WAGENINGEN EVALUATING PROGRAMS FOR
ANALYTICAL LABORATORIES

PROF. TESTING
RvA R 002

International Manure and Refuse Sample Exchange Program

Quarterly Report 2009.1 January - March 2009

WAGENINGEN UNIVERSITY
ENVIRONMENTAL SCIENCES

INTRODUCTION

Dear WEPAL-participants,

In this report for the first ringtest in 2009 WEPAL introduces a new method of statistical evaluation. There was no problem with the old statistical method to calculate the concensus value. The calculated mean was (and still is) reliable. The removal of outliers however had too much influence on the calculation of the standard deviation. In a number of datasets the standard deviation is underestimated by the old method.
We have tested several other statistical routines which should give a better estimate of the variation of the data. The aim of our study was to find a method which is not influenced by the presence or removal of outliers.
The new statistical model (Cofino NDA) that is chosen to calculate the mean and standard deviation uses probability functions. It calculates a best fit based on the observed values. The model is tested on simulated data sets and datasets of several interlaboratory studies. It is demonstrated that the model is robust and insensitive to outliers. It can cope with asymmetric, strongly tailing and multimodal distributions. A publication describing the proce-dure in more detail with the results of the tests is in preparation.
This year we will report both new and old statistics. So you can see what the differences are between the two methods. In general you will see that the new NDA mean and old median and mean are similar. The differences betrween the two methods can be observed in the standard deviation. In the NDA method they are not influenced by the presence or removal of outliers. Marking of outliers (**) and stragglers (*) is based on the old statistics. All results, including marked values, are used in the new NDA method.
The Z-scores are now calculated with the NDA standard deviation. Because in a number of cases the NDA standard deviation is higher than the 'old' standard deviation the Z-scores will be lower than in the past.

Early May we will move to our new building. Our telephone numbers, email and postal address will remain unchanged. Only our visiting address will change. Please note that if you send your mail by courier you must change the address.

WEPAL has a webpage where you can check if we have received and processed your data. We have also added the number of results. This way you can also see if all your results were pro-cessed correctly. Because you can see the status of the results that you sent us yourself it is no longer necessary to ask for a confirmation of receipt. You can also spare yourself and us the extra work for sending and processing extra copies. This information is published on "log received" page of the WEPAL website www.wepal.nl. Please note that we use your client number in this table, not your labnumber (or code number).

The WEPAL programs are organised to help you to improve the quality of your results. When you have ideas or remarks on the programs that can help us to improve them please feel free to contact us. We are always looking forward to hear from you,

Yours sincerely,

Bram Eijgenraam
Manager WEPAL

Calculated 02-04-2009 (13:59)

IMPORTANT INFORMATION

The results of the April - June 2009 period will be processed in the beginning of July 2009. Participants are kindly requested to take care that the results of this series are in Wageningen **before the first of July 2009.** All results, which are received later, will not be reported.

The 2009.3 samples will be mailed at the end of May 2009.

GENERAL INFORMATION

Accreditation

Accreditation

The Wageningen Evaluating Programmes for Analytical Laboratories organisation is accredited for the organisation of Interlaboratory Studies by the Dutch Accreditation Council RvA since April 26, 2000. The accreditation is based on the ILAC-requirements (Guidelines for the requirements for the competence of providers of proficiency testing schemes, ILAC-G13: 2000). In the following table the scope is given for all WEPAL programs.

