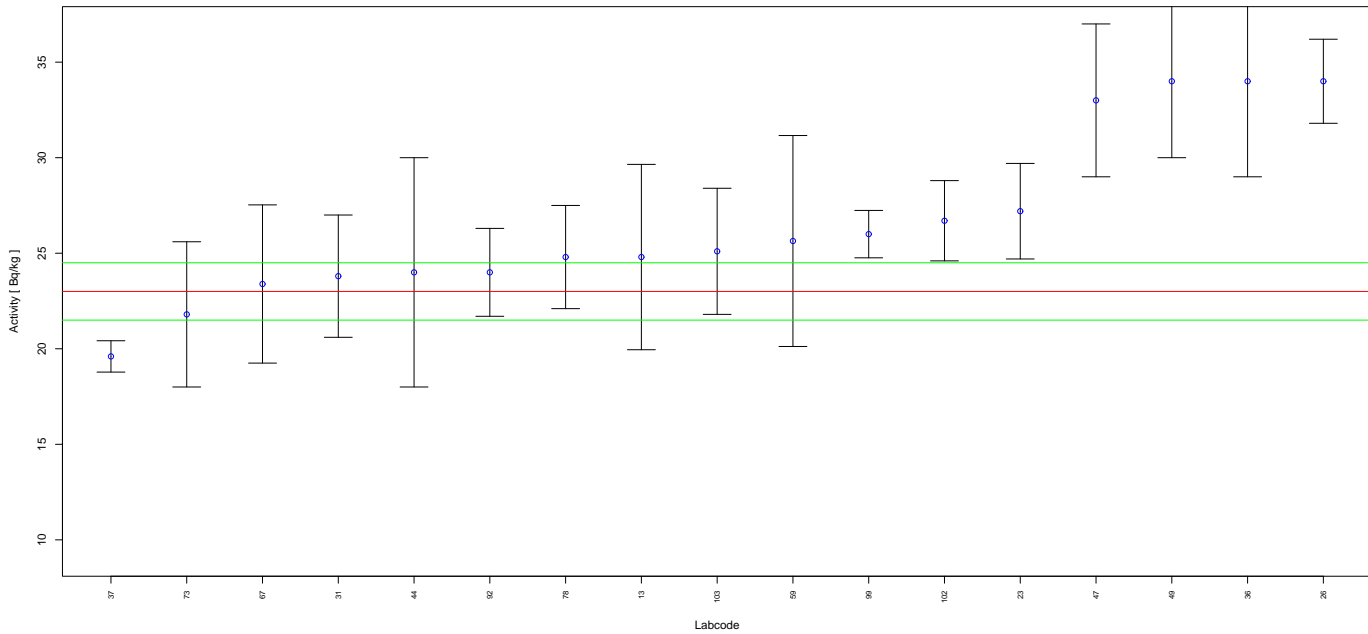


FIGURE 68. Reported results and evaluation parameters for U-238 in Sample 4.

TABLE 76. IC Evaluation Results for U-238 in Sample 4, Rep. Value and Rep. Unc. in Bq/kg

Labcode	Rep. Value	Rep. Unc.	Z-Score	Z-Score Evaluation
13	24.8	4.85	1.20	A
23	27.2	2.5	2.80	W
26	34.0	2.2	7.33	N
31	23.8	3.2	0.53	A
36	34	5	7.33	N
37	19.6	0.82	2.27	W
44	24	6	0.67	A
47	33	4	6.67	N
49	34	4	7.33	N
59	25.64	5.52	1.76	A
67	23.390	4.140	0.26	A
73	21.8	3.8	0.80	A
78	24.8	2.7	1.20	A
92	24.0	2.3	0.67	A
99	26.0	1.24	2.00	A
102	26.7	2.1	2.47	W
103	25.1	3.3	1.40	A



## 4 References

### References

- [1] International Organization for Standardization (ISO). (2010). Conformity assessment - General requirements for proficiency testing, ISO/IEC 17043:2010. Geneva: Switzerland.
- [2] International Organization for Standardization (ISO). (2022). Statistical methods for use in proficiency testing by interlaboratory comparison, ISO 13528:2022. Geneva: Switzerland.

## 5 Contributors to evaluation and report

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