Institute for
Interlaboratory Studies

Results of Proficiency Test
Total Metals in dried paint
April 2023

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 2008 the USA Consumer Product Safety Improvement Act (CPSIA, sec. 101) bans Lead in toys. This USA legislation reduces the amount of total Lead content in the substrates of children's products to 600 mg/kg by 2009 to 100 mg/kg by 2011 and the total Lead content in surface coatings or paint to 90 mg/kg by 2009.

Since 2008 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the determination of total Lead in dried paint every year. In 2015 it was decided to extend the scope with other heavy metals on request of several participants. During the annual proficiency testing program 2022/2023 it was decided to continue the proficiency test for the determination of Total Metals in dried paint.

In this interlaboratory study 94 laboratories in 28 countries registered for participation, see appendix 4 for the number of participants per country. In this report the results of the Total Metals in dried paint proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
It was decided to send two different dried paint samples approximately 0.5 grams each and labelled #23550 and #23551 respectively.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accreditation scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant’s data. Feedback from the participants on the reported data is encouraged and customer’s satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

All data presented in this report must be regarded as confidential and for use by the participating companies only. Disclosure of the information in this report is only allowed by means of the entire report. Use of the contents of this report for third parties is only allowed by written permission of the Institute for Interlaboratory Studies. Disclosure of the identity of one or more of the participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

For the first sample a batch of light purple dried paint was selected which was artificially fortified with some elements. The milled paint batch was divided over 125 plastic bags of 0.5 gram each and labelled #23550. The batch for sample #23550 was used in a previous proficiency test on Total Metals in dried paint as sample #21561 in iis21V01. Therefore, homogeneity of the subsamples was assumed.

For the second sample a batch of gray dried paint was selected which was artificially fortified with some elements. The milled paint batch was divided over 125 plastic bags of 0.5 grams each and labelled #23551.
The homogeneity of the subsamples was checked by the determination of Cadmium and Mercury using an in-house test method on 8 stratified randomly selected subsamples.

	Cadmium as Cd in mg/kg	Mercury as Hg in mg/kg
Sample #23551-1	73.9	138.3
Sample #23551-2	77.6	140.6
Sample #23551-3	77.6	138.5
Sample #23551-4	77.2	139.6
Sample #23551-5	77.3	141.5
Sample #23551-6	80.6	144.1
Sample #23551-7	74.3	139.6
Sample #23551-8	76.1	140.6

Table 1: homogeneity test results of subsamples #23551

From the above test results the repeatabilities were calculated and compared with 0.3 times the estimated reproducibility calculated with the Horwitz equation in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Cadmium as Cd in mg/kg	Mercury as Hg in mg/kg
r (observed)	5.9	5.5
reference method	Horwitz	Horwitz
0.3 x R (reference method)	5.4	9.0

Table 2: evaluation of the repeatabilities of subsamples #23551

The calculated repeatabilities are in agreement with 0.3 times the estimated reproducibilities calculated with the Horwitz equation. Therefore, homogeneity of the subsamples was assumed.

To each of the participating laboratories one dried paint sample labelled #23550 and one dried paint sample labelled #23551 was sent on March 22, 2023.

2.5 ANALYZES

The participants were requested to determine on samples #23550 and #23551 the total concentration of Aluminum as Al, Antimony as Sb, Arsenic as As, Cadmium as Cd, Chromium as Cr, Cobalt as Co, Copper as Cu, Lead as Pb, Manganese as Mn, Mercury as Hg, Nickel as Ni, Selenium as Se, Strontium as Sr and Zinc as Zn. It was also requested to report if the laboratory was accredited for the determined elements and to report some analytical details.

It was explicitly requested to treat the samples as if they were routine samples and to report the test results using the indicated units on the report form and not to round the test results, but report as much significant figures as possible. It was also requested not to report ‘less than’ test results, which are above the detection limit, because such test results cannot be used for meaningful statistical evaluations.

To get comparable test results a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods (when applicable) that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis-cts/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis-cts/. The reported test results are tabulated per determination in appendices 1 and 2 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyzes). Additional or corrected test results are used for data analysis and the original test results are placed under 'Remarks' in the result tables in appendices 1 and 2. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

First, the normality of the distribution of the various data sets per determination was checked by means of the Lilliefors-test, a variant of the Kolmogorov-Smirnov test and by the calculation of skewness and kurtosis. Evaluation of the three normality indicators in combination with the visual evaluation of the graphic Kernel density plot, lead to judgement of the normality being either 'unknown', 'OK', 'suspect' or 'not OK'. After removal of outliers, this check was repeated. If a data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

The assigned value is determined by consensus based on the test results of the group of participants after rejection of the statistical outliers and/or suspect data.

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT the criterion of ISO13528, paragraph 9.2.1, was met for all evaluated tests. Therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.

Finally, the reproducibilities were calculated from the standard deviations by multiplying them with a factor of 2.8

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method.

Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements (derived from e.g. ISO or ASTM test methods), the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

When a laboratory did use a test method with a reproducibility that is significantly different from the reproducibility of the reference test method used in this report, it is strongly advised to recalculate the z-score, while using the reproducibility of the actual test method used, this in order to evaluate whether the reported test result is fit-for-use.

The z-scores were calculated according to:

$z_{(target)}$ = (test result - average of PT) / target standard deviation

The $z_{(target)}$ scores are listed in the test result tables in appendix 1.

Absolute values for z<2 are very common and absolute values for z>3 are very rare. Therefore, the usual interpretation of z-scores is as follows:

	|z|	< 1	good
1 <	|z|	< 2	satisfactory
2 <	|z|	< 3	questionable
3 <	|z|		unsatisfactory

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Eight participants reported test results after the final reporting date and four other participants did not report any test results. Not all participants were able to report all tests requested. In total 90 participants reported 580 numerical test results. Observed were 22 outlying test results, which is 3.8%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

Not all data sets proved to have a normal Gaussian distribution. These are referred to as “not OK” or “suspect”. The statistical evaluation of these data sets should be used with due care, see also paragraph 3.1.

4.1 EVALUATION PER SAMPLE AND PER ELEMENT

In this section the reported test results are discussed per sample and per element. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 5.

Unfortunately, a suitable reference test method providing the precision data is not available for the determination of total Metals in dried paint. Therefore, the calculated reproducibility was compared against the estimated reproducibility calculated with the Horwitz equation.

sample #23550

Total Aluminum as Al: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the estimated reproducibility calculated with the Horwitz equation. It was decided not to calculate z-scores due to the large variation of the group compared to the target reproducibility.

Total Cobalt as Co: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Total Copper as Cu: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Total Lead as Pb: This determination may be problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Total Manganese as Mn: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Total Strontium as Sr: This determination may be problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

The majority of the participants agreed on a concentration near or below the limit of detection for all other requested elements mentioned in paragraph 2.5. Therefore, no z-scores are calculated for these elements. The reported results are given in appendix 2.

sample #23551

Total Aluminum as Al: This determination may be problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the estimated reproducibility calculated with the Horwitz equation. It was decided not to calculate z-scores due to the large variation of the group compared to the target reproducibility.

Total Cadmium as Cd: This determination is not problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility calculated with the Horwitz equation.

Total Cobalt as Co: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the estimated reproducibility calculated with the Horwitz equation. It was decided not to calculate z-scores due to the large variation of the group compared to the target reproducibility.

Total Mercury as Hg: This determination may be problematic for some participants. Six statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility calculated with the Horwitz equation.

Total Nickel as Ni: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

The majority of the participants agreed on a concentration near or below the limit of detection for all other requested elements mentioned in paragraph 2.5. Therefore, no z-scores are calculated for these elements. The reported results are given in appendix 2.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from reference method are presented in the next tables.

Element	unit	n	average	2.8 * sd	R(target)
Total Aluminum as Al	mg/kg	35	2386	2571	(332)
Total Cobalt as Co	mg/kg	49	167.1	66.3	34.7
Total Copper as Cu	mg/kg	45	48.3	21.3	12.1
Total Lead as Pb	mg/kg	86	106.8	28.1	23.7
Total Manganese as Mn	mg/kg	44	34.3	13.7	9.0
Total Strontium as Sr	mg/kg	33	504	120	89

Table 3: reproducibilities of tests on sample #23550

For results between brackets no z-scores are calculated.

Element	unit	n	average	2.8 * sd	R(target)
Total Aluminum as Al	mg/kg	34	9222	3594	(1046)
Total Cadmium as Cd	mg/kg	72	73.5	15.3	17.2
Total Cobalt as Co	mg/kg	51	442	409	(79.2)
Total Mercury as Hg	mg/kg	59	99.0	21.2	22.2
Total Nickel as Ni	mg/kg	50	1574	428	233

Table 4: reproducibilities of tests on sample #23551

For results between brackets no z-scores are calculated.

Without further statistical calculations it can be concluded that for most elements mentioned above there is not a good compliance of the group of participants with the estimated target reproducibilities calculated with the Horwitz equation. The problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF APRIL 2023 WITH PREVIOUS PTS

	April 2023	April 2022	April 2021	April 2020	April 2019
Number of reporting laboratories	90	96	109	110	113
Number of test results	580	558	658	770	417
Number of statistical outliers	22	9	26	27	22
Percentage of statistical outliers	3.8%	1.6%	4.0%	3.5%	5.3%

Table 5: comparison with previous proficiency tests

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.

The performance of the determination of elements in the proficiency test was compared to uncertainties observed in iis PTs over the years, expressed as relative standard deviation (RSD) of the PTs, see next table.

Element	April 2023	April 2022	April 2021	April 2020	2009-2019	Target
Total Aluminum	14-38%	11-21%	19-33%	12-18%	---	5 - 10%
Total Antimony	---	---	---	---	15%	5 - 10%
Total Arsenic	---	---	7%	---	9%	5 - 10%
Total Cadmium	7%	---	---	---	7-8%	5 - 10%
Total Chromium	---	---	11%	10%	9-12%	5 - 10%
Total Cobalt	14-33%	6-11%	12%	11%	7-30%.	5 - 10%
Total Copper	16%	9%	16%	10%	---	5 - 10%
Total Lead	9%	8-10%	10%	10%	6-10%	5 - 10%
Total Manganese	14%	12%	10-12%	10-11%	---	5 - 10%
Total Mercury	8%	---	---	---	14-18%.	5 - 10%
Total Nickel	10%	---	---	---	5-13%.	5 - 10%
Total Selenium	---	10%	---	10%	---	5 - 10%
Total Strontium	9%	13%	9-11%	9-10%	---	5 - 10%

Table 6: development of uncertainties over the years

The relative standard deviation observed in this PT are in line with the relative standard deviations observed in previous PTs.

Sample #23550 was used in a previous iis proficiency test on Total Metals in dried paint as sample #21561 in PT iis21V01. A comparison is made between the two proficiency tests. The PT findings of sample #23550 are in line with those of sample #21561.

Element	unit	sample #23550			sample #21561		
		n	average	R(calc)	n	average	R(calc)
Total Aluminum	mg/kg	35	2386	2571	41	2820	2601
Total Cobalt	mg/kg	49	167.1	66.3	65	167.3	56.3
Total Copper	mg/kg	45	48.3	21.3	53	50.5	22.1
Total Lead	mg/kg	86	106.8	28.1	106	107.9	29.2
Total Manganese	mg/kg	44	34.3	13.7	51	35.6	12.0
Total Strontium	mg/kg	33	504	120	42	510	163

Table 7: comparison of sample #23550 with #21561.

4.4 EVALUATION OF THE ANALYTICAL DETAILS

Many different test methods were mentioned by the participants. The American CPSC-CH-E1003-09 method “For determining Lead (Pb) in Paint and Other Similar Surface Coatings” was used by 53% of the participants. Also, other methods were reported and sometimes the method used was depending on the metal to be determined. Some of these test methods are not designed to determine metals in dried paint. For example, EN16711-1 is for metals in textile and IEC62321-5 for metals in electro technical products.

For this PT also some analytical details were requested, see appendix 3 for the reported details. Based on the answers given by the participants the following can be summarized:

- 96% of the reporting participants mentioned that they are accredited for the determination of Total Metals in dried paint.
- 19% used less than 100 mg as sample intake, 62% used 100 mg, 19% used more than 100 mg as sample intake.
- All laboratories used a strong acid like Nitric Acid (or Nitric Acid in combination with Hydrochloric Acid and/or Hydrofluoric Acid) to digest the dried paint. 66% of the participants used an acid solution with a concentration ≥ 65%.

As the majority of the group follow the same analytical procedures no separate statistical analysis has been performed.

5 DISCUSSION

In this PT the average of the homogeneity test results are not in line with the average (consensus value) from the PT results. There are several reasons for this. First, the goal of the homogeneity testing is very different from the goal of the evaluation of the reported PT results. In order to prove the homogeneity of the PT samples, a test method is selected with a high precision (smallest variation). The accuracy (trueness) of the test method is less relevant.
Secondly, the homogeneity testing is done by one laboratory only. The test results of this (ISO/IEC 17025 accredited) laboratory will have a bias (systematic deviation) depending on the test method used. The desire to detect small variations between the PT samples leads to the use of a sensitive test method with high precision, which may be a test method with significant bias.
Also each test result reported by the laboratories that participate in the PT will have a bias. However, some will have a positive bias and others a negative bias. These different biases compensate each other in the PT average (consensus value). Therefore, the PT consensus value may deviate from the average of the homogeneity test. At the same time the accuracy of the PT consensus value is more reliable than the accuracy of the average of the results of the homogeneity test.