Table 1 *Scope of the WEPAL programs.*
IPE, International Plant-analytical Exchange Program
(Parameters in bold are in the scope of the accreditation)

Group	**Parameter**
Inorganic Chemical Composition	Ag, **As**, **B**, **Ba**, Be, Bi, Br, **Ca**, **Cd**, **Cl**, **Co**, **Cr**, Cs, **Cu**, F, **Fe**, Ga, **Hg**, I, **K**, Li, **Mg**, **Mn**, **Mo**, **N - Kjeldahl**, N - NH_4, **N - NO_3**, **Na**, **Ni**, **P**, **Pb**, Pd, Pt, Rb, Rh, **S**, Sb, **Se**, Sn, SO_4, **Sr**, Ti, **V**, **Zn**
Real totals	**Al**, **C - elementary**, **N - elementary**, Si
Acid extractable (So-called totals)	**Al**, Si
Other determinations	13C, 15N, delta 13C, delta 15N
Nutritional values	ADF-ash-containing, ADF-ash-free, Crude fibre, NDF-ash-containing, NDF-ash-free, Polysaccharides (starch), TDF, TDF-non-soluble, TDF-soluble, **Total ash**, Total Disaccharides, Total fat, Total monosaccharides

ISE, International Soil-analytical Exchange Program
(Parameters in bold are in the scope of the accreditation)

Group	**Parameter**
Real totals	Ag, **Al**, **As**, B, **Ba**, **Be**, Bi, **Br**, C - elementary, **Ca**, **Cd**, **Ce**, **Co**, **Cr**, Cs, **Cu**, F, **Fe**, **Ga**, Ge, **Hg**, I, **K**, **La**, **Li**, **Mg**, **Mn**, **Mo**, **N - elementary**, **Na**, **Nb**, **Nd**, **Ni**, **P**, **Pb**, Pd, Pt, **Rb**, Rh, **S**, **Sb**, **Sc**, Se, **Si**, **Sn**, **Sr**, Te, **Th**, **Ti**, Tl, **U**, **V**, W, **Y**, **Zn**, **Zr**
Acid extractable (So-called totals)	Ag, **Al**, **As**, **B**, **Ba**, **Be**, Bi, Br, **Ca**, **Cd**, Ce, **Co**, **Cr**, **Cu**, F, **Fe**, Ga, **Hg**, I, **K**, La, **Li**, **Mg**, **Mn**, **Mo**, **N**, **Na**, Nb, Nd, **Ni**, **P**, **Pb**, Pt, Rb, **S**, **Sb**, Sc, **Se**, Si, **Sn**, **Sr**, Te, Th, **Ti**, **Tl**, U, **V**, Y, **Zn**, Zr
Aqua Regia (ISO 11466)	Ag, **Al**, **As**, B, Ba, **Be**, Bi, Br, **Ca**, **Cd**, Ce, **Co**, **Cr**, **Cu**, F, **Fe**, Ga, **Hg**, I, **K**, La, Li, **Mg**, **Mn**, **Mo**, N, **Na**, Nb, Nd, **Ni**, **P**, **Pb**, Pt, Rb, **S**, Sb, Sc, Se, Si, Sn, Sr, Te, Th, Ti, Tl, U, **V**, Y, **Zn**, Zr
Extraction with boiling 2M HNO_3	**Cd**, **Co**, **Cr**, **Cu**, **Hg**, **Mo**, **Ni**, **Pb**, Tl, **Zn**
Extraction with 0.1M $NaNO_3$	**Cd**, **Cu**, **Ni**, Pb, **Zn**
Extraction with 0.01M $CaCl_2$ 1:10	Al, B, Cd, CN, Co, Cr, Cu, Fe, **K**, **Mg**, Mn, **N - NH_4**, **N - NO_3**, N total soluble, Na, Ni, P, Pb, SO_4, Zn
Extraction with 1M NH_4NO_3 1:2.5 (w/v) (DIN 19730)	As, Cd, Cr, Cu, Hg, Ni, Pb, Tl, Zn
Soil characteristics	**C - org others (W&B a.o.)**, **EC-SC (ISO 11265)**, **Fraction < 16 µm**, **Fraction < 2 µm**, **Fraction < 63 µm**, **Fraction > 63 µm**, **Org.matter (L.O.I.)**, **pH - $CaCl_2$**, **pH - H_2O**, **pH - KCl**, **TC=Total C (org.+inorg.)**, **TIC=Tot.Inorg, C($CaCO_3$)**, **TOC=Total Org. C**
Other determinations	C^{13}, N^{15}, B - Hot water, CN - Free, CN - Total, delta 13C, delta 15N, K - HCl, Mg - NaCl, Moisture-content

