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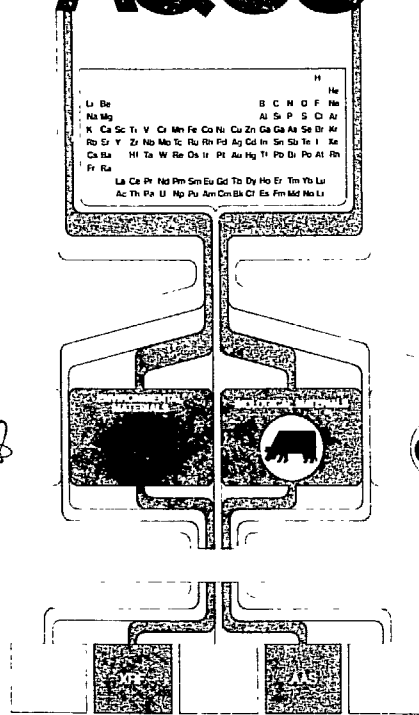
IAEA/AL/035

REPORT ON THE INTERCOMPARISON RUN

IAEA-156

RADIONUCLIDES IN CLOVER

AQCS



ANALYTICAL QUALITY CONTROL SERVICES

INTERNATIONAL ATOMIC ENERGY AGENCY, P.O. BOX 100, A-1400 VIENNA, AUSTRIA



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Intercomparison Study IAEA-156 on the Determination
of Radionuclides in Clover

by

V. Strachnov, V. Valkovic, R. Dekner

International Atomic Energy Agency
Agency's Laboratories
Analytical Quality Control Services

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Summary

This report contains the results of the intercomparison IAEA-156 on the determination of radionuclides in clover. Initially participants were requested to determine the levels of ^{134}Cs , ^{137}Cs , ^{40}K , ^{90}Sr and invited to provide data for other radionuclides. The participants included 46 laboratories located in 25 countries, and statistical evaluation of their data yield recommended values for these four radionuclides. Additional radionuclides reported were ^{210}Pb , ^{239}Pu and ^{125}Sb ; however, insufficient data exists to statistically determine recommended values for these radionuclides.

The radionuclides, their recommended values and confidence intervals are listed below:

Cs-134:	132.1 Bq/kg	(126.4 - 137.7)
Cs-137:	264 Bq/kg	(254 - 274)
K-40 :	657 Bq/kg	(637 - 676)
Sr-90 :	14.8 Bq/kg	(13.4 - 16.3)

Reference date: 1 August 1986

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1. INTRODUCTION

Shortly after the Chernobyl nuclear power plant accident, the IAEA started collecting many environmental samples for the AQCS programme in order for them to serve as material for intercomparison studies. One was a clover from Austria collected in 1986. It was anticipated that the concentrations of the radionuclides in this clover would be higher than the environmental levels usually found and, therefore, would constitute an important intercomparison sample.

2. SCOPE OF THE STUDY

Participating laboratories were to determine the following radionuclides: ^{40}K , ^{90}Sr , ^{134}Cs and ^{137}Cs . Data on other radionuclides were also invited. The analysts were requested to make at least three, but preferably six independent measurements for each radionuclide.

The results listed in the tables are from 46 laboratories in 25 countries. For this intercomparison, 44 laboratories determined ^{40}K , 22 determined ^{90}Sr , 44 determined ^{134}Cs and 44 determined ^{137}Cs .

Since only very limited data were received for other radionuclides, these have not been included in this report.

3. DESCRIPTION OF THE MATERIAL

The clover (1000 kg) was collected in 1986 during summer harvest from different farms, but the same field in Austria.

The air-dried bulk sample was milled to a grain size smaller than 0.3 mm and homogenized in an agricultural animal nutrition mixer. Aliquots of 250 g of the material were distributed to plastic bottles, sealed and sterilized by gamma ray irradiation of about 2.5×10^6 Gy using a ^{60}Co source.

The homogeneity of the material was tested by gamma spectrometry on each bottle to be shipped for this intercomparison study. Considering the results of ^{40}K and ^{137}Cs measurements, the count rates did not differ significantly (the variations fall within the statistical counting errors) and thus this material can be considered sufficiently homogeneous for these radionuclides for a sample size of greater or equal to 250 g.

4. EVALUATION OF RESULTS

The original data that were received from the participating laboratories were edited (converted to the same units and format) before entry typed into a computer data file. This data file was processed by a computer program especially written for evaluation of intercomparison results. Results which deviated significantly from the population were considered to be outliers and rejected if they failed either one of the following statistical tests at the significance level of $\alpha = 0.05$:

- (1) Dixon's;
- (2) Grubb's;
- (3) Coefficient of skewness; and
- (4) Coefficient of Kurtosis.

Additional information on acceptance criteria can be found in Reference [1].

4.1. Explanation of tables

4.1.1. Data tables

The laboratory mean values for a specific radionuclide for which at least two laboratory means were supplied are presented in Tables 1 to 9.

Lab. code No.: Each laboratory was assigned a code number, which is the same throughout the report. To ensure anonymity these code numbers do not correspond to the sequence of the laboratories in the list of participants given at the end of the report.

Method code: The analytical techniques employed by the participating laboratories are presented in the form of codes (a letter and number). The key to the different analytical techniques is given in Table A.

No. of determinations: The number of individual results for a given radionuclide reported by the participating laboratory.

Lab. mean: The arithmetic mean computed from all the individual results reported by the participating laboratory. An asterisk (*) after the lab. mean denotes that it was detected and rejected as an outlier. Outliers were not used to compute the overall mean for this radionuclide.

Lab. standard deviation: The absolute and relative standard deviations were calculated if at least three results were reported by the participating laboratory.