When the concentration limit recommended in UN Environment's "Model Law and Guidance for Regulating Lead Paint" 90 mg/kg total Lead is taken into account 92% of the participants would have rejected sample #23550 based on the total Lead content and all reporting laboratories would have accepted sample #23551 based on the total Lead content.

6 CONCLUSION

In general the participants were able to detect the added elements in both samples in this proficiency test. However, for most of the elements, artificially added or already part of the paint matrix, the group of participants did not met the target reproducibility.

Each participating laboratory will have to evaluate its performance in this study and decide about any corrective actions if necessary. Therefore, participation on a regular basis in this scheme could be helpful to improve the performance and thus increase of the quality of the analytical results.

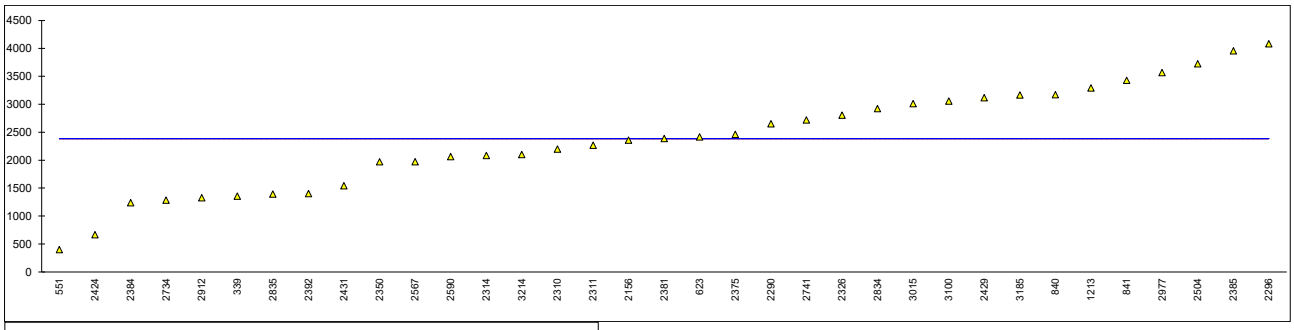
APPENDIX 1

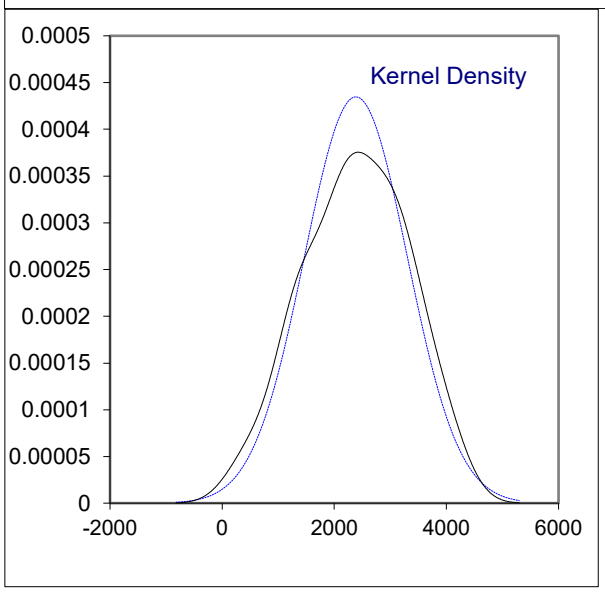
Determination of Total Aluminum as Al on sample #23550; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210		-----		-----	
339	In house	1354		-----	
551	CPSC-CH-E1003-09.1	397.62		-----	
623	In house	2415.57		-----	
840	In house	3171.40		-----	
841	ISO8124-5	3427		-----	
1051		-----		-----	
1213		3290.58		-----	
2121		-----		-----	
2132		-----		-----	
2137		-----		-----	
2138		-----		-----	
2139		-----		-----	
2156	EPA3052	2358.00		-----	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	
2287		-----		-----	
2290	CPSC-CH-E1003-09	2648.4		-----	
2294		-----		-----	
2296	In house	4083.7972		-----	
2301		-----		-----	
2310	EN16711-1	2198		-----	
2311	CPSC-CH-E1003-09	2265.78		-----	
2314	CPSC-CH-E1003-09	2084		-----	
2326	CPSC-CH-E1003-09	2803.21		-----	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	1968		-----	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	C02.2.2	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370		-----		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	2460		-----	
2380		-----		-----	
2381	CPSC-CH-E1003-09	2385.10		-----	
2382	CPSC-CH-E1003-09	no capability		-----	
2384	EPA3051	1236.63		-----	
2385	EPA3052	3954		-----	
2392	IEC62321-5	1400.50		-----	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	662.9	C	-----	first reported 24.65
2426		-----		-----	
2429	CPSC-CH-E1003-09	3117.0		-----	
2431	In house	1541.09		-----	
2449		-----		-----	
2453		-----		-----	
2459		-----		-----	
2460		-----		-----	
2480		-----		-----	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	3723.072		-----	
2511		-----		-----	
2529		-----		-----	
2567	CPSC-CH-E1003-09	1972.0		-----	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	not analyzed		-----	
2590	CPSC-CH-E1003-09	2061.23		-----	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	1283.72		-----	
2741	CPSC-CH-E1003-09	2717.3		-----	
2799		-----		-----	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	2920		-----	
2835	ISO62321	1393.12		-----	
2864		-----		-----	
2912	CPSC-CH-E1003-09	1326.058		-----	
2976		-----		-----	
2977	CPSC-CH-E1003-09	3565		-----	
3015	ASTM F963	3012		-----	
3100	CPSC-CH-E1003-09	3058.10		-----	
3110		-----		-----	
3116		-----		-----	
3118		-----		-----	
3172		-----		-----	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	3166.37		-----	
3199	EPA3051	Not tested		-----	
3214	EPA3052	2100.56		-----	
3218		-----		-----	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

normality	OK	
n	35	
outliers	0	
mean (n)	2386.317	
st.dev. (n)	918.1488	RSD = 38%
R(calc.)	2570.817	
st.dev.(Horwitz)	(118.4266)	
R(Horwitz)	(331.595)	



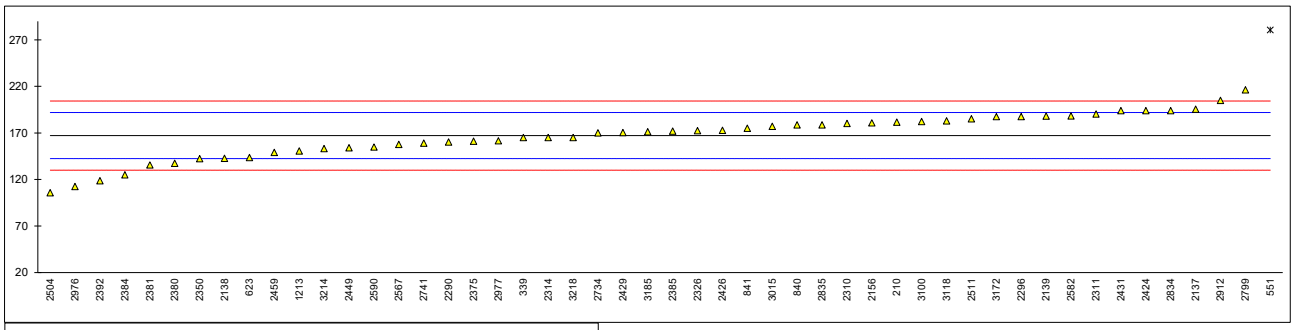


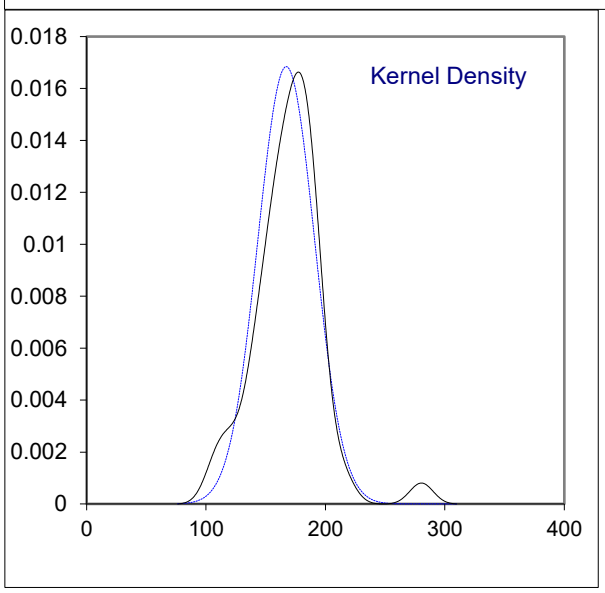
Determination of Total Cobalt as Co on sample #23550; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	CPSC-CH-E1003-09	181.572		1.17	
339	In house	165		-0.17	
551	CPSC-CH-E1003-09.1	280.413	R(0.01)	9.15	
623	In house	143.5		-1.91	
840	In house	178.590282		0.93	
841	ISO8124-5	175		0.64	
1051		-----		-----	
1213		150.54		-1.34	
2121		-----		-----	
2132		-----		-----	
2137	IEC62321-5	195.5		2.29	
2138	CPSC-CH-E1003-09	142.7		-1.97	
2139	CPSC-CH-E1003-09	188		1.69	
2156	EPA3052	180.75		1.10	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287		-----		-----	
2290	CPSC-CH-E1003-09	160.1		-0.57	
2294		-----		-----	
2296	In house	187.5898		1.65	
2301		-----		-----	
2310	EN16711-1	180		1.04	
2311	CPSC-CH-E1003-09	190.23		1.87	
2314	CPSC-CH-E1003-09	165		-0.17	
2326	CPSC-CH-E1003-09	172.35		0.42	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	142.3		-2.01	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	C02.2.2	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370		-----		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	161		-0.49	
2380	CPSC-CH-E1003-09	137.26		-2.41	
2381	CPSC-CH-E1003-09	135.50		-2.56	
2382	CPSC-CH-E1003-09	no capability		-----	
2384	EPA3051	124.98		-3.41	
2385	EPA3052	172		0.39	
2392	IEC62321-5	118.63		-3.92	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	193.99	C	2.17	first reported 35.91
2426	ASTM E1645	172.71		0.45	
2429	CPSC-CH-E1003-09	170.3		0.26	
2431	In house	193.95		2.17	
2449	ASTM E1645	153.97		-1.06	
2453		-----		-----	
2459	EN16711-1	149		-1.46	
2460		-----		-----	
2480		-----		-----	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	105.653		-4.97	
2511	CPSC-CH-E1003-09	185.169		1.46	
2529		-----		-----	
2567	CPSC-CH-E1003-09	157.6		-0.77	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	188.22		1.70	
2590	CPSC-CH-E1003-09	154.86		-0.99	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	170.00		0.23	
2741	CPSC-CH-E1003-09	159.1		-0.65	
2799	In house	216.17		3.96	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	194		2.17	
2835	ISO62321	178.63		0.93	
2864		-----		-----	
2912	CPSC-CH-E1003-09	204.882		3.05	
2976	ASTM F963	112.4		-4.42	
2977	CPSC-CH-E1003-09	161.4		-0.46	
3015	ASTM F963	177		0.80	
3100	CPSC-CH-E1003-09	182.24		1.22	
3110		-----		-----	
3116		-----		-----	
3118	CPSC-CH-E1003-09	182.8340		1.27	
3172	ISO8124-5	187.41		1.64	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	171.24		0.33	
3199	EPA3051	Not tested		-----	
3214	EPA3052	153.20		-1.13	
3218	EN16711-1	165.1		-0.16	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

normality	OK	
n	49	
outliers	1	
mean (n)	167.125	
st.dev. (n)	23.6819	RSD = 14%
R(calc.)	66.309	
st.dev.(Horwitz)	12.3754	
R(Horwitz)	34.651	