Group	Parameter
Fluoride (Swiss standard procedure)	F - Total
Digestion with conc. HNO_3 + conc. HCl + H_2O_2 (UNEP-UN/EC 91075A)	Al, As, B, Ba, Be, Br, Ca, Cd, Co, Cr, Cu, F, Fe, Ga, Hg, I, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Rb, S, Sb, Se, Si, Sn, Sr, Tl, V, Y, Zn, Zr
Pot. CEC using 1M NH_4-acetate at pH=7	Al, **Ca**, **CEC**, **K**, **Mg**, **Na**
Pot. CEC using 1M or 0.1M $BaCl_2$-TEA at pH=8.1 (ISO 13536 OR BZE)	Al, Ca, **CEC**, K, Mg, Na
Pot. CEC using 1M NH_4Cl (BZE)	Al, Ca, CEC, Fe, H, K, Mg, Mn, Na
Act. CEC using 0.01M $BaCl_2$ (ISO 11260)	Al, Ca, CEC, Fe, H, K, Mg, Mn, Na
Act. CEC using 0.1M $BaCl_2$ (UNEP-UN/EC 91065A)	Al, Ca, CEC, Fe, H, K, Mg, Mn, Na
Act. CEC using cobaltihexamine (AFNOR NFX 31 130)	Al, Ca, CEC, Fe, H, K, Mg, Mn, Na
Mehlich-3	Al, As, B, **Ca**, Cd, Cr, **Cu**, **Fe**, **K**, **Mg**, **Mn**, **Na**, **P**, Pb, **Zn**
Extraction with Ca-lactate (VDLUFA)	K, P
Extraction with double lactate (VDLUFA)	**K**, **P**
Water soluble 1:10 (w/v) (EN-12457-4)	Br, Cl, F, N - NO_3
Extraction with 0.01M $CaCl_2$ + 0.005M DTPA 1:10 (w/v)	Cu, Fe, Mn, Zn
Extraction with 1M KCl 1:10 (w/v)	N - NH_4, N - NO_3
Phosphorus and related analysis	Al - Ox, Fe - Ox, P - Ox, P - AL, **P - Bray**, **P - Olsen**, Pw
Extraction with 1M HCl (Polish standard)	B, Cu, Fe, Mn, Zn
Water soluble 1:10 (w/v) (NL VPR C85-06)	Br, Cl, F, SO_4

SETOC, International Sediment Exchange for Tests on Organic Contaminants

(Parameters in bold are in the scope of the accreditation)