[1] R. Dybczynski, A. Tugsavul, O. Suschny, Analyst 103 (1978) 733

SUMMA	RADI	DETE	UNIT	NUMB	REPD	RESU	NUMB	ACCE	RESU	TOTA	LABO	RANG	LABO	PERC	LABO	OVER	LABO	STAN	DEVI	STAN	ERRD	CONE	THE	FOR
-------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----

4.1.2. Summary of results tables

The summary of the results for IAEA-156 is given in Table B. Most of the terms used in the summary table have already been defined. The standard error (S.E.) is defined as the standard deviation of the mean values divided by the square root of the number of laboratory means.

4.2. Description of figures

A figure was plotted for a radionuclide when at least five or more laboratory means were reported. The laboratory means are plotted in ascending order (Bq/kg) on the y-axis with their corresponding laboratory code noted along the x-axis.

The reported uncertainties or "error bars" (standard deviation of the laboratory mean) are also shown. The code above the error bar is the laboratory method code, while the value below the error bar is the number of individual determinations. If a "less than" value was reported, an arrow downwards was employed rather than the numerical value. The mean value and the 95% confidence interval for all the accepted laboratory means are listed in the figure caption when appropriate. Finally, the solid points indicate those values that (filled in circles) were detected and rejected as outliers for the calculation of the overall laboratory mean.

4.3. Criteria for recommended values and confidence intervals

Please note that these criteria are especially designed for this report and do not apply for general consideration.

The mean value of the overall data, excluding outliers, were considered as the recommended values when they satisfy, the following criteria:

- (1) More than 15 laboratory means were available;
- (2) The percentage of outliers was less than 20%; and
- (3) The relative uncertainty of the overall mean does not exceed $\pm 10\%$ for activity concentrations equal to or higher than 100 Bq/kg and $\pm 20\%$ for activity concentrations lower than 100 Bq/kg.

5. RESULTS AND CONCLUSION

The results obtained from this intercomparison are detailed in Tables 1-9. In view of the level of radionuclide concentration in this material, the dispersion of results supplied can be accepted as satisfactory. Although data on seven radionuclides were reported, only four radionuclides (^{134}Cs , ^{137}Cs , ^{40}K , ^{90}Sr) are assigned recommended values and confidence intervals according to the previously described criteria.

The other radionuclides (^{210}Pb , ^{239}Pu , ^{125}Sb) are not assigned recommended values as they fail to meet one or more of the criteria listed above.

The recommended values for the activity concentration (Bq/kg) of ^{134}Cs , ^{137}Cs , ^{40}K and ^{90}Sr in IAEA-156 are summarized in Table C.

6. ACKNOWLEDGEMENTS

The authors of this report wish to thank Ms. Katalin Lewis-Goettler for processing the results and to the Oesterreichisches Forschungszentrum for the ^{60}Co irradiation of these intercomparison samples. Finally, we would also like to thank all the participating laboratories listed at the end of this report for their co-operation in providing the data for this intercomparison.

Table A

Method Codes in the IAEA-156 Intercomparison

Method code	Method
B1	Beta counting following radiochemical separation
G2	Direct high-resolution gamma spectrometry without sample pre-treatment, except for drying
G3	High-resolution gamma spectrometry with sample pre-treatment
G4	Direct low-resolution gamma spectrometry without sample pre-treatment, except for drying
K-2	Alpha spectrometry following radiochemical separation
S-1	Spectro-photometric determination of potassium and calculation of ^{40}K content

TABLE NO. 1 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR CS-134 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.		ACCEPTANCE CODE **
					ABS	REL %	
1	2	G2	6	104.58	2.40	2.3	-9.1
2	3	G2	3	108.00	1.73	1.6	-10.6
3	4	G2	6	122.33	8.71	7.1	-0.5
4	5	G2	3	141.00	7.00	5.0	0.5
5	6A	G4	6	158.33	4.27	2.7	4.9
6	6B	G4	6	161.17	4.26	2.6	5.5
7	6C	G4	6	166.00	11.05	6.7	2.6
8	6D	G4	6	151.00	4.20	2.8	3.2
9	7	G2	6	78.93	4.24	5.4	-11.2
10	8	G2	6	147.50	6.95	4.7	1.4
11	9	G2	3	44.67*	1.53	3.4	-53.5
12	10	G2	6	124.67	3.50	2.8	-0.5
13	11	G2	2	140.00	2.83	2.0	0.8
14	12A	G2	6	138.83	13.03	9.4	0.1
15	12B	G2	6	135.47	16.06	11.9	OK
16	12C	G2	6	126.42	6.40	5.1	-0.0
17	12D	G2	6	122.43	7.10	5.8	-0.6
18	13	G2	3	128.33	9.50	7.4	OK
19	14	G2	5	124.80	3.90	3.1	-0.4
20	16	G2	6	116.50	6.98	6.0	-1.4
21	17	G2	3	133.00	5.00	3.8	OK
22	18	G2	6	154.50	3.62	2.3	4.6
23	19	G2	6	168.38	4.29	2.5	7.2
24	20	G2	4	141.50	6.35	4.5	0.6
25	21	G2	1	132.70			OK
26	22	G2	3	130.90	2.52	1.9	OK
27	23	G2	6	120.00	3.16	2.6	-2.0
28	24	G2	4	148.50	5.51	3.7	2.0
29	25	G2	6	124.33	2.34	1.9	-0.9
30	26	G2	6	106.83	10.57	9.9	-1.9
31	27	G2	4	116.50	4.36	3.7	-2.3
32	28	G2	6	126.00	7.18	5.7	-0.1
33	29	G2	6	154.83	2.14	1.4	8.0
34	30	G2	6	127.50	4.51	3.5	OK
35	31	G2	4	51.75*	7.14	13.8	-10.5
36	32A	G2	5	141.74	4.19	3.0	1.0
37	32B	G2	6	145.48	3.11	2.1	2.5
38	33	G4	6	173.33	26.95	15.5	1.3
39	34	G2	6	105.00	1.17	1.1	-18.3
40	36A	G2	4	148.25	7.85	5.3	1.3
41	36B	G2	4	143.25	8.06	5.6	0.7
42	37	G2	6	120.17	2.79	2.3	-2.2
43	38A	G2	6	145.68	3.74	2.6	2.1
44	38B	G2	6	134.63	11.10	8.2	OK
45	39	G2	6	129.83	4.49	3.5	OK
46	40	G2	3	120.67	13.05	10.8	-0.4
47	41	G2	6	112.17	3.43	3.1	-4.2
48	42	G2	6	114.00	9.72	8.5	-1.3
49	43	G4	5	48.70*	0.61	1.2	LO
50	44	G2	6	124.33	15.47	12.4	-0.1