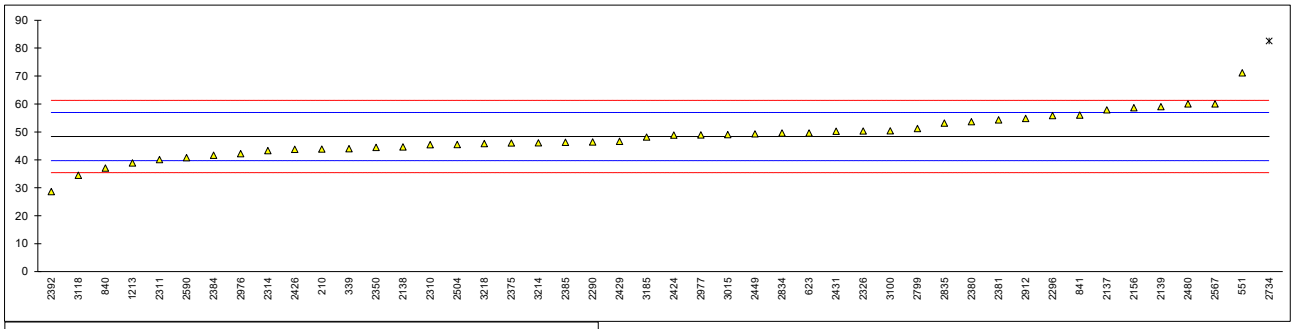


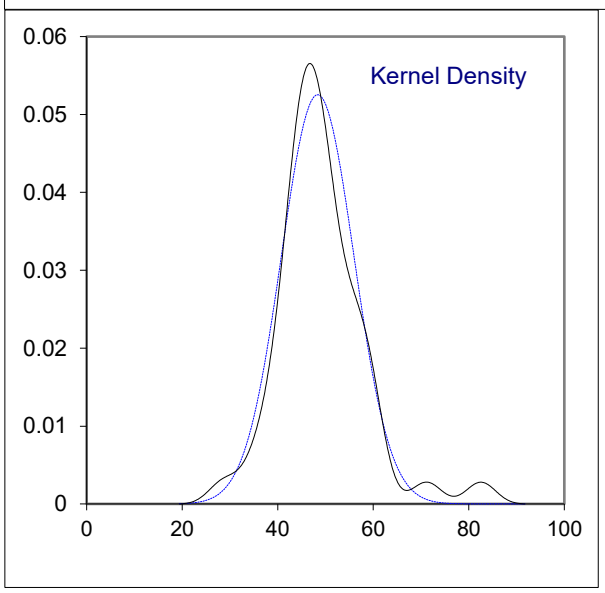
Determination of Total Copper as Cu on sample #23550; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	CPSC-CH-E1003-09	43.851		-1.04	
339	In house	44		-1.01	
551	CPSC-CH-E1003-09.1	71.15		5.29	
623	In house	49.63		0.30	
840	In house	37.055234		-2.62	
841	ISO8124-5	56		1.77	
1051		-----		-----	
1213		38.87		-2.20	
2121		-----		-----	
2132		-----		-----	
2137	IEC62321-5	57.9		2.21	
2138	CPSC-CH-E1003-09	44.6		-0.87	
2139	CPSC-CH-E1003-09	59		2.47	
2156	EPA3052	58.64		2.39	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287		-----		-----	
2290	CPSC-CH-E1003-09	46.4		-0.45	
2294		-----		-----	
2296	In house	55.8393		1.74	
2301		-----		-----	
2310	EN16711-1	45.4		-0.68	
2311	CPSC-CH-E1003-09	40.10		-1.91	
2314	CPSC-CH-E1003-09	43.3		-1.17	
2326	CPSC-CH-E1003-09	50.31		0.46	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	44.42		-0.91	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	C02.2.2	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370		-----		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	46		-0.54	
2380	CPSC-CH-E1003-09	53.64		1.23	
2381	CPSC-CH-E1003-09	54.30		1.38	
2382	CPSC-CH-E1003-09	no capability		-----	
2384	EPA3051	41.63		-1.56	
2385	EPA3052	46.3		-0.47	
2392	IEC62321-5	28.61		-4.57	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	48.85	C	0.12	first reported 0
2426	ASTM E1645	43.75		-1.06	
2429	CPSC-CH-E1003-09	46.6		-0.40	
2431	In house	50.19		0.43	
2449	ASTM E1645	49.27		0.21	
2453		-----		-----	
2459		-----		-----	
2460		-----		-----	
2480	In house	60		2.70	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	45.464		-0.67	
2511		-----		-----	
2529		-----		-----	
2567	CPSC-CH-E1003-09	60.0		2.70	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	not analyzed		-----	
2590	CPSC-CH-E1003-09	40.79		-1.75	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	82.53	R(0.01)	7.92	
2741	CPSC-CH-E1003-09	<100		-----	
2799	In house	51.16	C	0.65	first reported 114.79

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	49.6		0.29	
2835	ISO62321	53.15		1.11	
2864		-----		-----	
2912	CPSC-CH-E1003-09	54.809		1.50	
2976	ASTM F963	42.2		-1.42	
2977	CPSC-CH-E1003-09	48.9		0.13	
3015	ASTM F963	49		0.15	
3100	CPSC-CH-E1003-09	50.36		0.47	
3110		-----		-----	
3116		-----		-----	
3118	CPSC-CH-E1003-09	34.5018		-3.21	
3172		-----		-----	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	48.14		-0.05	
3199	EPA3051	Not tested		-----	
3214	EPA3052	46.05		-0.53	
3218	EN16711-1	45.8		-0.59	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

normality	suspect	
n	45	
outliers	1	
mean (n)	48.345	
st.dev. (n)	7.5928	RSD = 16%
R(calc.)	21.260	
st.dev.(Horwitz)	4.3147	
R(Horwitz)	12.081	



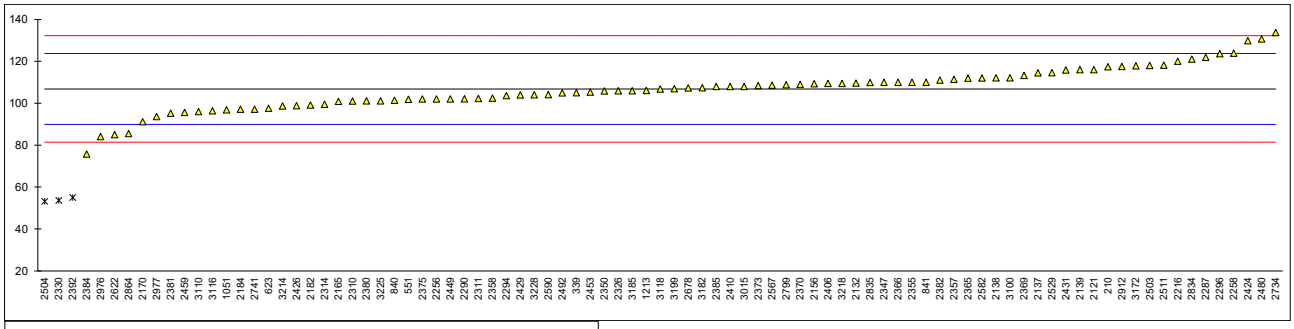


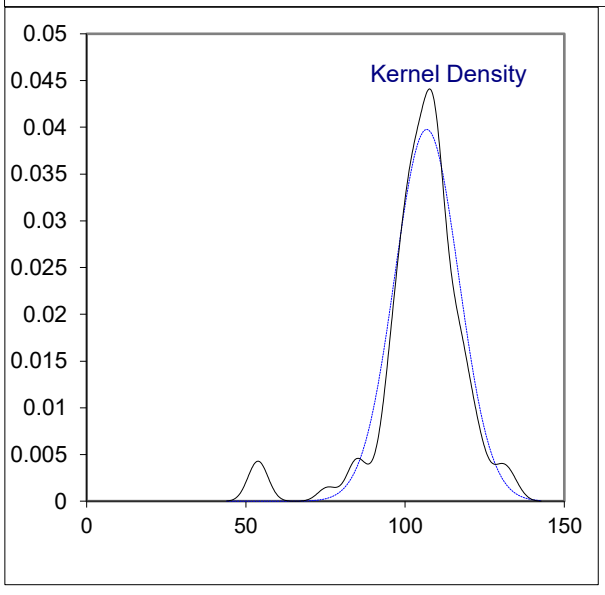
Determination of Total Lead as Pb on sample #23550; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	CPSC-CH-E1003-09	117.373		1.25	
339	In house	105	C	-0.22	first reported “not detected”
551	CPSC-CH-E1003-09.1	101.86		-0.59	
623	In house	97.61		-1.09	
840	In house	101.459125		-0.63	
841	ISO8124-5	110		0.37	
1051	CPSC-CH-E1003-09	96.8		-1.19	
1213		106.12		-0.08	
2121	CPSC-CH-E1003-09	116	C	1.08	first reported 137.92
2132	CPSC-CH-E1003-09	109.56		0.32	
2137	IEC62321-5	114.5		0.91	
2138	CPSC-CH-E1003-09	112.1		0.62	
2139	CPSC-CH-E1003-09	116		1.08	
2156	EPA3052	109.30		0.29	
2165	ASTM F963	100.9		-0.70	
2170	CPSC-CH-E1003-09	91.17		-1.85	
2182	CPSC-CH-E1003-09	99.09		-0.91	
2184	CPSC-CH-E1003-09	97.2		-1.14	
2216	ASTM F963	120		1.56	
2256	CPSC-CH-E1003-09	102.0		-0.57	
2258	16CFR1303	123.89	C	2.02	first reported 0.0124
2287	EPA3052	121.9		1.78	
2290	CPSC-CH-E1003-09	102.1		-0.56	
2294	CPSC-CH-E1003-09	103.6496		-0.38	
2296	In house	123.6258		1.98	
2301		-----		-----	
2310	EN16711-1	101		-0.69	
2311	CPSC-CH-E1003-09	102.28		-0.54	
2314	CPSC-CH-E1003-09	99.5		-0.87	
2326	CPSC-CH-E1003-09	105.95		-0.10	
2330	CPSC-CH-E1003-09.1	53.54	C,R(0.01)	-6.30	first reported 59.28
2347	CPSC-CH-E1003-09	110		0.37	
2350	CPSC-CH-E1003-09	105.9		-0.11	
2355	EPA3052	110		0.37	
2357	CPSC-CH-E1003-09	111.4		0.54	
2358	CPSC-CH-E1003-09	102.40		-0.52	
2365	CPSC-CH-E1002-08	112		0.61	
2366	C02.2.2	110		0.37	
2369	EPA3052	113.25		0.76	
2370	CPSC-CH-E1003-09	109		0.26	
2373	CPSC-CH-E1003-09	108.39		0.18	
2375	EN16711-1	102		-0.57	
2380	CPSC-CH-E1003-09	101.07		-0.68	
2381	CPSC-CH-E1003-09	95.20		-1.37	
2382	CPSC-CH-E1003-09	111		0.49	
2384	EPA3051	75.74		-3.67	
2385	EPA3052	108		0.14	
2392	IEC62321-5	54.96	C,R(0.01)	-6.13	first reported 63.55
2406	ASTM F963	109.40		0.30	
2410	CPSC-CH-E1003-09	108		0.14	
2424	ASTM F2853	129.79	C	2.71	first reported 15.56
2426	ASTM E1645	98.86		-0.94	
2429	CPSC-CH-E1003-09	103.9		-0.35	
2431	In house	115.88		1.07	
2449	ASTM E1645	102		-0.57	
2453	CPSC-CH-E1003-09	105.3		-0.18	
2459	EN16711-1	95.66		-1.32	
2460		-----		-----	
2480	In house	130.7		2.82	
2492	CPSC-CH-E1003-09	104.9520		-0.22	
2503	ASTM F963	118		1.32	
2504	EPA3052	53.128	C,R(0.01)	-6.35	first reported 76.263
2511	CPSC-CH-E1003-09	118.165		1.34	
2529	CPSC-CH-E1003-09	114.61		0.92	
2567	CPSC-CH-E1003-09	108.6		0.21	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	112.07		0.62	
2590	CPSC-CH-E1003-09	104.04		-0.33	
2622	CPSC-CH-E1002-08	84.95		-2.59	
2678	CPSC-CH-E1003-09.1	107.3		0.06	
2734	EN16711-1	133.71		3.18	
2741	CPSC-CH-E1003-09	97.2		-1.14	
2799	In house	108.82		0.24	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	121		1.67	
2835	ISO62321	109.89		0.36	
2864	CPSC-CH-E1003-09	85.50		-2.52	
2912	CPSC-CH-E1003-09	117.547		1.27	
2976	ASTM F963	84.1		-2.69	
2977	CPSC-CH-E1003-09	93.6		-1.56	
3015	ASTM F963	108		0.14	
3100	CPSC-CH-E1003-09	112.12		0.63	
3110	ASTM F963	96		-1.28	
3116		96.40		-1.23	
3118	CPSC-CH-E1003-09	106.7221		-0.01	
3172	ISO8124-5	117.86		1.30	
3182	CPSC-CH-E1003-09	107.4		0.07	
3185	CPSC-CH-E1003-09	105.98		-0.10	
3199	EPA3051	106.88		0.01	
3214	EPA3052	98.68		-0.96	
3218	EN16711-1	109.4		0.30	
3225	CPSC-CH-E1003-09	101.1		-0.68	
3228	CPSC-CH-E1003-09	103.98		-0.34	
8005		-----		-----	

normality	suspect	
n	86	
outliers	3	
mean (n)	106.830	
st.dev. (n)	10.0323	RSD = 9%
R(calc.)	28.091	
st.dev.(Horwitz)	8.4618	
R(Horwitz)	23.693	