Group	Parameter
Polycyclic aromatic hydrocarbons	**acenaphtene**, **acenaphtylene**, **anthracene**, **benz(a)anthracene**, **benzo(a)pyrene**, **benzo(b)fluoranthene**, **benzo(ghi)perylene**, **benzo(k)fluoranthene**, **chrysene**, **dibenz(ah)anthracene**, **fluoranthene**, **fluorene**, **indeno(1,2,3-cd)pyrene**, **naphtalene**, **phenanthrene**, **pyrene**
Polychlorobiphenyls	**PCB 028**, PCB 031, **PCB 052**, PCB 077, PCB 081, **PCB 101**, **PCB 105**, PCB 114, **PCB 118**, PCB 123, PCB 126, **PCB 128**, **PCB 138**, PCB 149, **PCB 153**, PCB 156, PCB 157, PCB 167, PCB 169, **PCB 180**, PCB 189
Organochlorine pesticides	1,2,3 trichlorobenzene, 1,2,3,4 tetrachlorobenzene, 1,2,3,5 tetrachlorobenzene, 1,2,4 trichlorobenzene, 1,2,4,5 tetrachlorobenzene, 1,3,5 trichlorobenzene, aldrin, alpha-endosulfan, alpha-HCH, beta-endosulfan, beta-HCH, chlordane, cis-chlordane, delta-HCH, dieldrin, endosulfan, endosulfan sulfate, endrin, gamma-HCH, heptachlor, heptachlor epoxide, **hexachlorobenzene**, **hexachlorobutadiene**, isodrin, **o,p`-DDD**, **o,p`-DDE**, **o,p`-DDT**, **p,p`-DDD**, **p,p`-DDE**, **p,p`-DDT**, **pentachlorobenzene**, Sum tetrachlorobenzenes, Sum trichlorobenzenes, telodrin, toxaphene, trans-chlordane
Other parameters	**AOX**, CN - Free, **CN - Total**, **EOX**, Inorganic carbon, **Mineral oil (GC)**, **Mineral oil (IR)**, **Organic carbon**, **Particles < 2 µm**, Particles < 63 µm, Particles > 63 µm

Group	Parameter
Metals (aqua regia)	**As**, Ba, **Cd**, Co, **Cr**, **Cu**, **Hg**, Mo, **Ni**, **Pb**, **Zn**
Dibenzo-P Dioxin	**1,2,3,4,6,7,8 Cl_7DD**, 1,2,3,4,7,8 Cl_6DD, **1,2,3,6,7,8 Cl_6DD**, 1,2,3,7,8 Cl_5DD, **1,2,3,7,8,9 Cl_6DD**, 2,3,7,8 Cl_4DD, **Cl_8DD**
Dibenzofuran	**1,2,3,4,6,7,8 Cl_7DF**, **1,2,3,4,7,8 Cl_6DF**, **1,2,3,4,7,8,9 Cl_7DF**, **1,2,3,6,7,8 Cl_6DF**, **1,2,3,7,8 Cl_5DF**, **1,2,3,7,8,9 Cl_6DF**, **2,3,4,6,7,8 Cl_6DF**, **2,3,4,7,8 Cl_5DF**, **2,3,7,8 Cl_4DF**, **Cl_8DF**
Brominated Flame Retarders	BDE 028, BDE 047, BDE 066, BDE 085, BDE 099, BDE 100, BDE 153, BDE 154, BDE 183, BDE 209
Experimental	DEHP, Tributyl Tin (TBT)

MARSEP, Manure and Refuse Sample Exchange Program

(Parameters in bold are in the scope of the accreditation)

Group	Parameter
Real totals	Ag, Al, As, B, Ba, Be, Bi, Br, C, Ca, Cd, Co, Cr, Cu, F, Fe, Ga, Hg, I, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn
Acid extractable (So-called totals)	Ag, **Al**, **As**, B, Ba, Be, Bi, Br, C, **Ca**, **Cd**, Cl, **Co**, **Cr**, **Cu**, F, **Fe**, Ga, **Hg**, I, **K**, Li, **Mg**, **Mn**, **Mo**, **N**, N - NH_4, N - NO_3, **Na**, **Ni**, **P**, **Pb**, S, SO_4, Sb, Se, Si, Sn, Sr, Ti, Tl, V, **Zn**
Other determinations	**AOX**, **loss-on-ignition**

The selection of parameters included in the scope of accreditation is based on the information that can be given about the homogeneity of the parameters in the samples. This information is based on the relation between the Coefficient of Variation as given in the Annual Reports and the concentration in the different samples used in the WEPAL-programs during the last years. Only in case of a clear and consistent pattern, conclusions can be drawn concerning homogeneity of the material. In the case of a large variation in CV values no distinction can be made between inhomogeneity of the material and the variation in the analytical performance caused by the participating laboratories. These parameters are not (yet) included in the scope of the accreditation.
Some aspects of the proficiency testing scheme may from time to time be subcontracted. When subcontracting occurs it is placed with a competent subcontractor. WEPAL is responsible to the scheme participants for the subcontractor's work.