TABLE NO. 1 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR CS-134 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.		ACCEPTANCE CODE **
					ABS	REL %	
51	45	G2	2	98.00	8.49	8.7	-3.4

** FOR CONFIDENCE INTERVAL 126.43 TO 137.67

RESULTS BELOW LIMIT OF DETECTION REPORTED

NO.	LAB. CODE NO.	METHOD CODE	LAB. LOD
1	46	G2	37.00

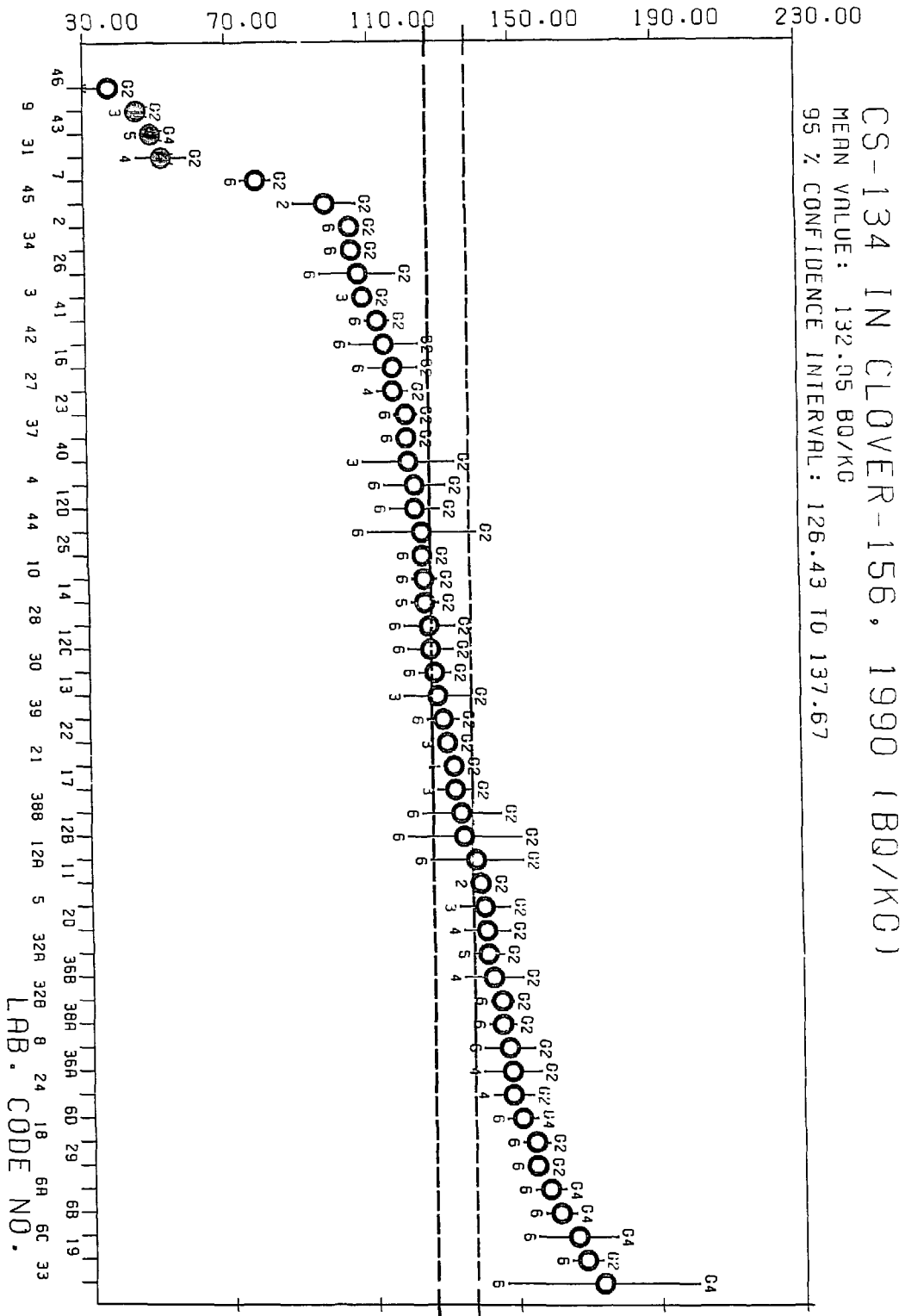


TABLE NO. 2 SIGNIFICANCE LEVEL 0.05

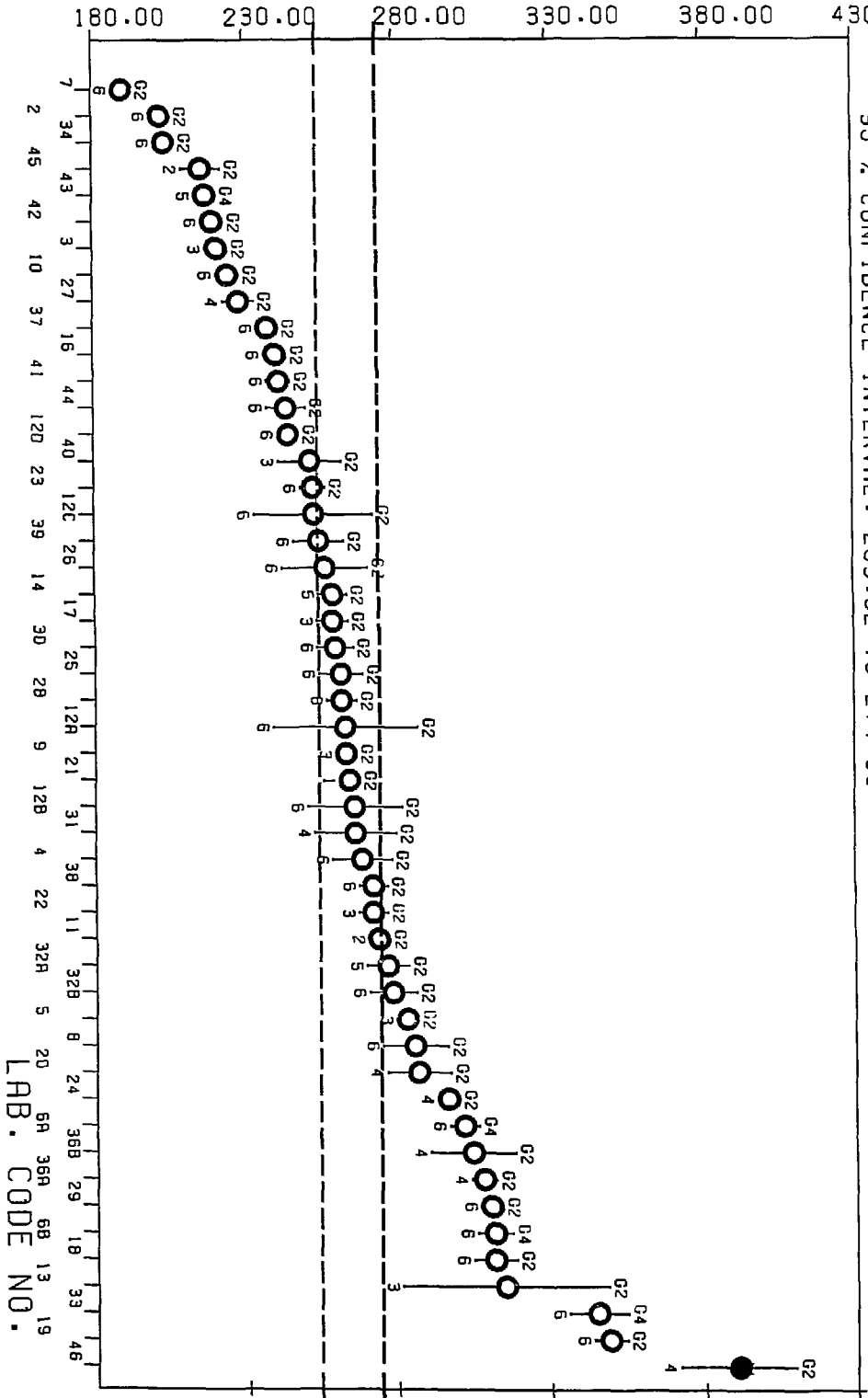
RESULTS OF INTERCOMPARISON FOR CS-137 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.		ACCEPTANCE CODE **
					ABS	REL %	
1	2	G2	6	203.02	1.49	0.7	-34.2
2	3	G2	3	221.33	2.08	0.9	-15.7
3	4	G2	6	268.67	9.97	3.7	OK
4	5	G2	3	283.33	3.51	1.2	2.5
5	6A	G4	6	301.83	4.71	1.6	5.8
6	6B	G4	6	311.50	5.68	1.8	6.5
7	7	G2	6	190.23	1.71	0.9	-37.2
8	8	G2	6	285.83	10.67	3.7	1.1
9	9	G2	3	263.33	2.89	1.1	OK
10	10	G2	6	224.83	3.76	1.7	-7.7
11	11	G2	2	274.00	2.83	1.0	OK
12	12A	G2	6	263.05	24.17	9.2	OK
13	12B	G2	6	266.10	15.86	6.0	OK
14	12C	G2	6	252.92	19.93	7.9	-0.1
15	12D	G2	6	244.35	3.55	1.5	-2.7
16	13	G2	3	315.00	33.78	10.7	1.2
17	14	G2	5	259.00	4.85	1.9	OK
18	16	G2	6	240.17	3.87	1.6	-3.6