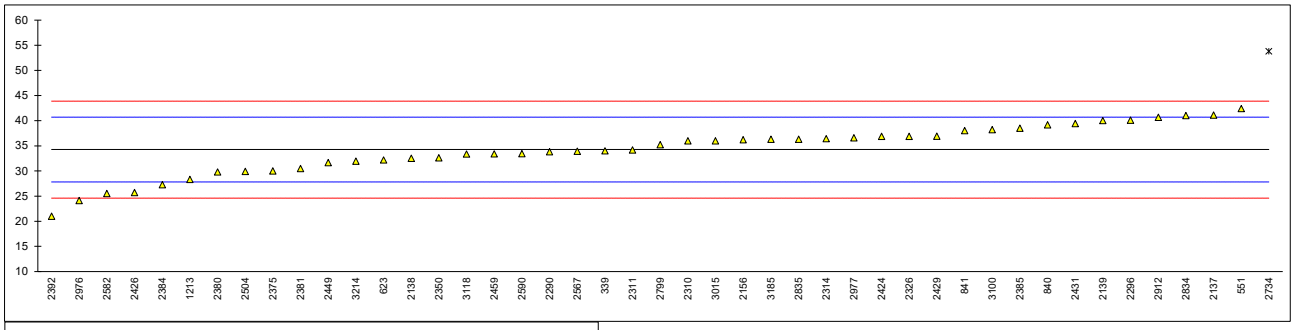


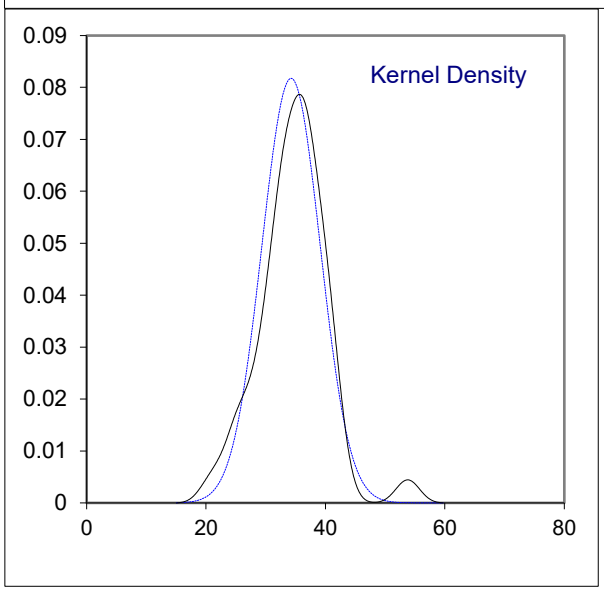
Determination of Total Manganese as Mn on sample #23550; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210		-----		-----	
339	In house	34		-0.08	
551	CPSC-CH-E1003-09.1	42.41		2.53	
623	In house	32.19		-0.64	
840	In house	39.1604		1.52	
841	ISO8124-5	38		1.16	
1051		-----		-----	
1213		28.32		-1.84	
2121		-----		-----	
2132		-----		-----	
2137	IEC62321-5	41.1		2.13	
2138	CPSC-CH-E1003-09	32.5		-0.55	
2139	CPSC-CH-E1003-09	40		1.78	
2156	EPA3052	36.20		0.60	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	
2287		-----		-----	
2290	CPSC-CH-E1003-09	33.8		-0.14	
2294		-----		-----	
2296	In house	40.1062		1.82	
2301		-----		-----	
2310	EN16711-1	36		0.54	
2311	CPSC-CH-E1003-09	34.17		-0.03	
2314	CPSC-CH-E1003-09	36.4		0.67	
2326	CPSC-CH-E1003-09	36.87		0.81	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	32.6		-0.51	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	C02.2.2	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370		-----		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	30		-1.32	
2380	CPSC-CH-E1003-09	29.80		-1.38	
2381	CPSC-CH-E1003-09	30.50		-1.17	
2382	CPSC-CH-E1003-09	no capability		-----	
2384	EPA3051	27.24		-2.18	
2385	EPA3052	38.5		1.32	
2392	IEC62321-5	20.99		-4.12	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	36.85		0.81	
2426	ASTM E1645	25.7		-2.66	
2429	CPSC-CH-E1003-09	36.9		0.82	
2431	In house	39.43		1.61	
2449	ASTM E1645	31.67		-0.80	
2453		-----		-----	
2459	EN16711-1	33.4		-0.27	
2460		-----		-----	
2480		-----		-----	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	29.900		-1.35	
2511		-----		-----	
2529		-----		-----	
2567	CPSC-CH-E1003-09	33.9		-0.11	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	25.49		-2.72	
2590	CPSC-CH-E1003-09	33.46		-0.25	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	53.80	R(0.05)	6.07	
2741	CPSC-CH-E1003-09	<50		-----	
2799	In house	35.23	C	0.30	first reported 49.07
2834	ISO11885	41		2.09	

lab	method	value	mark	z(targ)	remarks
2835	ISO62321	36.30		0.63	
2864		-----		-----	
2912	CPSC-CH-E1003-09	40.666		1.99	
2976	ASTM F963	24.1		-3.15	
2977	CPSC-CH-E1003-09	36.6		0.73	
3015	ASTM F963	36		0.54	
3100	CPSC-CH-E1003-09	38.23		1.23	
3110		-----		-----	
3116		-----		-----	
3118	CPSC-CH-E1003-09	33.3570		-0.28	
3172		-----		-----	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	36.28		0.63	
3199	EPA3051	Not tested		-----	
3214	EPA3052	31.95		-0.72	
3218		-----		-----	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

normality	OK	
n	44	
outliers	1	
mean (n)	34.256	
st.dev. (n)	4.8820	RSD = 14%
R(calc.)	13.670	
st.dev.(Horwitz)	3.2200	
R(Horwitz)	9.016	



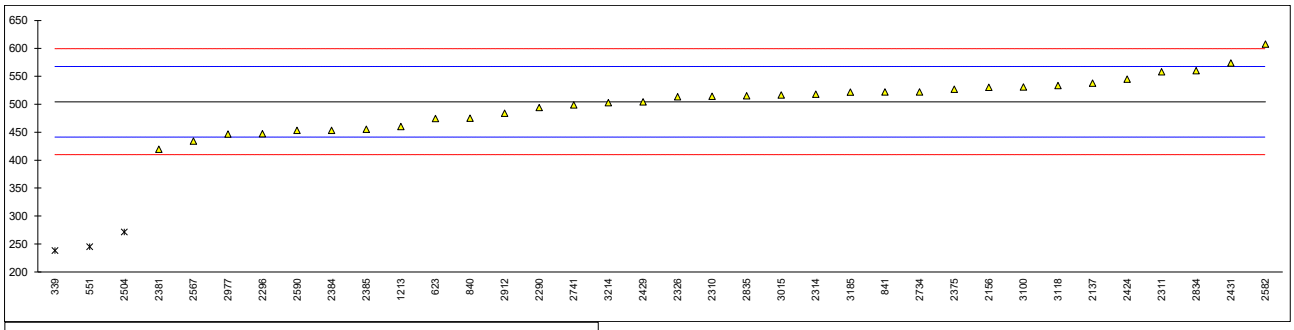


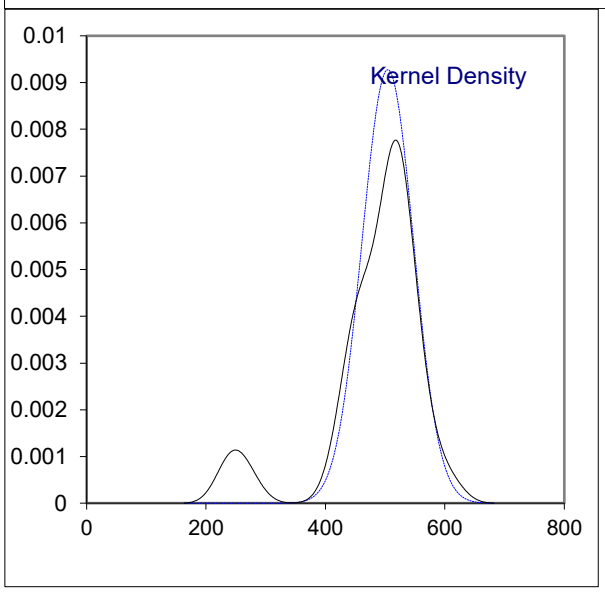
Determination of Total Strontium as Sr on sample #23550; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210		-----		-----	
339	In house	238	C,R(0.01)	-8.42	first reported 251
551	CPSC-CH-E1003-09.1	244.84	R(0.01)	-8.21	
623	In house	474.29		-0.95	
840	In house	474.832		-0.94	
841	ISO8124-5	522		0.55	
1051		-----		-----	
1213		460.05		-1.40	
2121		-----		-----	
2132		-----		-----	
2137	IEC62321-5	537.7		1.05	
2138		-----		-----	
2139		-----		-----	
2156	EPA3052	530.25		0.82	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287		-----		-----	
2290	CPSC-CH-E1003-09	494.1		-0.33	
2294		-----		-----	
2296	In house	447.2117		-1.81	
2301		-----		-----	
2310	EN16711-1	514		0.30	
2311	CPSC-CH-E1003-09	557.91		1.69	
2314	CPSC-CH-E1003-09	518		0.43	
2326	CPSC-CH-E1003-09	513.34		0.28	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350		-----		-----	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	C02.2.2	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370		-----		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	527		0.71	
2380		-----		-----	
2381	CPSC-CH-E1003-09	419.35		-2.69	
2382	CPSC-CH-E1003-09	no capability		-----	
2384	EPA3051	453.20		-1.62	
2385	EPA3052	455		-1.56	
2392	IEC62321-5	Not analyzed		-----	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	544.83	C	1.28	first reported 84.88
2426		-----		-----	
2429	CPSC-CH-E1003-09	504.1		-0.01	
2431	In house	573.66		2.19	
2449		-----		-----	
2453		-----		-----	
2459		-----		-----	
2460		-----		-----	
2480		-----		-----	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	271.303	C,R(0.01)	-7.37	first reported 351.498
2511		-----		-----	
2529		-----		-----	
2567	CPSC-CH-E1003-09	433.8		-2.23	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	607.74		3.26	
2590	CPSC-CH-E1003-09	453.11		-1.62	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	522.00		0.55	
2741	CPSC-CH-E1003-09	498.7		-0.18	
2799		-----		-----	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	560		1.76	
2835	ISO62321	514.93		0.33	
2864		-----		-----	
2912	CPSC-CH-E1003-09	484.064		-0.64	
2976		-----		-----	
2977	CPSC-CH-E1003-09	446.8		-1.82	
3015	ASTM F963	516.5		0.38	
3100	CPSC-CH-E1003-09	530.59		0.83	
3110		-----		-----	
3116		-----		-----	
3118	CPSC-CH-E1003-09	533.5592		0.92	
3172		-----		-----	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	521.78		0.55	
3199	EPA3051	Not tested		-----	
3214	EPA3052	502.82		-0.05	
3218		-----		-----	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

	normality	OK	
	n	33	
	outliers	3	
	mean (n)	504.461	
	st.dev. (n)	43.0212	RSD = 9%
	R(calc.)	120.459	
	st.dev.(Horwitz)	31.6324	
	R(Horwitz)	88.571	



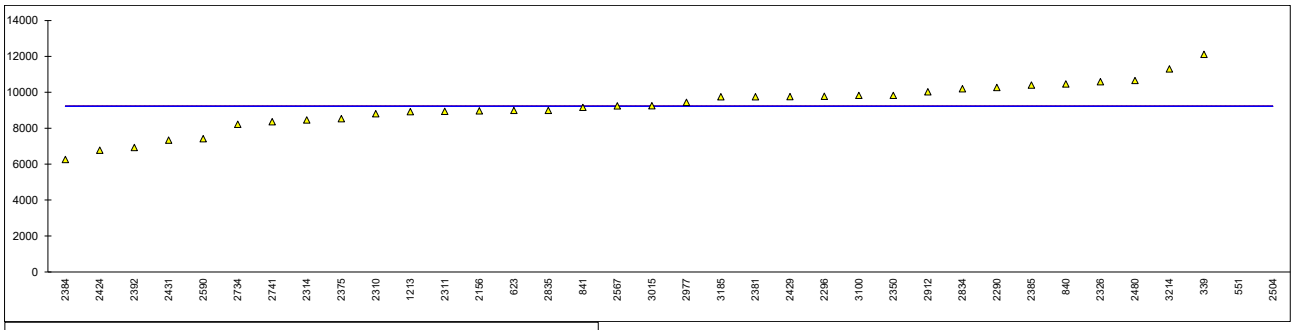


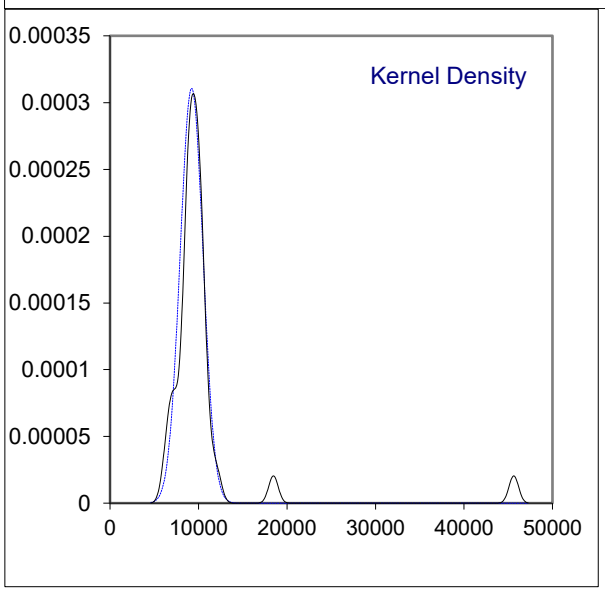
Determination of Total Aluminum as Al on sample #23551; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210		-----		-----	
339	In house	12109		-----	
551	CPSC-CH-E1003-09.1	18460.22	R(0.01)	-----	
623	In house	8986.29		-----	
840	In house	10458.20		-----	
841	ISO8124-5	9152		-----	
1051		-----		-----	
1213	EN16711-1/ISO11885	8916.17		-----	
2121		-----		-----	
2132		-----		-----	
2137		-----		-----	
2138		-----		-----	
2139		-----		-----	
2156	EPA3052	8959.00		-----	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	
2287		-----		-----	
2290	CPSC-CH-E1003-09	10267.3		-----	
2294		-----		-----	
2296	In house	9774.0898		-----	
2301		-----		-----	
2310	EN16711-1	8800		-----	
2311	CPSC-CH-E1003-09	8934.51		-----	
2314	ISO8124-5	8454		-----	
2326	CPSC-CH-E1003-09	10582.95		-----	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	9826		-----	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	ASTM F963	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370		-----		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	8530		-----	
2380		-----		-----	
2381	CPSC-CH-E1003-09	9748.50		-----	
2382	IEC62321-4/5	no capability		-----	
2384	EPA3051	6250.18		-----	
2385	EPA3052	10400		-----	
2392	IEC62321-5	6923.68		-----	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	6768.1	C	-----	first reported 228.46
2426		-----		-----	
2429	CPSC-CH-E1003-09	9754.0		-----	
2431	In house	7332.51		-----	
2449		-----		-----	
2453		-----		-----	
2459		-----		-----	
2460		-----		-----	
2480	In house	10650		-----	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	45608.800	C,R(0.01)	-----	first reported 4702.360
2511		-----		-----	
2529		-----		-----	
2567	CPSC-CH-E1003-09	9236.5		-----	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	not analyzed		-----	
2590	CPSC-CH-E1003-09	7415.50		-----	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	8213.70		-----	
2741	CPSC-CH-E1003-09	8356.7		-----	
2799		-----		-----	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	10200		-----	
2835	IEC62321	8997.15		-----	
2864		-----		-----	
2912	CPSC-CH-E1003-09	10026.59		-----	
2976		-----		-----	
2977		9433		-----	
3015	ASTM F963	9245		-----	
3100	EN16711-1	9820.70		-----	
3110		-----		-----	
3116		-----		-----	
3118		-----		-----	
3172		-----		-----	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	9748.06		-----	
3199	EPA3051	Not tested		-----	
3214	EPA3052	11292.49		-----	
3218		-----		-----	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

	normality	OK	
	n	34	
	outliers	2	
	mean (n)	9222.408	
	st.dev. (n)	1283.6207	RSD = 14%
	R(calc.)	3594.138	
	st.dev.(Horwitz)	(373.4185)	
	R(Horwitz)	(1045.572)	