Homogeneity of the distributed samples

Homogeneity tests

WEPAL has developed special equipment for the production of representative subsamples (Houba, 1993) from a bulk material. The proper functioning of this equipment is tested by a homogeneity test in the final subsamples. To perform this test, samples are collected at regular intervals during the preparation of the the samples. The collected samples, with a minimum of 10, are analysed in duplicate measurements under repeatability conditions. A selection of critical parameters is chosen for the tests. The results of the homogeneity tests are published in the annual reports.

Check of results

Before distribution of the periodic reports to the participants, a final check is made based on the results found by the participants. This check is made for all reported parameters. The Coefficient of Variances and concentrations found in the periodic reports are compared with the patterns as found in the latest Annual Report (part B). The expected pattern is a high CV at a low concentration and a gradually decreasing CV at higher concentrations till a more or less constant level of CV-values is reached (Houba et al., 1986). Deviations from this expected pattern are mentioned in the periodic reports. This might be an indication of inhomogeneity of the material for the certain parameter.

All data of this period are compared with the general patterns as published in the latest year report. No deviating values were found.

The quarterly report

In order to evaluate the accuracy and precision of the analytical procedures used, four proficiency testing programs have been established. At this moment the WEPAL Exchange Programs comprises approximately 600 laboratories in many countries. The participating laboratories receive four air-dried samples every three months and analyse the samples according to their own procedures. The results of the determinations are collected and processed at Wageningen University and published every three months. The participating laboratories are informed of the results in the third week of the next three-month period. Each participant can compare his results with those of all the other members of the exchange program. WEPAL will not comment on results unless asked to do so.

Reporting of data

The analysed components must be reported in ovendry (105 °C) material. For this purpose the moisture content has to be determined separately and the analytical results have to be recalculated (see the form to report the results). To get reproducible results of these moisture contents we recommend you to dry the material during at least 3 hours at 105 °C and let cool down in a desiccator before weighing.

New statistics: normal distribution approximation (NDA)

Interlaboratory studies like the WEPAL proficiency testing ringtests frequently give rise to datasets that have complex distributions including excessive tailing and multiple modes. Consequently, sophisticated statistical methods are required to obtain meaningful assessments. The strategy that was used until now makes use of an outlier test followed by straightforward statistics. Problem with this strategy is that removal of outliers causes an underestimation of variance of the dataset. Therefore a methodology is needed that does not rely on arbitrary outlier removal or subjective manual interpretations. Ideally the new methodology must provide the characteristics of the highest mode of the dataset.

A new model is chosen to calculate population characteristics (mean and standard deviation) from experimental datasets (Cofino 2000). The model uses an estimate for the probability density function (pdf) of the measurement process and calculates a best fit based on all observed values. The implementation of the model that is used does not require uncertainty estimates for all data points. Instead it uses a normal distribution approximation (NDA) for the pdf of the individual data points. In essence, the pdf's of the individual datapoints are superposed on each other to create a continuous pdf representing the entire distribution (all datapoints).

With the mathematical model coefficients can be obtained by looking for the combination of data points that has the highest probability in the basis set. This maximization amounts to the identification of the first mode of the dataset. The coefficients can be used to calculate the weighted mean and standard deviation. Subsequent calculations give additional modes of the distribution and for each mode the expectation value (mean), the standard deviation and a percentage indicating the fraction of observations encompassed. In this report only mean and standard deviation for the first mode (combination with the highest probability in the dataset) are given.

The model is tested on simulated data sets and datasets of several interlaboratory studies. It is demonstrated that the model is robust and insensitive to outliers. It can cope with asymmetric, strongly tailing and multimodal distributions. Publications describing the procedure in more detail and results of the tests are in preparation.