19	17	G2	3	259.00	5.29	2.0	OK
20	18	G2	6	311.67	7.03	2.3	5.3
21	19	G2	6	349.37	5.42	1.6	13.8
22	20	G2	4	287.00	10.36	3.6	1.2
23	21	G2	1	264.40			OK
24	22	G2	3	272.20	4.79	1.8	OK
25	23	G2	6	252.50	4.18	1.7	-0.3
26	24	G2	4	296.75	1.50	0.5	14.9
27	25	G2	6	261.67	7.39	2.8	OK
28	26	G2	6	256.67	14.51	5.7	OK
29	27	G2	4	228.25	4.99	2.2	-5.1
30	28	G2	6	261.83	5.00	1.9	OK
31	29	G2	6	310.50	2.66	0.9	13.6
32	30	G2	6	259.67	6.12	2.4	OK
33	31	G2	4	266.25	13.72	5.2	OK
34	32A	G2	5	276.94	6.96	2.5	0.4
35	32B	G2	6	278.57	7.80	2.8	0.5
36	33	G4	6	345.50	9.67	2.8	7.4
37	34	G2	6	204.35	0.59	0.3	-84.2
38	36A	G2	4	308.00	4.08	1.3	8.2
39	36B	G2	4	304.50	13.77	4.5	2.2
40	37	G2	6	237.67	1.97	0.8	-8.3
41	38	G2	6	272.17	4.73	1.7	OK
42	39	G2	6	254.50	8.53	3.4	OK
43	40	G2	3	251.67	10.69	4.2	-0.2
44	41	G2	6	241.17	3.97	1.6	-3.2
45	42	G2	6	220.17	3.43	1.6	-9.8
46	43	G4	5	217.80	2.77	1.3	-13.0
47	44	G2	6	243.67	6.56	2.7	-1.6
48	45	G2	2	216.50	6.36	2.9	-5.9
49	46	G2	4	390.87*	18.89	4.8	6.2

** for confidence interval 253.92 to 274.38

CS-137 IN CLOVER-156, 1990 (BQ/KG)
MEAN VALUE: 264.15 BQ/KG
95 % CONFIDENCE INTERVAL: 253.92 TO 274.38



LAB. CODE NO.