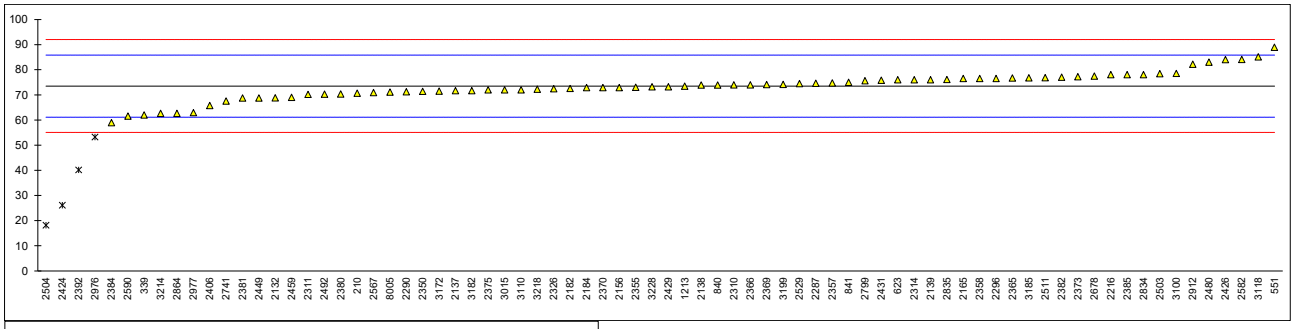


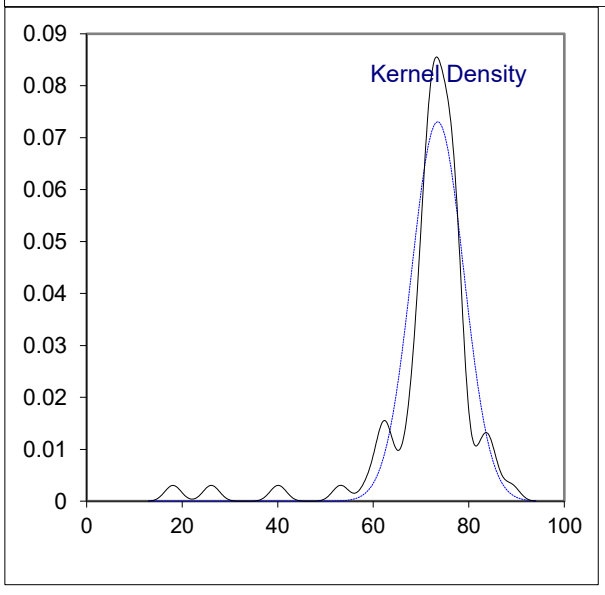
Determination of Total Cadmium as Cd on sample #23551; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	In house	70.641		-0.47	
339	In house	62	C	-1.87	first reported 58
551	CPSC-CH-E1003-09.1	88.895		2.50	
623	In house	75.95		0.40	
840	In house	73.936777		0.07	
841	ISO8124-5	75		0.24	
1051		-----		-----	
1213	EN16711-1/ISO11885	73.42		-0.01	
2121		-----		-----	
2132	CPSC-CH-E1003-09	68.80		-0.76	
2137	IEC62321-5	71.7		-0.29	
2138	CPSC-CH-E1003-09	73.9		0.06	
2139	CPSC-CH-E1003-09	76		0.40	
2156	EPA3052	72.90		-0.10	
2165	ASTM F963	76.5		0.49	
2170		-----		-----	
2182	EN1122	72.5		-0.16	
2184	CPSC-CH-E1003-09	72.9		-0.10	
2216	ASTM F963	78		0.73	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287	EPA3052	74.58		0.17	
2290	CPSC-CH-E1003-09	71.2		-0.37	
2294		-----		-----	
2296	In house	76.5166		0.49	
2301		-----		-----	
2310	EN16711-1	74		0.08	
2311	CPSC-CH-E1003-09	70.16		-0.54	
2314	ISO8124-5	76		0.40	
2326	CPSC-CH-E1003-09	72.38		-0.18	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	71.37		-0.35	
2355	EPA3052	73		-0.08	
2357	CPSC-CH-E1003-09	74.7		0.19	
2358	CPSC-CH-E1003-09	76.51		0.49	
2365	CPSC-CH-E1002-08	76.7		0.52	
2366	ASTM F963	74		0.08	
2369	EPA3052	74.08		0.09	
2370	EPA3052	72.9		-0.10	
2373	CPSC-CH-E1003-09	77.19		0.60	
2375	EN16711-1	72		-0.24	
2380	CPSC-CH-E1003-09	70.34		-0.51	
2381	CPSC-CH-E1003-09	68.70		-0.78	
2382	IEC62321-4/5	77		0.57	
2384	EPA3051	58.95		-2.36	
2385	EPA3052	78.0		0.73	
2392	IEC62321-5	40.12	C,R(0.01)	-5.42	first reported 50.19
2406	ASTM F963	65.78		-1.25	
2410		-----		-----	
2424	ASTM F2853	26.11	R(0.01)	-7.70	
2426	ASTM E1645	84		1.70	
2429	CPSC-CH-E1003-09	73.2		-0.05	
2431	In house	75.81		0.37	
2449	ASTM E1645	68.73		-0.78	
2453		-----		-----	
2459	EN 16711-1	69		-0.73	
2460		-----		-----	
2480	In house	83		1.54	
2492	CPSC-CH-E1003-09	70.3126		-0.52	
2503	ASTM F963	78.4		0.79	
2504	EPA3052	18.096	C,R(0.01)	-9.00	first reported 53.610
2511	CPSC-CH-E1003-09	76.832		0.54	
2529	CPSC-CH-E1003-09	74.48		0.16	
2567	CPSC-CH-E1003-09	70.9		-0.42	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	84.06		1.71	
2590	CPSC-CH-E1003-09	61.55		-1.94	
2622		-----		-----	
2678	CPSC-CH-E1003-09.1	77.5		0.65	
2734		-----		-----	
2741	CPSC-CH-E1003-09	67.5		-0.98	
2799	In house	75.6		0.34	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	78		0.73	
2835	IEC62321	76.10		0.42	
2864	CPSC-CH-E1003-09	62.63		-1.77	
2912	CPSC-CH-E1003-09	82.202		1.41	
2976	ASTM F963	53.2	R(0.05)	-3.30	
2977		62.9		-1.72	
3015	ASTM F963	72		-0.24	
3100	EN16711-1	78.53		0.82	
3110	ASTM F963	72		-0.24	
3116		-----		-----	
3118	CPSC-CH-E1003-09	85.1063		1.88	
3172	ISO8124-5	71.48		-0.33	
3182	CPSC-CH-E1003-09	71.7		-0.29	
3185	CPSC-CH-E1003-09	76.77		0.53	
3199	EPA3051	74.16		0.11	
3214	EPA3052	62.61		-1.77	
3218	EN16711-1	72.2		-0.21	
3225		-----		-----	
3228	CPSC-CH-E1003-09	73.17		-0.05	
8005		71.09		-0.39	

normality	suspect	
n	72	
outliers	4	
mean (n)	73.509	
st.dev. (n)	5.4608	RSD = 7%
R(calc.)	15.290	
st.dev.(Horwitz)	6.1595	
R(Horwitz)	17.247	



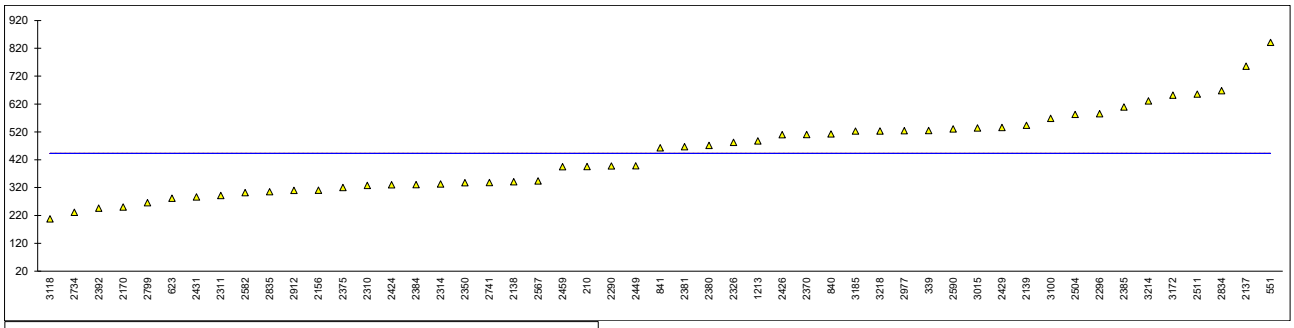


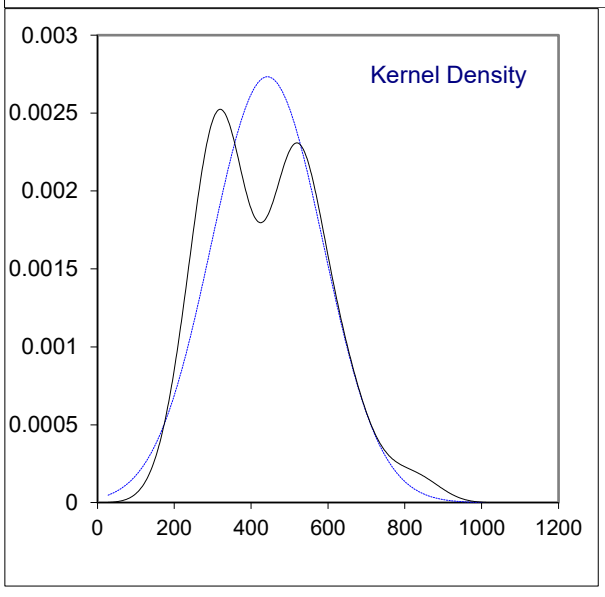
Determination of Total Cobalt as Co on sample #23551; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	In house	395.191		-----	
339	In house	525		-----	
551	CPSC-CH-E1003-09.1	840.8		-----	
623	In house	281.81		-----	
840	In house	512.128		-----	
841	ISO8124-5	463		-----	
1051		-----		-----	
1213	EN16711-1/ISO11885	487.19		-----	
2121		-----		-----	
2132		-----		-----	
2137	IEC62321-5	755.5		-----	
2138	CPSC-CH-E1003-09	341.0		-----	
2139	CPSC-CH-E1003-09	543		-----	
2156	EPA3052	310.20		-----	
2165		-----		-----	
2170	CPSC-CH-E1003-09	249.86		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287		-----		-----	
2290	CPSC-CH-E1003-09	397.4		-----	
2294		-----		-----	
2296	In house	585.2346		-----	
2301		-----		-----	
2310	EN16711-1	328		-----	
2311	CPSC-CH-E1003-09	291.62		-----	
2314	ISO8124-5	333		-----	
2326	CPSC-CH-E1003-09	482.59		-----	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	337.6		-----	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	ASTM F963	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370	EPA3052	510		-----	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	320		-----	
2380	CPSC-CH-E1003-09	471.70		-----	
2381	CPSC-CH-E1003-09	466.70		-----	
2382	IEC62321-4/5	no capability		-----	
2384	EPA3051	330.68		-----	
2385	EPA3052	609		-----	
2392	IEC62321-5	246.46		-----	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	330.16	C	-----	first reported 71.02
2426	ASTM E1645	509.6		-----	
2429	CPSC-CH-E1003-09	535.6		-----	
2431	In house	286.35		-----	
2449	ASTM E1645	398.28		-----	
2453		-----		-----	
2459	EN 16711-1	395		-----	
2460		-----		-----	
2480		-----		-----	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	582.505		-----	
2511	CPSC-CH-E1003-09	655.406		-----	
2529		-----		-----	
2567	CPSC-CH-E1003-09	343.5		-----	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	301.52		-----	
2590	CPSC-CH-E1003-09	530.32		-----	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	230.82		-----	
2741	CPSC-CH-E1003-09	338.1		-----	
2799	In house	265.8		-----	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	668		-----	
2835	IEC62321	304.83		-----	
2864		-----		-----	
2912	CPSC-CH-E1003-09	309.883		-----	
2976		-----		-----	
2977		524.0		-----	
3015	ASTM F963	534		-----	
3100	EN16711-1	568.06		-----	
3110		-----		-----	
3116		-----		-----	
3118	CPSC-CH-E1003-09	207.3836		-----	
3172	ISO8124-5	651.73		-----	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	522.6		-----	
3199	EPA3051	Not tested		-----	
3214	EPA3052	630.59		-----	
3218	EN16711-1	523.4		-----	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

normality	OK	
n	51	
outliers	0	
mean (n)	442.394	
st.dev. (n)	145.9795	RSD = 33%
R(calc.)	408.743	
st.dev.(Horwitz)	(28.2941)	
R(Horwitz)	(79.223)	