With the NDA model mean and standard deviation are calculated using all reported data when at least 8 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

Table 2. The model summarised

- Each observation is attributed an ' Observation measurement function' (OMF, φ_i)
- An OMF is defined as the square root of the probability density function appropriate for the observation. If normal distributions are used: $\varphi_i=\sqrt{N(\mu_i,\sigma_i^2)}$
- The set of φ_i 's constitutes a basisset in which the population measurement function Ψ is constructed: $\Psi_i=\sum c_{ik}\,\varphi_k$
- The coefficients are obtained by finding the combination which renders highest probability density (maximise $\int\Psi^2 dx$, x being concentration). Mathematically this amounts to solving the eigenvector-eigenvalue equation $Sc=\lambda c$, S_{ij} being an overlap integral defined as $\int \varphi_i\,\varphi_j dx$, $0\leq S_{ij}\leq 1$
- Mean and standard deviation of Ψ_i are calculated from the first and second moment of the probability density function Ψ_i^2

$$\overline{m}_i = \frac{\int x\Psi_i^2 dx}{\int \Psi_i^2 dx},$$

$$s_i^2 = \frac{\int x^2\Psi_i^2 dx}{\int \Psi_i^2 dx} - \overline{m}_i^{\,2}$$

- The variance calculated by the model represents the sum of the estimates for the within-laboratory and between-laboratory variances, i.e. $s_i^2 = s_{between\,labs,i}^2 + s_{within\,labs,i}^2$
- When the NDA approximation is used, s_i^2 estimates the between-laboratory variance

Old statistics: Calculation of median and MAD.

Starting with the first proficiency tests in 2009 a new statical method was chosen. For reasons of continuity the statistical results of the old method will be reported in 2009. The old statistical method was preferred because strange values had less influence on the estimated central value (location) and the spread of this value (scale). Therefore estimators for location and scale were used which give less weight to observations in the tails (van Montfort, 1996). For each element a median value (μ_1) and a median of absolute deviations (MAD, σ_1) are calculated using all reported data except the reported '<' and 0 (= zero) values. The median is the middle observation of the sorted array of observations in the case of an odd sample size. Otherwise it is the mean of the two middle observations. Using the median instead of mean, extreme data are of less influence. MAD is the median of the absolute values of the observations minus their median. In case more than 7 data are reported, the values with $|(x - \mu_1)| / (f*\sigma_1) > 2$ are marked with a double asterisk (**). The factor f, aiming at 5% (singly or doubly) asterisked data in a sample of size n (n > 7) from a Gaussian distribution, is approximated by (0.7722 + 1.604 / n) * t, where t is the 2½ percent point of Student's t with (n - 1) degrees of freedom. A second median (μ_2) and a second MAD (σ_2) are computed then leaving out the items labelled **; included values with $|(x - \mu_2)| / (f*\sigma_2) > 2$ are marked with a single asterisk (*). Finally a third median and MAD are calculated, discarding both * and **.
In the case of small results which are heavily rounded the MAD often becomes 0 (= zero). This is very unsatisfactory because all results other than the median are marked as outlier. Therefore no results are marked as outlier in cases where MAD = 0. Mean and standard deviation are only calculated when at least 8 results are left after removal of outliers (**) and stragglers (*).

Rounding of results

Rounding interval is based on the first decimal value lower than sd / 2 (standard deviation divided by 2). If no standard deviation is available (less than 8 results) the MAD is used. At least three significant digits are shown as a minimum. If no standard deviation and MAD are available rounding is also based on three (most) significant digits. For the statistical results (mean, standard deviation, median and MAD) one extra digit is shown.
Note that larger results are also rounded (e.g. 1809 may be rounded as 1810).