TABLE NO. 3 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR K-40 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.		ACCEPTANCE CODE **
					ABS	REL %	
1	2	G2	6	335.48*	5.83	1.7	-51.7
2	3	G2	3	570.00	10.00	1.8	-6.7
3	4	G2	6	502.83	58.39	11.6	-2.3
4	5	G2	3	705.33	20.60	2.9	1.4
5	6A	G4	6	102.50*	3.67	3.6	LO
6	6B	G4	6	93.50*	9.89	10.6	-54.9
7	7	G2	6	603.65	11.96	2.0	-2.8
8	8	G2	6	779.50	72.41	9.3	1.4
9	9	G2	3	629.67	35.92	5.7	-0.2
10	10	G2	6	576.67	24.22	4.2	-2.5
11	11	G2	2	610.00	29.70	4.9	-0.9
12	12A	G2	6	738.17	143.36	19.4	0.4
13	12B	G2	6	639.17	102.33	16.0	OK
14	12C	G2	6	622.83	65.35	10.5	-0.2
15	12D	G2	6	639.08	38.83	6.1	OK
16	13	G2	3	701.67	17.62	2.5	1.4
17	14	G2	5	664.00	27.82	4.2	OK
18	16	G2	6	650.17	26.00	4.0	OK
19	17	G2	3	669.00	3.46	0.5	OK
20	18	G2	6	734.33	7.45	1.0	7.8
21	19	G2	6	1073.00*	79.10	7.4	5.0
22	20	G2	4	639.00	109.86	17.2	OK
23	22	G2	3	718.33	10.97	1.5	3.8
24	23	G2	6	606.67	12.11	2.0	-2.5
25	24	G2	4	758.50	17.97	2.4	4.6
26	25	G2	6	605.33	30.04	5.0	-1.1
27	26	G2	4	678.75	47.42	7.0	0.1
28	27	G2	4	580.25	26.50	4.6	-2.1
29	28	G2	5	672.00	28.73	4.3	OK
30	29	G2	6	763.33	13.40	1.8	6.5
31	30	G2	6	651.33	18.97	2.9	OK
32	31	G2	4	643.50	38.65	6.0	OK
33	32A	G2	5	674.40	22.98	3.4	OK
34	32B	G2	5	712.88	52.76	7.4	0.7
35	34	G2	6	335.52*	2.69	0.8	LO
36	36A	G2	4	701.25	37.39	5.3	0.7
37	36B	G2	4	679.25	70.01	10.3	0.0
38	37	G2	6	763.00	31.77	4.2	2.7
39	38	G2	6	604.50	12.08	2.0	-2.7
40	39	G2	6	680.33	29.91	4.4	0.1
41	40	G2	3	632.33	16.56	2.6	-0.3
42	41	G2	6	665.50	23.96	3.6	OK
43	42	G2	6	566.17	18.36	3.2	-3.9
44	43	G4	5	616.60	16.15	2.6	-1.3
45	44	G2	6	616.33	101.57	16.5	-0.2
46	45	G2	1	440.00*			LO
47	46	G2	4	4158.05*	1764.18	42.4	2.0

** FOR CONFIDENCE INTERVAL 636.94 TO 676.34

K-40 IN CLOVER-156, 1990 (BQ/KG)