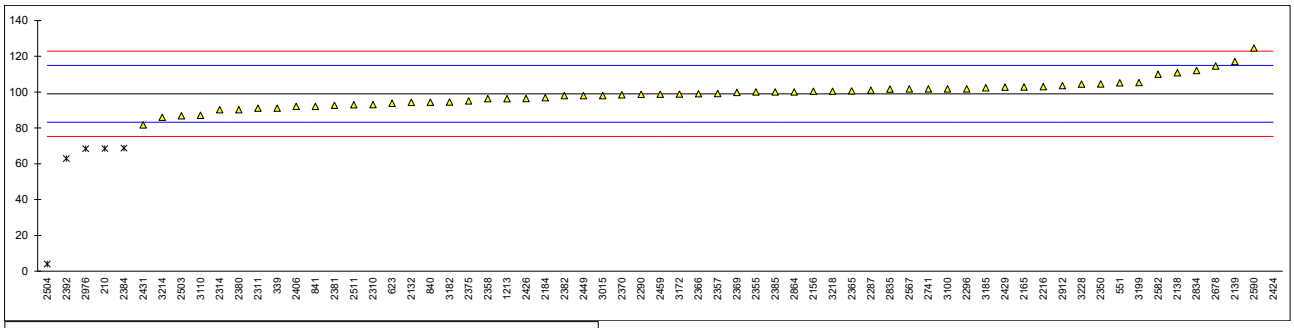


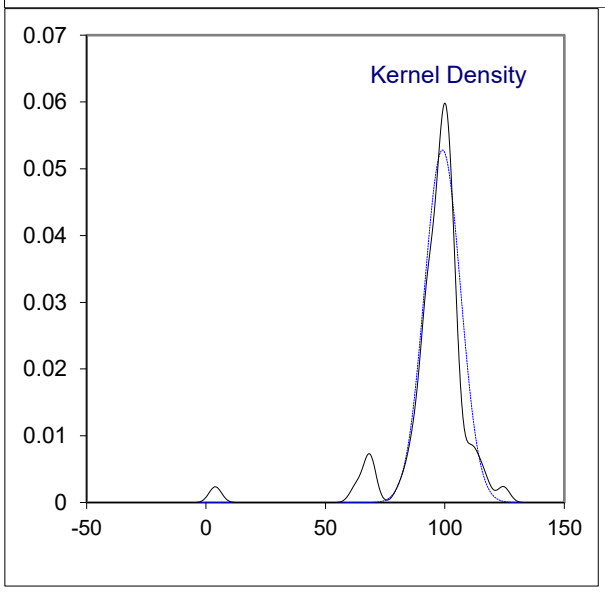
Determination of Total Mercury as Hg on sample #23551; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	In house	68.487	R(0.05)	-3.85	
339	In house	91		-1.01	
551	CPSC-CH-E1003-09.1	105.11		0.76	
623	In house	93.66		-0.68	
840	In house	94.383214		-0.59	
841	ISO8124-5	92		-0.89	
1051		-----		-----	
1213	EN16711-1/ISO11885	96.32		-0.34	
2121		-----		-----	
2132	CPSC-CH-E1003-09	94.29		-0.60	
2137		-----		-----	
2138	CPSC-CH-E1003-09	110.8		1.48	
2139	CPSC-CH-E1003-09	117		2.26	
2156	EPA3052	100.40		0.17	
2165	ASTM F963	102.8		0.47	
2170		-----		-----	
2182		-----		-----	
2184	CPSC-CH-E1003-09	96.8		-0.28	
2216	ASTM F963	103		0.50	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287	EPA3052	101.0		0.25	
2290	CPSC-CH-E1003-09	98.7		-0.04	
2294		-----		-----	
2296	In house	101.7337		0.34	
2301		-----		-----	
2310	EN16711-1	93		-0.76	
2311	CPSC-CH-E1003-09	90.93		-1.02	
2314	ISO8124-5	90.1		-1.13	
2326	CPSC-CH-E1003-09	ND		-----	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	104.5		0.69	
2355	EPA3052	100		0.12	
2357	CPSC-CH-E1003-09	99.2		0.02	
2358	CPSC-CH-E1003-09	96.31		-0.34	
2365	CPSC-CH-E1002-08	100.6		0.20	
2366	ASTM F963	99		-0.01	
2369	EPA3052	99.73		0.09	
2370	EPA3052	98.4		-0.08	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	95		-0.51	
2380	CPSC-CH-E1003-09	90.12		-1.12	
2381	CPSC-CH-E1003-09	92.60		-0.81	
2382	IEC62321-4/5	98		-0.13	
2384	EPA3051	68.67	R(0.05)	-3.83	
2385	EPA3052	100		0.12	
2392	IEC62321-5	62.88	R(0.05)	-4.56	
2406	ASTM F963	91.98		-0.89	
2410		-----		-----	
2424	ASTM F2853	65772.17	C,R(0.01)	8276.61	first reported 22.25
2426	ASTM E1645	96.36		-0.34	
2429	CPSC-CH-E1003-09	102.7		0.46	
2431	In house	81.69		-2.19	
2449	ASTM E1645	98		-0.13	
2453		-----		-----	
2459	EN 16711-1	98.77		-0.03	
2460		-----		-----	
2480		-----		-----	
2492		-----		-----	
2503	ASTM F963	86.7		-1.56	
2504	EPA3052	3.925	C,R(0.01)	-11.99	first reported 18.215
2511	CPSC-CH-E1003-09	92.898		-0.77	
2529		-----		-----	
2567	CPSC-CH-E1003-09	101.7		0.34	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	109.95		1.37	
2590	CPSC-CH-E1003-09	124.55		3.21	
2622		-----		-----	
2678	CPSC-CH-E1003-09.1	114.45		1.94	
2734		-----		-----	
2741	CPSC-CH-E1003-09	101.7		0.34	
2799		-----		-----	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	112		1.63	
2835	IEC62321	101.65		0.33	
2864	CPSC-CH-E1003-09	100.03		0.12	
2912	CPSC-CH-E1003-09	103.599		0.57	
2976	ASTM F963	68.4	R(0.05)	-3.86	
2977		-----	W	-----	test result withdrawn, reported 71.2
3015	ASTM F963	98		-0.13	
3100	EN16711-1	101.73		0.34	
3110	ASTM F963	87		-1.52	
3116		-----		-----	
3118		-----		-----	
3172	ISO8124-5	98.80		-0.03	
3182	CPSC-CH-E1003-09	94.4		-0.58	
3185	CPSC-CH-E1003-09	102.36		0.42	
3199	EPA3051	105.22		0.78	
3214	EPA3052	85.87		-1.66	
3218	EN16711-1	100.4		0.17	
3225		-----		-----	
3228	CPSC-CH-E1003-09	104.43		0.68	
8005		-----		-----	

normality	suspect	
n	59	
outliers	6	
mean (n)	99.041	
st.dev. (n)	7.5572	RSD = 8%
R(calc.)	21.160	
st.dev.(Horwitz)	7.9348	
R(Horwitz)	22.217	



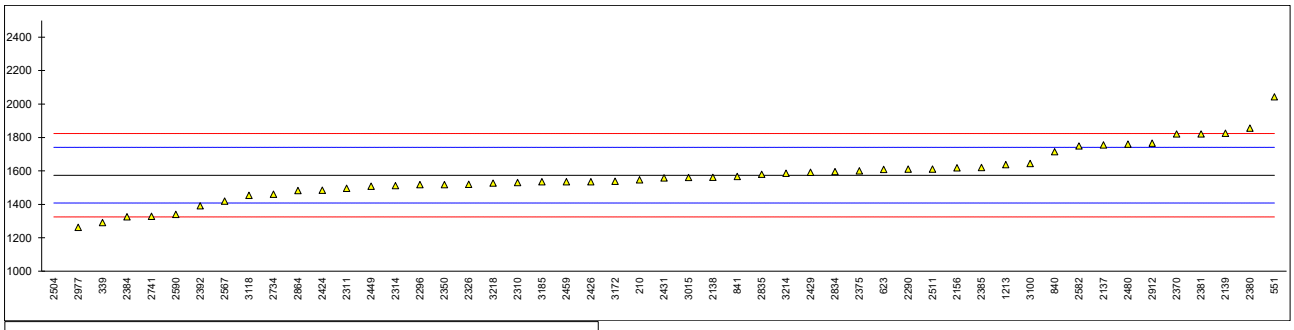


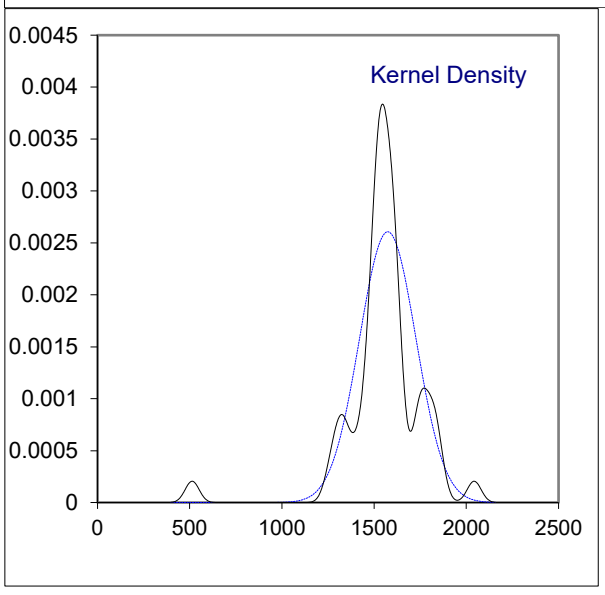
Determination of Total Nickel as Ni on sample #23551; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	In house	1546.547		-0.33	
339	In house	1291		-3.40	
551	CPSC-CH-E1003-09.1	2042.5		5.63	
623	In house	1607.98		0.41	
840	In house	1714.20336		1.68	
841	ISO8124-5	1567		-0.09	
1051		-----		-----	
1213	EN16711-1/ISO11885	1637.71		0.77	
2121		-----		-----	
2132		-----		-----	
2137	IEC62321-5	1755		2.18	
2138	CPSC-CH-E1003-09	1561		-0.16	
2139	CPSC-CH-E1003-09	1825		3.02	
2156	EPA3052	1618.50		0.53	
2165		-----		-----	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2216		-----		-----	
2256		-----		-----	
2258	16CFR1303	not detected		-----	Possibly a false negative test result?
2287		-----		-----	
2290	CPSC-CH-E1003-09	1609.9		0.43	
2294		-----		-----	
2296	In house	1517.7503		-0.68	
2301		-----		-----	
2310	EN16711-1	1530		-0.53	
2311	CPSC-CH-E1003-09	1495.39		-0.95	
2314	ISO8124-5	1511		-0.76	
2326	CPSC-CH-E1003-09	1519.61		-0.66	
2330	CPSC-CH-E1003-09.1	not determined		-----	
2347		-----		-----	
2350	CPSC-CH-E1003-09	1518		-0.67	
2355		-----		-----	
2357	CPSC-CH-E1003-09	not analyzed		-----	
2358	CPSC-CH-E1003-09	na		-----	
2365		-----		-----	
2366	ASTM F963	out cap		-----	
2369	EPA3052	not analyzed		-----	
2370	EPA3052	1820		2.96	
2373	CPSC-CH-E1003-09	not applicable		-----	
2375	EN16711-1	1600		0.31	
2380	CPSC-CH-E1003-09	1855.44		3.38	
2381	CPSC-CH-E1003-09	1820.20		2.96	
2382	IEC62321-4/5	no capability		-----	
2384	EPA3051	1325.73		-2.99	
2385	EPA3052	1620		0.55	
2392	IEC62321-5	1390.67		-2.21	
2406		-----		-----	
2410		-----		-----	
2424	ASTM F2853	1484.41	C	-1.08	first reported 440.37
2426	ASTM E1645	1535.19		-0.47	
2429	CPSC-CH-E1003-09	1591		0.20	
2431	In house	1557.66		-0.20	
2449	ASTM E1645	1508		-0.79	
2453		-----		-----	
2459	EN 16711-1	1535		-0.47	
2460		-----		-----	
2480	In house	1760		2.24	
2492		-----		-----	
2503		-----		-----	
2504	EPA3052	513.460	C,R(0.01)	-12.75	first reported 1013.373
2511	CPSC-CH-E1003-09	1609.966		0.43	
2529		-----		-----	
2567	CPSC-CH-E1003-09	1419.0		-1.86	
2572		-----		-----	
2573		-----		-----	
2582	CPSC-CH-E1003-09	1749.07		2.10	
2590	CPSC-CH-E1003-09	1339.79		-2.82	
2622		-----		-----	
2678		-----		-----	
2734	EN16711-1	1460.20		-1.37	
2741	CPSC-CH-E1003-09	1328.1		-2.96	
2799		-----		-----	

lab	method	value	mark	z(targ)	remarks
2834	ISO11885	1596		0.26	
2835	IEC62321	1579.27		0.06	
2864	CPSC-CH-E1003-09	1482.62		-1.10	
2912	CPSC-CH-E1003-09	1765.125		2.30	
2976		-----		-----	
2977		1262		-3.75	
3015	ASTM F963	1560		-0.17	
3100	EN16711-1	1643.80		0.84	
3110		-----		-----	
3116		-----		-----	
3118	CPSC-CH-E1003-09	1453.6659		-1.45	
3172	ISO8124-5	1537.5		-0.44	
3182	CPSC-CH-E1003-09	not analyzed		-----	
3185	CPSC-CH-E1003-09	1534.60		-0.47	
3199	EPA3051	Not tested		-----	
3214	EPA3052	1585.20		0.13	
3218	EN16711-1	1527.0		-0.57	
3225		-----		-----	
3228		-----		-----	
8005		-----		-----	

normality	OK	
n	50	
outliers	1	
mean (n)	1574.086	
st.dev. (n)	152.9625	RSD = 10%
R(calc.)	428.295	
st.dev.(Horwitz)	83.1664	
R(Horwitz)	232.866	