Z-score

For all analytical data a Z-score is calculated according to the formula:

$$\text{Z-score} = \frac{X - X_{mean}}{S_d}$$

in which:

X = the reported value
X_{mean} = the mean of all values calculated with the NDA model
S_d = standard deviation calculated with the NDA model

Method Indicating Code (MIC)

In order to evaluate the analytical results for each reported element (see **Table 3** for the different element groups), a Method Indicating Code (MIC) is used. Details of the analytical procedures used by the individual participants are indicated by four characters, added at the end of each row with results. The first character indicates the method of extraction or digestion according to the codes explained in **Table 4**. The last three characters (see **Table 5**) indicate the method of detection of the element in the extracts or digests. In this way it is possible for all participants to compare the results of their analytical procedures more specifically with the results of other participants. This could be a further valuable tool in judgement of the individual results.

Table 3 *Used abbreviations in errors and z-scores*

Method	Abbreviation	Digestion/extraction procedure
1	RT	Real Totals
2	AE	Acid Extractable (So-called totals)
3	OD	Other Determinations

Table 4 *Digestion/extraction and other procedures*

Code	Procedure
A	Dry ashing and uptake af the ash in HCl
B	Dry ashing and uptake of the ash in HNO3
C	Digestion with a mix. of conc. HCl (ISO 11466) using boiling under reflux
D	As C using a microwave system
E	Digestion with (conc) HNO3 under pressure
F	As E using a microwave system
G	Digestion with HNO3/HF/HCLO4 under pressure
H	Melt with LiBO2
I	Digestion with HNO3 and H2O2
K	Dry ashing and digestion of the ash with HNO3 under pressure
L	As K using a microwave system
M	Digestion with H2SO4/H2O2, Se as a catalyst
N	Extraction with 2 M HNO3 1:10 at 100oC
O	Digestion with KMnO4 at 70 oC
P	Extraction with KCl 2 N 1:20
Q	Digestion with conc HNO3
R	(for AOX and Mo) method according to DIN 38414S18
S	Digestion with conc H2SO4
T	Using aqua regia; (EN 13346 for sludges) and (EN 13657 for waste)
Z	Others (give short description)

Table 5 *Methods of detection*

Code	Method
AA	AAS Flame without preconcentration
AAA	without background correction using air acetylene
AAB	without background correction using N2O acetylene
AAC	with deuterium background correction using air acetylene
AAD	with deuterium background correction using N2O acetylene
AAE	with Zeeman background correction using air acetylene
AAF	with Zeeman background correction using N2O acetylene
AAG	with pulsed hollow cathode lamp background correction using air acetylene
AAH	with pulsed hollow cathode lamp background correction using N2O acetylene
AB	AAS Flame with preconcentration

Code	Method
ABA	without background correction using air acetylene
ABB	without background correction using N2O acetylene
ABC	with deuterium background correction using air acetylene
ABD	with deuterium background correction using N2O acetylene
ABE	with Zeeman background correction using air acetylene
ABF	with Zeeman background correction using N2O acetylene
ABG	with pulsed hollow cathode lamp background correction using air acetylene
ABH	with pulsed hollow cathode lamp background correction using N2O acetylene
BA	AAS ETA without preconcentration
BAA	without background correction without chemical modifier
BAB	without background correction with chemical modifier*
BAC	with deuterium background correction without chemical modifier
BAD	with deuterium background correction with chemical modifier*
BAE	with Zeeman background correction without chemical modifier
BAF	with Zeeman background correction with chemical modifier*
BAG	with pulsed hollow cathode lamp without chemical modifier
BAH	with pulsed hollow cathode lamp with chemical modifier*
CA	Flame emission
CB	ICP AES (different wavelengths possible; indicate wavelength)
CC	other excitation source (dif. wavelengths possible; indicate wavelength)
D	ICP MS
E	Spectrophotometry
F	Hydride technique (simular techniques using analyte volatilization;specify)
G	Cold vapour technique
H	Ion selective electrode
IA	Direct voltammetry
IB	Stripping voltammetry
JA	Gas chromatography
JB	Liquid chromatography
JC	Ion chromatography
KA	X ray fluorescence with material melted
KB	X ray fluorescence with material pressed
L	Neutron activation analysis
M	Near infrared
O	Titrimetric/coulometric
P	Gravimetric
Q	Turbidimetric or Nephelometric
Z	Others

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MATERIALS ANALYSED

Table 6 Materials analysed in this period.