MEAN VALUE: 656.64 BQ/KG
 95 % CONFIDENCE INTERVAL: 636.94 TO 676.34

Data not shown on the graph

Lab.Code No.	Meth.Code No.	Lab.Mean
19	G-2	1073
46	G-2	4158.05

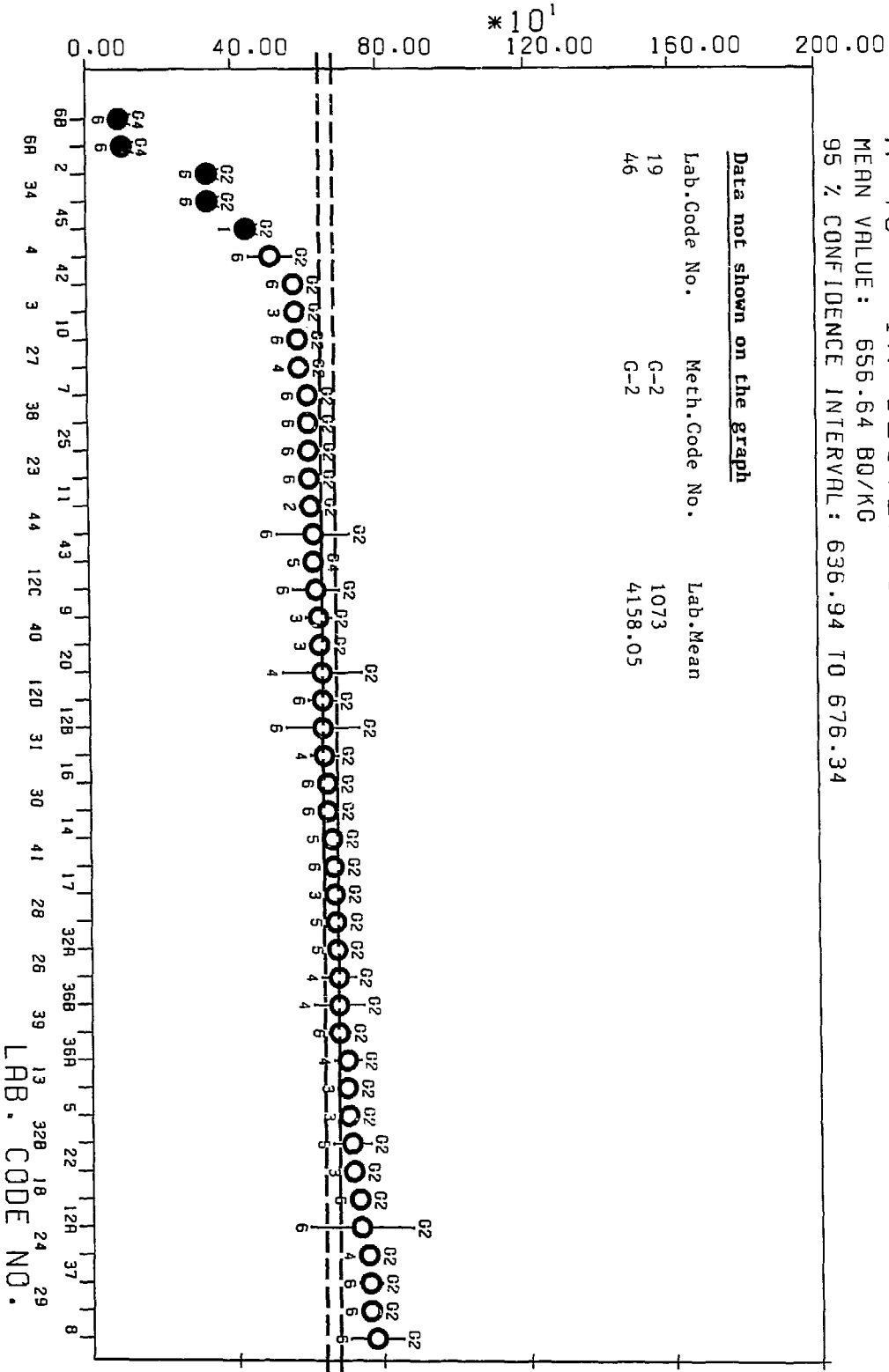


TABLE NO. 4 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR PB-210 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.	
					ABS	REL %
1	27	G2	3	12.00	2.00	16.7
2	28	G2	1	12.00		

TABLE NO. 5 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR PU-239 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.	
					ABS	REL %
1	10	K2	2	0.03	0.01	29.4
2	24	K2	2	0.07	0.00	7.3

RESULTS BELOW LIMIT OF DETECTION REPORTED

NO.	LAB. CODE NO.	METHOD CODE	LAB. LOD
1	15		0.00

TABLE NO. 6 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR RA-226 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.	
					ABS	REL %
1	28	G2	6	1.93	0.74	38.5

TABLE NO. 7 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR RU-106 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.	
					ABS	REL %
1	28	G2	6	57.50	32.83	57.1

TABLE NO. 8 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR SB-125 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.	
					ABS	REL %
1	28	G2	6	12.84	6.55	51.0
2	29	G2	3	20.67	1.53	7.4

TABLE NO. 9 SIGNIFICANCE LEVEL 0.05

RESULTS OF INTERCOMPARISON FOR SR-90 IN CLOVER-156, 1990

UNIT: BQ/KG

NO.	LAB. CODE NO.	METHOD CODE	NO.OF DETERM.	MEAN	STANDARD DEV.		ACCEPTANCE CODE **
					ABS	REL %	
1	1	B1	4	12.82	0.62	4.9	-0.9
2	3	B1	3	18.73	0.78	4.1	3.2
3	9	B1	3	13.10	0.40	3.1	-0.7
4	10	B1	4	13.62	0.95	7.0	OK
5	14	B1	3	13.77	0.32	2.3	OK
6	17	B1	4	19.20	2.48	12.9	1.2
7	20	B1	5	15.18	1.16	7.6	OK
8	22	B1	3	12.90	3.30	25.6	-0.1
9	23	B1	3	15.73	0.40	2.6	OK
10	24	B1	6	10.27	0.47	4.6	-6.7
11	29	B1	2	12.80	0.57	4.4	-1.0
12	35	B1	3	12.50	0.00	0.0	LO
13	37	B1	3	15.53	0.59	3.8	OK
14	38	B1	2	8.30	0.42	5.1	-12.0
15	39	B1	2	15.68	0.12	0.8	OK
16	40	B1	6	20.02	1.79	8.9	2.1
17	41	B1	5	19.50	1.21	6.2	2.7
18	42	B1	6	17.67	1.86	10.5	0.7
19	43	B1	3	15.90	1.22	7.7	OK
20	44	B1	3	13.43	1.58	11.8	OK