APPENDIX 2 Other reported elements

sample #23550; results in mg/kg

lab	Sb	As	Cd	Cr
210	-----	-----	-----	-----
339	not detected	not detected	not detected	not detected
551	-----	2.180	-----	2.741
623	Not Detected	Not Detected	Not Detected	Not Detected
840	not detected	not detected	not detected	not detected
841	<10	<10	<10	<10
1051	-----	-----	-----	-----
1213	not detected	not detected	not detected	not detected
2121	-----	-----	-----	-----
2132	<10	<10	<10	<10
2137	-----	-----	-----	-----
2138	-----	-----	-----	-----
2139	-----	-----	-----	-----
2156	<10	<3	<1	<5
2165	-----	-----	not detected	not detected
2170	-----	-----	-----	-----
2182	-----	-----	-----	-----
2184	-----	-----	not detected	not detected
2216	Not Detected	Not Detected	Not Detected	Not Detected
2256	-----	-----	-----	-----
2258	not detected	not detected	not detected	not detected
2287	-----	<5	<5	<5
2290	<20	<20	<20	<20
2294	-----	-----	-----	-----
2296	5.2981	0.1271	0.7330	4.3642
2301	-----	-----	-----	-----
2310	not detected	not detected	not detected	not detected
2311	Not Detected	Not Detected	Not Detected	Not Detected
2314	-----	-----	-----	-----
2326	ND	ND	ND	ND
2330	not determined	not determined	not determined	not determined
2347	-----	-----	-----	-----
2350	< 10	< 10	< 5	< 5
2355	-----	-----	<2	-----
2357	not analyzed	not analyzed	<5	<10
2358	na	na	nd	na
2365	＜10	＜10	＜10	＜5
2366	<20	<20	<5	<5
2369	not analyzed	not analyzed	<2	not analyzed
2370	-----	-----	-----	-----
2373	not applicable	not applicable	not detected	not applicable
2375	<10	<10	<10	<10
2380	-----	-----	-----	-----
2381	-----	-----	-----	-----
2382	no capability	no capability	no capability	no capability
2384	Not Detected	Not Detected	Not Detected	Not Detected
2385	<10	<10	<1	2.02
2392	Not detected	Not detected	Not detected	Not detected
2406	<20	<20	<20	<20
2410	-----	-----	-----	-----
2424	0.53 C	1.91 C	1.66 C	2.25 C
2426	-----	-----	n.d.	n.d.
2429	<10	<10	<10	<10
2431	-----	-----	-----	-----
2449	-----	-----	-----	-----
2453	-----	-----	-----	-----
2459	-----	ND	ND	ND
2460	-----	-----	-----	-----
2480	-----	-----	-----	-----
2492	-----	-----	-----	-----
2503	-----	3.3	-----	1.9
2504	<5	<5	<2	<2
2511	-----	-----	-----	-----
2529	-----	-----	-----	-----
2567	<20	<20	<20	<20
2572	-----	-----	-----	-----
2573	-----	-----	-----	-----
2582	<5	<5	<5	<5
2590	< L.O.Q.	< L.O.Q.	< L.O.Q.	< L.O.Q.
2622	-----	-----	-----	-----
2678	-----	Not detected	Not detected	-----
2734	-----	-----	-----	-----
2741	<50	<2.5	<5	<5
2799	-----	not detected	not detected	not detected

lab	Sb	As	Cd	Cr
2834	not detected	not detected	not detected	1.8
2835	not detected	not detected	0.10	1.53
2864	not determined	not determined	not determined	-----
2912	< 1	< 1	< 1	2.511
2976	-----	-----	-----	-----
2977	not detected	not detected	not detected	not detected
3015	<10	<10	<10	<10
3100	＜10	＜5	＜5	＜20
3110	-----	-----	-----	-----
3116	<10	<7	<10	<7
3118	<5	<2,5	<5	<5
3172	< 10	< 10	< 5	< 10
3182	not analyzed	not analyzed	<5	not analyzed
3185	<10	<10	<10	<10
3199	None detected	None detected	None detected	None detected
3214	<20	<20	<20	<20
3218	<10	<10	<10	<10
3225	-----	-----	-----	-----
3228	-----	-----	-----	-----
8005	-----	-----	-----	-----

lab 2424 first reported Sb 0; As 0.032; Cd 0.006; Cr0.036

sample #23550; results in mg/kg - continued

lab	Hg	Ni	Se	Zn
210	-----	-----	-----	-----
339	not detected	not detected	not detected	10
551	-----	1.631	0.246	15.34
623	Not Detected	Not Detected	Not Detected	Not Detected
840	not detected	not detected	not detected	not detected
841	<10	<10	<10	<10
1051	-----	-----	-----	-----
1213	not detected	not detected	not detected	not detected
2121	-----	-----	-----	-----
2132	<10	-----	-----	-----
2137	-----	-----	-----	-----
2138	-----	-----	-----	-----
2139	-----	-----	-----	-----
2156	<5	<5	<10	<10
2165	not detected	-----	-----	-----
2170	-----	-----	-----	-----
2182	-----	-----	-----	-----
2184	not detected	-----	-----	-----
2216	Not Detected	-----	Not Detected	-----
2256	-----	-----	-----	-----
2258	not detected	not detected	not detected	not detected
2287	<5	-----	-----	-----
2290	<20	<20	<20	<20
2294	-----	-----	-----	-----
2296	17.6820	4.8768	9.2504	9.0781
2301	-----	-----	-----	-----
2310	not detected	not detected	not detected	not detected
2311	Not Detected	Not Detected	Not Detected	Not Detected
2314	-----	-----	-----	-----
2326	ND	ND	ND	ND
2330	not determined	not determined	not determined	not determined
2347	-----	-----	-----	-----
2350	< 2	< 5	< 10	< 5
2355	<2	-----	-----	-----
2357	<5	not analyzed	not analyzed	not analyzed
2358	nd	na	na	na
2365	＜5	-----	＜10	-----
2366	<5	out cap	<20	out cap
2369	<2	not analyzed	not analyzed	not analyzed
2370	-----	-----	-----	-----
2373	not applicable	not applicable	not applicable	not applicable
2375	<10	<10	<10	<10
2380	-----	-----	-----	-----
2381	-----	-----	-----	-----
2382	no capability	no capability	no capability	no capability
2384	Not Detected	Not Detected	Not Detected	3.10
2385	<0.5	<5	<5	<10
2392	Not detected	Not detected	Not detected	Not detected
2406	<20	-----	<20	-----
2410	-----	-----	-----	-----
2424	194.96 C	1.95 C	2.27 C	7.85 C
2426	n.d.	n.d.	-----	-----
2429	<10	<10	<10	<10
2431	-----	-----	-----	-----
2449	-----	-----	-----	-----
2453	-----	-----	-----	-----
2459	ND	ND	ND	-----
2460	-----	-----	-----	-----
2480	-----	-----	-----	-----
2492	-----	-----	-----	-----
2503	2.4	-----	-----	-----
2504	<2	<5	<5	<5
2511	-----	-----	-----	-----
2529	-----	-----	-----	-----
2567	<20	<20	<20	<20
2572	-----	-----	-----	-----
2573	-----	-----	-----	-----
2582	<5	<5	not detected	not analyzed
2590	-----	-----	-----	-----
2622	-----	-----	-----	-----
2678	Not detected	-----	-----	-----
2734	-----	-----	-----	30.30
2741	<10	<10	<50	<50
2799	-----	-----	not detected	9.11 C
2834	not detected	1.0	not detected	7
2835	not detected	0.86	not detected	6.33

lab	Hg	Ni	Se	Zn
2864	not determined	not determined	not determined	-----
2912	0.091	1.039	< 1	10.354
2976	-----	-----	-----	-----
2977	not detected	not detected	not detected	not detected
3015	<10	<10	<10	<10
3100	＜10	＜10	＜10	＜20
3110	-----	-----	-----	-----
3116	<5	-----	<10	-----
3118	<5	<5	<5	<5
3172	< 10	< 10	-----	-----
3182	<13	not analyzed	not analyzed	not analyzed
3185	<10	<10	<10	<20
3199	None detected	Not tested	None detected	Not tested
3214	<20	<20	<20	<20
3218	<10	<10	-----	-----
3225	-----	-----	-----	-----
3228	-----	-----	-----	-----
8005	<2.5	-----	-----	-----

lab 2424 first reported Hg 2.72; Ni 0.06; Se 0.003; Zn 0.15
lab 2799 first reported 39.38

sample #23551; results in mg/kg

lab	Sb	As	Cr	Cu	Pb
210	-----	-----	5.847	3.565	-----
339	not detected	not detected	18 C	not detected	not detected
551	0.717	2.931	8.375	23.883	2.057
623	Not detected	Not detected	Not detected	Not detected	Not detected
840	not detected	not detected	not detected	not detected	not detected
841	<10	<10	<10	<10	<10
1051	-----	-----	-----	-----	<10
1213	not detected	not detected	not detected	not detected	not detected
2121	-----	-----	-----	-----	<LQ
2132	<10	<10	<10	-----	-----
2137	-----	-----	-----	-----	-----
2138	-----	-----	-----	-----	-----
2139	-----	-----	-----	-----	-----
2156	<10	<3	5.08	<5	<10
2165	-----	-----	not detected	-----	not detected
2170	-----	-----	-----	-----	-----
2182	-----	-----	-----	-----	-----
2184	-----	-----	not detected	-----	not detected
2216	Not Detected	Not Detected	Not Detected	-----	Not Detected
2256	-----	-----	-----	-----	ND
2258	not detected	not detected	not detected	not detected	not detected
2287	-----	<5	5.193	-----	<5
2290	<20	<20	<20	<20	<20
2294	-----	-----	-----	-----	Not detected
2296	1.8696	2.1378 C	7.6430	4.7179	2.8619
2301	-----	-----	-----	-----	-----
2310	not detected	not detected	not detected	not detected	not detected
2311	Not Detected	Not Detected	<5	Not Detected	Not Detected
2314	-----	-----	-----	-----	-----
2326	ND	ND	ND	ND	ND
2330	not determined	not determined	not determined	not determined	not detected
2347	-----	-----	-----	-----	<20
2350	< 10	< 10	< 5	< 5	< 20
2355	-----	-----	-----	-----	<20
2357	not analyzed	not analyzed	<10	not analyzed	<10
2358	na	na	na	na	nd
2365	＜10	＜10	6.7	-----	＜5
2366	<20	<20	10	out cap	<10
2369	not analyzed	not analyzed	not analyzed	not analyzed	<2
2370	<2	<2	6.27	<5	<2
2373	not applicable	not applicable	not applicable	not applicable	not detected
2375	<10	<10	<10	<10	<10
2380	-----	-----	-----	-----	-----
2381	-----	-----	-----	-----	-----
2382	no capability	no capability	no capability	no capability	not detected
2384	Not Detected	Not Detected	4.22	3.16	Not Detected
2385	<10	<5	5.0	<5	<5
2392	Not detected	Not detected	Not detected	Not detected	Not detected
2406	<20	<20	<20	-----	<20
2410	-----	-----	-----	-----	-----
2424	0.12	0.42	5.08 C	5.09 C	3.09
2426	-----	-----	n.d.	n.d.	n.d.
2429	<10	<10	<10	<10	<10
2431	-----	-----	6.20	-----	-----
2449	-----	-----	-----	-----	-----
2453	-----	-----	-----	-----	<LQ [24mg/kg]
2459	ND	ND	ND	ND	ND
2460	-----	-----	-----	-----	-----
2480	-----	-----	-----	-----	<25
2492	-----	-----	-----	-----	-----
2503	-----	2.3	6.2	-----	-----
2504	352.585	<5	<2	<5	<2
2511	-----	-----	-----	-----	-----
2529	-----	-----	-----	-----	-----
2567	<20	<20	<20	<20	<20
2572	-----	-----	-----	-----	-----
2573	-----	-----	-----	-----	-----
2582	<5	<5	<5	not analyzed	<5
2590	< L.O.Q.	< L.O.Q.	-----	-----	< L.O.Q.
2622	-----	-----	-----	-----	<10
2678	-----	Not detected	-----	-----	Not detected
2734	-----	-----	-----	-----	14.73
2741	<50	<2.5	<5	<100	<10
2799	-----	not detected	3.84 C	not detected	not detected
2834	not detected	1.3	5.6	4.7	not detected
2835	not detected	not detected	5.13	3.90	not detected