** FOR CONFIDENCE INTERVAL 13.38 TO 16.28

RESULTS BELOW LIMIT OF DETECTION REPORTED

NO.	LAB. CODE NO.	METHOD CODE	LAB. LOD
1	45	B1	20.00
2	46	B1	2500.00

SR-90 IN CLOVER-156, 1990 (BQ/KG)
MEAN VALUE: 14.83 BQ/KG
95 % CONFIDENCE INTERVAL: 13.38 TO 16.28

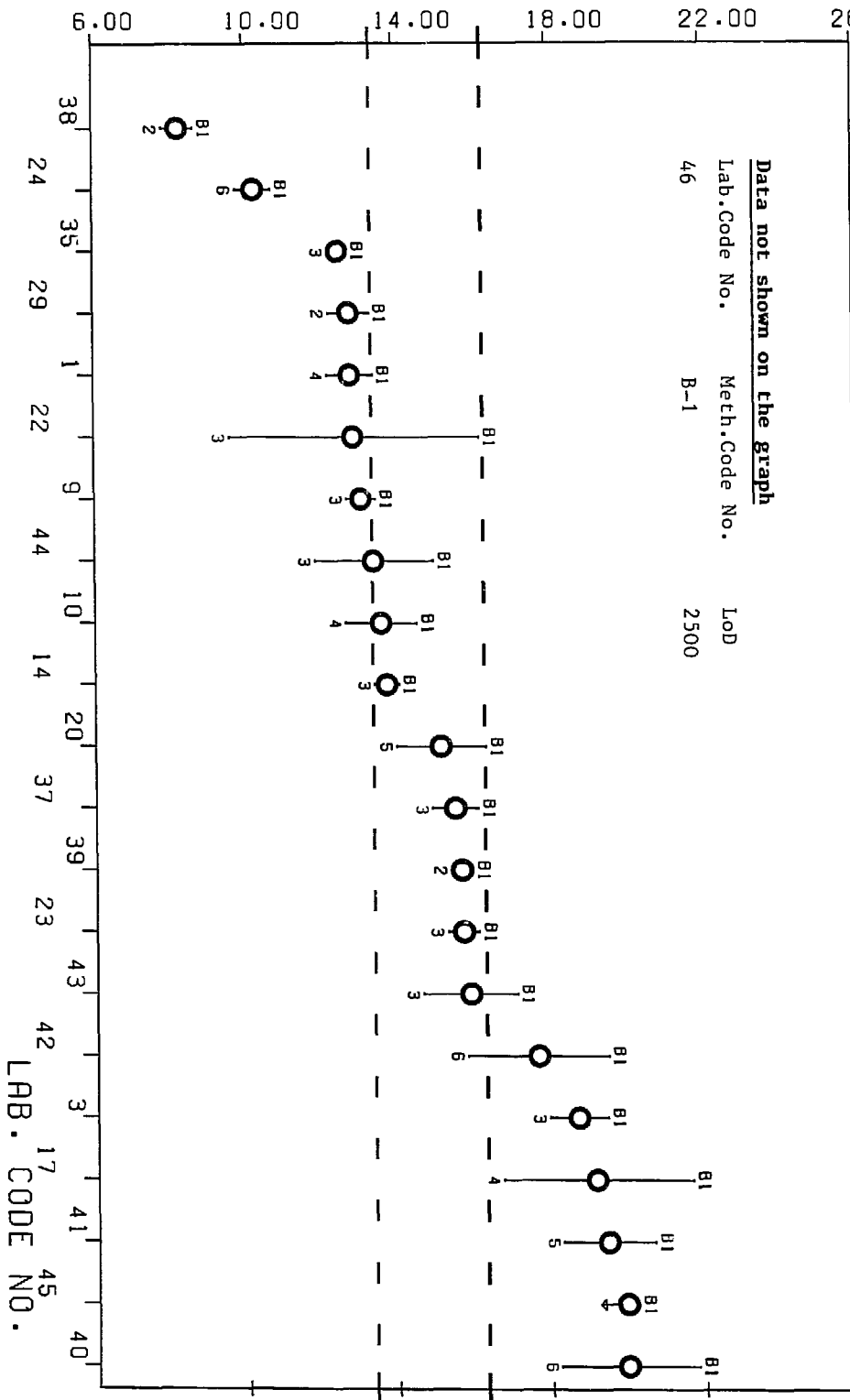


TABLE B

SUMMARY OF RESULTS OF THE INTERCOMPARISON CLOVER-156, 1990

RADIONUCLIDE DETERMINED	CS-134	CS-137	K-40	PB-210	PU-239	SB-125	SR-90
UNIT	BQ/KG	BQ/KG	BQ/KG	BQ/KG	BQ/KG	BQ/KG	BQ/KG
NUMBER OF REPORTED RESULTS	51	49	47	2	2	2	20
NUMBER OF LABORATORY AVERAGES	257	243	231	4	4	9	73
NUMBER OF ACCEPTED RESULTS	48	48	40	2	2	2	20
TOTAL RANGE OF LABORATORY AVERAGES	44.67 - 173.33	190.23 - 390.87	93.50 - 4158.05	12.00 - 12.00	0.03 - 0.07	12.84 - 20.67	8.30 - 20.02
RANGE OF ACCEPTED LABORATORY AVERAGES	78.93 - 173.33	190.23 - 349.37	502.83 - 779.50	12.00 - 12.00	0.03 - 0.07	12.84 - 20.67	8.30 - 20.02
PERCENTAGE OF OUTLYING LABORATORIES	6	2	15	0	0	0	0
OVERALL MEAN OF ACCEPTED LABORATORY AVERAGES	132.05	264.15	656.64	12.00	0.05	16.75	14.83
STANDARD DEVIATION (S.D.)	ABS 19.34 REL% 14.6	ABS 35.19 REL% 13.3	ABS 61.58 REL% 9.4	0.00 0.0	0.03 61.7	ABS 5.54 REL% 33.1	ABS 3.10 REL% 20.9
STANDARD ERROR (S.E.)	2.79	5.08	9.74	0.00	0.02	3.92	0.69
CONFIDENCE INTERVALS FOR THE MEAN OF POPULATION FOR SIGNIFICANCE LEVEL .05	126.43 - 137.67	253.92 - 274.38	636.94 - 676.34	12.00 - 12.00	-0.21 - 0.31	-33.00 - 66.50	13.38 - 16.28

Table C

Recommended Values and Confidence Intervals for
Radionuclides in IAEA-156 Clover

Radionuclide	Recommended value, Bq/kg	Confidence interval[*]
¹³⁴ Cs	132	126 - 138
¹³⁷ Cs	264	254 - 274
⁴⁰ K	657	637 - 676
⁹⁰ Sr	14.8	13.4 - 16.3

[*] Confidence intervals are for significance level 0.05

Reference date: 1 August 1986

List of participating laboratories for IAEA's intercomparison
study of clover (IAEA-156) for radionuclides

Austria

IAEA, Seibersdorf Laboratory
Chemistry Unit
A. Ghods

Bundesanstalt für Lebensmitteluntersuchung und -Forschung
Abt. Strahlenschutz
Berggasse 11, A-1090 Wien
E. Henrich

Bundesversuchs- und Forschungsanstalt Arsenal
Geotechnisches Institut, Isotopengeophysik
Faradaygasse 3, A-1030 Wien
F.J. Maringer, D. Rank, D. Sauer

Bulgaria

Institute of Nuclear Medicine
Radiobiology and Radiation Hygiene
132 Clement Ochridsky Blvd., 1756 Sofia
T. Petkov