lab	Sb	As	Cr	Cu	Pb
2864	not determined	not determined	-----	-----	not determined
2912	< 1	< 1	6.415	9.169	1.337
2976	-----	-----	-----	-----	-----
2977	not detected	not detected	not detected	not detected	not detected
3015	<10	<10	<10	<10	<10
3100	＜10	＜5	＜20	＜10	＜10
3110	-----	-----	-----	-----	-----
3116	-----	-----	-----	-----	<10
3118	<5	<2,5	<5	<5	<5
3172	< 10	< 10	< 10	-----	< 5
3182	not analyzed	not analyzed	not analyzed	not analyzed	<13
3185	<10	<10	<10	<10	<10
3199	None detected	None detected	None detected	Not tested	None detected
3214	<20	<20	<20	<30	<20
3218	<10	<10	<10	<10	<10
3225	-----	-----	-----	-----	<15
3228	-----	-----	-----	-----	-----
8005	-----	-----	-----	-----	-----

lab 339 first reported Cr 14
lab 2296 first reported As 67.9950
lab 2424 first reported Sb 0.019; As 0.022; Cr 0.051; Cu 0; Pb 0.09
lab 2799 first reported Cr 18.49

sample #23551; results in mg/kg - continued

lab	Mn	Se	Sr	Zn
210	-----	-----	-----	-----
339	not detected	not detected	not detected	15
551	6.733	0.734	7.361	58.97
623	Not detected	Not detected	Not detected	Not detected
840	not detected	not detected	not detected	not detected
841	<10	<10	<10	<10
1051	-----	-----	-----	-----
1213	not detected	not detected	not detected	not detected
2121	-----	-----	-----	-----
2132	-----	-----	-----	-----
2137	-----	-----	-----	-----
2138	-----	-----	-----	-----
2139	-----	-----	-----	-----
2156	<5	<10	4.37	<10
2165	-----	-----	-----	-----
2170	-----	-----	-----	-----
2182	-----	-----	-----	-----
2184	-----	-----	-----	-----
2216	-----	Not Detected	-----	-----
2256	-----	-----	-----	-----
2258	not detected	not detected	not detected	not detected
2287	-----	-----	-----	-----
2290	<20	<20	<20	<20
2294	-----	-----	-----	-----
2296	3.5410	1.1861	3.2324	6.7539
2301	-----	-----	-----	-----
2310	not detected	not detected	not detected	9.2
2311	<5	Not Detected	<5	Not Detected
2314	-----	-----	-----	8.6
2326	ND	ND	ND	ND
2330	not determined	not determined	not determined	not determined
2347	-----	-----	-----	-----
2350	< 5	< 10	-----	< 5
2355	-----	-----	-----	-----
2357	not analyzed	not analyzed	not analyzed	not analyzed
2358	na	na	na	na
2365	-----	＜10	-----	-----
2366	out cap	<20	out cap	out cap
2369	not analyzed	not analyzed	not analyzed	not analyzed
2370	-----	<2	-----	-----
2373	not applicable	not applicable	not applicable	not applicable
2375	<10	<10	<10	<10
2380	-----	-----	-----	-----
2381	-----	-----	-----	-----
2382	no capability	no capability	no capability	no capability
2384	2.73	Not Detected	3.25	Not Detected
2385	<5	<5	<10	<10
2392	Not detected	Not detected	Not analyzed	14.99
2406	-----	<20	-----	-----
2410	-----	-----	-----	-----
2424	4.34	0.81 C	13.53 C	12.92 C
2426	n.d.	-----	-----	-----
2429	<10	<10	<10	<10
2431	-----	-----	-----	-----
2449	-----	-----	-----	-----
2453	-----	-----	-----	-----
2459	ND	ND	ND	-----
2460	-----	-----	-----	-----
2480	-----	-----	-----	-----
2492	-----	-----	-----	-----
2503	-----	-----	-----	-----
2504	<5	<5	<5	<5
2511	-----	-----	-----	-----
2529	-----	-----	-----	-----
2567	<20	<20	<20	<20
2572	-----	-----	-----	-----
2573	-----	-----	-----	-----
2582	<5	<5	<5	not analyzed
2590	3.23	< L.O.Q.	-----	< L.O.Q.
2622	-----	-----	-----	-----
2678	-----	-----	-----	-----
2734	-----	-----	-----	-----
2741	<50	<50	<50	<50
2799	6.63	not detected	3.37	-----
2834	4.2	not detected	not detected	3
2835	3.48	not detected	4.04	4.59

lab	Mn	Se	Sr	Zn
2864	-----	not determined	-----	-----
2912	4.463	< 1	5.160	22.671
2976	-----	-----	-----	-----
2977	not detected	not detected	not detected	not detected
3015	<10	<10	<10	<10
3100	＜10	＜10	＜10	＜20
3110	-----	-----	-----	-----
3116	-----	-----	-----	-----
3118	<5	<5	<5	<5
3172	-----	-----	-----	-----
3182	not analyzed	not analyzed	not analyzed	not analyzed
3185	<10	<10	<10	<20
3199	Not tested	None detected	Not tested	Not tested
3214	<20	<20	<20	<20
3218	-----	-----	-----	-----
3225	-----	-----	-----	-----
3228	-----	-----	-----	-----
8005	-----	-----	-----	-----

lab 2424 first reported Se 0.015; Sr 1.01; Zn 0,02

APPENDIX 3 Analytical Details

lab	ISO17025 accr.	Sample intake	Acid used for the digestion	Concentration of the acid (%)
210	Yes			
339	Yes	0,1 g	HNO3, H2O2, HF	16% HNO3, 4% H2O2, 4% HF
551	Yes	0.1 grams	HNO3(6mL) - HF (2mL)	
623	Yes	0.1	HNO3 & H2O2	65%
840	Yes	0.3g	7HNO3:2HCl	14%
841	---	0.1g	HNO3+HCl+H2O2	
1051	Yes	0.18	HNO3	67%
1213	Yes	0.5g	HNO3 + H2O + HCl	
2121	Yes	50 mg	Nitric Acid	69,5%
2132	Yes	0.06g	HNO3+H2O2	65% HNO3
2137	Yes	0.05	HNO3	70%
2138	---			
2139	Yes	0.05 grams	HNO3, HCl, HF	about 25%
2156	Yes	0.1 g	Nitric Acid and Hydrochloric Acid	Nitric acid 65%, Hydrochloric acid 37%.
2165	Yes	0.1g nearest 0.0001g	2.5mL conc. HNO3	Nitric Acid 69.0%~70.0%
2170	Yes	0.1g	Nitric Acid	65%
2182	Yes			
2184	Yes	0.1g	nitric acid	20%
2216	Yes	#23550 - 0.0725 g #23551 - 0.0688 g	Nitric acid	~67%
2256	Yes	23550：0.0839g 23551: 0.1047g	HNO3	69%-70%
2258	No	0.0226	nitric	40%
2287	Yes	0.1g	NO3+HCL	5%
2290	Yes			
2294	Yes	#23550: 0.0505 g #23551: 0.0503 g	Nitric Acid Baker Instra	8.34%
2296	Yes	100mg	10ml of 43% (m/m) Nitric Acid and 50ml of 37% (m/m) Hydrochloric Acid	10ml of 43% (m/m) Nitric Acid and 50ml of 37% (m/m) Hydrochloric Acid
2301	---			
2310	Yes	0.2gram	Conc.nitric acid	69-70%
2311	Yes	0.05	Nitric Acid	69
2314	Yes	0.1 gms	Nitric acid	69%
2326	Yes	S#23550 = 0.241GM S#23551 = 0.2062GM	HNO3 + H2O2	65% + 28 %
2330	Yes	100 mg	HNO3 + H2O2	65% HNO3 30% H2O2
2347	Yes	0.1g	6.5ml HNO3+1ml H2O2	25%
2350	Yes	approxximately 0.1g	Nitric acid	Nitric acid 70 %
2355	Yes	0.2 g	#23550:10 mLHNO3+2 mLH2O2 #23551:7 mLHNO3+1 mLHCl+2 mLHF	22%
2357	---			
2358	Yes	0.25g	Nitric Acid	65%
2365	Yes	0.15g	HBF4,H2O2,HNO3	
2366	---			
2369	---			
2370	Yes	0.1 g	nitric acid 、hydrofluoric acid	20% nitric acid 、8% hydrofluoric acid
2373	Yes	0.1g	nitric acid	65%~68%
2375	Yes	0.1 gram	HNO3 + H2O2	
2380	Yes	0.05 gm	65% Nitric acid and 30% Hydrogen peroxide	15%
2381	Yes	0.05 gm	Nitric Acid	65%
2382	Yes	0.5g	nitric acid、hydrochloric acid	10%
2384	Yes	0.1grams	nitric acid	65%
2385	Yes	~0.12	Nitric acid / hydrochlorid acid	67-69 % / 34-37 %
2392	Yes	0.5 g	HNO3 : H2O2 10 ml : 1 ml	Nitric acid 65 % Hydrogen peroxide 30%
2406	Yes	Sample #23550: 0.0415g Sample #23551: 0.0374g	Nitric acid	69%
2410	Yes	0.05 g	HNO3	69 ~ 71 %
2424	Yes	0.1 g	HCl	0.25
2426	Yes	#23550 0.1132 g #23551 0.1025 g	Nitric Acid	25%
2429	Yes	0.1005g	3mlHNO3+1mlHCl	5%HNO3
2431	Yes	0.1	HNO3, HCl	5%
2449	---			
2453	---			

lab	ISO17025 accr.	Sample intake	Acid used for the digestion	Concentration of the acid (%)
2459	Yes	0.1gm	HNO3 & H2O2	69%
2460	---			
2480	Yes	0.2g	HCl / HNO3	
2492	Yes	0.1g	nitric acid	69%
2503	Yes	0,1015 for 23550 and 0,1075 for 23551	HCl	0.07 M
2504	Yes	0.10-0.125 g	Nitric acid , HF , Hydrogenperoxide	10%
2511	---			
2529	No	0.030 grams per trial, three trials per sample	Nitric acid, 5 mL	68-70% (v/v)
2567	Yes	0.1	Nitric acid	65
2572	---			
2573	---			
2582	Yes	#23550 - 0.1020 #23551 - 0.1020	Con.HNO3	69%
2590	Yes	0.1 gr	HNO3	2.5%
2622	Yes	0.1147	Nitric acid	65
2678	Yes	0.1grams	Nitric acid	67
2734	Yes	0.25	HNO3	69%
2741	Yes	0.1g	HNO3 + H2O2	3% (v/v)
2799	Yes	210mg	Conc. HNO3	65%
2834	Yes	0,1 g	HNO3 and HCl	HNO3: 65% HCl: 37 %
2835	Yes	0.2 g (sample)	HNO3 H202	HNO3-69.50 % H202-30.32 %
2864	Yes	0.1 grams	HNO3/HCl=1:3	HNO3 65% HCL 37%
2912	Yes	0.05	nitric acid	
2976	No	0.10g	5ml HNO3	HNO3 65%
2977	Yes	0,1 g	HNO3, HCl, HF	about 10%
3015	Yes	0.1	HNO3	65
3100	Yes	#23550:0.1051g; #23551:0.1002g	nitric acid	65%~68%
3110	---			
3116	Yes	#23550: 0.05 #23551: 0.1	Nitric acid	Concentrated
3118	Yes	0,1 gram	HNO3 H2O2	HNO3 65% H2O2 30%
3172	Yes			
3182	Yes	0.1 g	Nitric acid	65%
3185	Yes	0.1g	Concentrated nitric acid and concentrated hydrochloric acid	Concentrated nitric acid:68% Concentrated hydrochloric acid:37%
3199	Yes	#23550 = 0.1719 g #23551 = 0.2113 g	Nitric	40% Nitric
3214	Yes	#23550:0.1064g #23551:0.1118g	9ml HNO3 , 3ml HCl , 1m lHF	50%
3218	Yes	0.1g	HNO3+HCl	65%HNO3,36.5%HCl
3225	Yes	0.1	HNO3	67
3228	Yes	0.1g	HNO3	65%
8005	Yes	0.1	Nitric acid	Concentrated

APPENDIX 4

Number of participants per country

2 labs in BANGLADESH
1 lab in BRAZIL
2 labs in CAMBODIA
3 labs in FRANCE
2 labs in GERMANY
1 lab in GUATEMALA
12 labs in HONG KONG
3 labs in INDIA
3 labs in INDONESIA
6 labs in ITALY
1 lab in JAPAN
5 labs in KOREA, Republic of
2 labs in MALAYSIA
2 labs in MEXICO
1 lab in MOROCCO
17 labs in P.R. of CHINA
4 labs in PAKISTAN
1 lab in PORTUGAL
2 labs in SINGAPORE
1 lab in SRI LANKA
3 labs in TAIWAN
3 labs in THAILAND
2 labs in TUNISIA
1 lab in TURKEY
5 labs in U.S.A.
1 lab in UNITED ARAB EMIRATES
1 lab in UNITED KINGDOM
7 labs in VIETNAM

APPENDIX 5

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
8 J.N. Miller, Analyst, 118, 455, (1993)
9 Analytical Methods Committee, Technical Brief, No 4, January 2001
10 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)
11 W. Horwitz and R. Albert, J. AOAC Int, 79, 3, 589-621, (1996)
12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)
13 Update on the Global Status of Legal Limits on Lead in Paint December 2020, Publication developed by the UN Environment in partnership with WHO and US EPA, the Chair of the Lead Paint Alliance.