Canada

Ecolepolytechnique
C.P. 6079 - Sue. A.
Montreal H3C3A
Zikovsky

Czechoslovakia

Laboratory of Gamma Spectrometry
Centre of Radiation Hygiene
Institute of Hygiene and Epidemiology
Sroberova 48, 10042 Praha 10
I. Malatova

Federal Republic of Germany

Fachbereich Physikalische Chemie der Philipps-Universität
Hans-Meerwein-Strasse
3550 Marburg
D. Molzahn

Institute für Wasser-, Boden- und Lufthygiene
des Bundesgesundheitsamtes
Corrensplatz 1., Berlin 33
H. Fusban

Rossendorf Central Institute for Nuclear Research
Radiation Protection Department, Dresden 5910
W. Rossbänder, B. Knobus

Finland

Finnish Centre for Radiation and Nuclear Safety
Surveillance Department
S. Klemola

Hong Kong

Royal Observatory
134A Nathan Road
Hong Kong
M.C. Wong

Hungary

National Research Institute for
Radiobiology and Radiohygiene
Box 101, Budapest 22
D. Stur

Italy

Istituto di Ingegneria Nucleare
Politecnico di Milano
Via P.O.N. 210 34/3, 20133 Milano
M. Terrani

Kuwait

Central Analytical Laboratory
Kuwait Institute for Scientific Research
P.O. Box 24885
Safat, 13109
R. Abu-Eid

Mexico

Comision Federal de Electricidad
Laboratorio de Monitoreo y Dosimetria
Ambiental del Proyecto Nu Cleoelectrico Laguna Verde
PDO Postal 53, Cd. Cardel, Veracruz
Quim. H. Armando, Silva Jimenez

The Netherlands

RijksKeuringsdienst van Waren
Evertsenstraat 17
K.M. Jonker

Rijks-Kwailiteitsinstituut voor land- en tuinbouwprodukten
Rikilt., P.O. Box 230
6700 AE Wageningen
T.D.B. van der Struijs

Norway

Institute for Energy Technology
Health and Safety Department
P.O. Box 40, N-2007 Kjeller
J.C. Christensen

Poland

Central Laboratory for Radiological Protection
Konwaliowa 7, 03-194 Warsaw
A. Pietruczewski

Portugal

LNETI - Departamento de Protec cao e Seguranca
Radiologica, Estrada National 10
P-2685 SACAEM
A. Ortins de Bettencourt

Republic of South Africa

Atomic Energy Corporation of South Africa
P.O. Box 582, Pretoria
M.C.B. Smit

Romania

Institute of Physics and Nuclear Engineering
P.O. Box Mg-6, Bucharest
R. Dumitrescu

Insittute for Physics and Nuclear Engineering
Nuclear Medicine Department, Lab. 8
P.O. Box Mg-6, R-76900 Bucharest
R. Margineanu

Institute of Hygiene and Public Health
Str. Dr. Leonte 1-3, R-76256 Bucharest 35
M. Constantin, G. Raluca

Institute for Atomic Physics
P.O. Box Mg-6, Bucharest
M. Salagean, A. Pantelica

Institute for Food Chemistry
Girlei 1, Bucharest
O. Ferdes

Spain

Instituto PRYMA-CIEMAT
Av. Complutense 32
28040 Madrid
J.P. Lopez

Pryma CIEMAT
Avda de al Complutense 22
28040 Madrid
L. Romero, C. Casco

Sweden

Division of Chemistry
National Institute for Radiation
Protection, Box 60204
S-10401 Stockholm
J. Melin

United Kingdom

Central Radiochemical Laboratory
National Power
Cenal Road
Gravesend, Kent
K.J. Odell

Somerset County Council
County Laboratory, County Hall
Tounton, TA1 4DY
G.A. Hudd

Radiochemcial Group
Environmental Science Division
I.E.B.S., Lancaster University
Lancaster LA1 4YQ
M.R. Emptage

United States of America

Oak Ridge National Laboratory
P.O. Box 2008, TN 37831
I.L. Larsen

Nysdon, WCL&R, LINC.
Empire State Plaza, Rm. D349A
Albany, NY 12201-0509
L. Husain

Union of Soviet Socialist Republic

All-Union Scientific Center of Radiation Medicine
AMS USSR, Melnikova 42, Kiev 252050
I.P. Los

Institute of Radiobiology AS BSSR
zhodinskaj 2, Minsk 220600
E.F. Konoplij

Ukrainian Branch of the USSR Institute of
Agricultural Radiology
255205 Kiev'region, Chabani
Mashinostroitelej 7
N.A. LoshHilov

Byelorussian Branch of the All-Union
Institute of Agricultural Radiology
BSSR Gomel 246020
Barykina 305E
V.A. Shumilin

Leningrad Institute of Radiation Hygiene
Leningrad 197101, Mira 8
P.V. Ramzaev

V.G. Khlopin Radium Institute
Roentgen 1, 197198 Leningrad
Y. Panteleev

All-Union Scientific Research Institute of
Experimental Physics
607200 Arzamas-16, Gorki'region
V.A. Belugin

Scientific Research Institute of Experimental
Veterinary, BSSR, Minsk'region,
223020 Kynsevshina
N.A. Kovalev

Yugoslavia

Laboratory for High Resolution Gamma Spectrometry
Department for Nuclear Physics
J. Stefan Institute, Jamova 39, P.O. Box 100
61111 Ljubljana
M. Korun

Laboratorij za Niklearnu Kemiju i Radioekologiju
Institute "Ruder Boskovic", Bijnicka 54
P.O. Box 1016, 41000 Zagreb
S. Lulic

J. Stefan Institute, P.O. Box 100
Jamova 39, 61111 Ljubljana
K. Junic, S. Fedina

Venezuela

Lab. Espectroscopia Atomica y Nuclear, IVIC
Caracas 1020A
P.A. Rosales, O. Carias, J.J. LaBrecque