Sample	Sample ID	Type	Country
1	262	Compost	Switzerland
2	217	Sewage Sludge	Switzerland
3	273	Sewage Sludge	United Kingdom
4	264	Compost	Switzerland

NEW MEMBERS

LAB-CONTROl S.R.L. , San Martino di Venezzo - Rovigo, Italy
Veritas SPA Laboratorio Chimico, Fusina (Venezia), Italy

ERRORS

No errors or corrections in last Period 2008.4

Used abbrevations and symbols

Table 7 *Used abbreviations and symbols*

Where	Abbreviation	Explanation
General Information	CV	coefficient of variation
General Information	MIC	method indicating code
General Information	MAD	median absolute deviation
General Information	Sd	standard deviation
General Information	f	f factor
General Information	μ_1	first median
General Information	μ_2	second median leaving out **
General Information	μ_3	third median leaving out * and **
General Information	σ_1	first MAD
General Information	σ_2	second MAD leaving out **
General Information	σ_3	third MAD leaving out * and **
General Information	<	value smaller than
General Information	*	straggler
General Information	**	outlier
Results	median "result" (0)	no median available
Results	median "result" (1)	first median (all results)
Results	median "result" (2)	second median leaving out **
Results	median "result" (3)	third median leaving out * and **
Results	-	no result was submitted
Results	x	zero (0) was submitted as result, not taken into account
Results	-	statistical values: not calculated
Z-scores	#	less than 8 values, no mean and Sd calculated or Sd = 0
Z-scores	<	a smaller than value was reported
Z-scores	-	no result (or zero) was submitted
Errors	C	Correction participant
Errors	D	Results received after deadline (before publication date)
Errors	E	Error WEPAL
Errors	M	Modified results
Errors	N	New results
Errors	R	Results removed

Analysis
MARSEP 2009.1

MARSEP 2009.1 - Real totals

Sample		262	217	273	264	MIC
Cr (mg/kg)						
MICHAEL	(904)	54.6	56.2	129	43.2	Q|AAB
Median		54.60 (1)	56.20 (1)	129.0 (1)	43.20 (1)	
MAD		-	-	-	-	
N		1	1	1	1	
Cu (mg/kg)						
MICHAEL	(904)	38.3	310	288	37.7	Q|AAA
Median		38.30 (1)	310.0 (1)	288.0 (1)	37.70 (1)	
MAD		-	-	-	-	
N		1	1	1	1	
Ni (mg/kg)						
MICHAEL	(904)	18.5	31.5	110	-	Q|AAC
Median		18.50 (1)	31.50 (1)	110.0 (1)	- (0)	
MAD		-	-	-	-	
N		1	1	1	-	
Pb (mg/kg)						
MICHAEL	(904)	40.2	135	218	35.4	Q|AAC
Median		40.20 (1)	135.0 (1)	218.0 (1)	35.40 (1)	
MAD		-	-	-	-	
N		1	1	1	1	
Zn (mg/kg)						
MICHAEL	(904)	124	873	616	116	Q|AAC
Median		124.0 (1)	873.0 (1)	616.0 (1)	116.0 (1)	
MAD		-	-	-	-	
N		1	1	1	1	

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Ag (µg/kg)										
LABAMB	(878)	100	<	17000		2500		100	<	T| CB
Median		-	(0)	17000	(1)	2500	(1)	-	(0)	
MAD		-		-		-		-		
N		-		1		1		-		
Al (g/kg)										
POLASP	(9)	22.7		29.1		49.8		20.20		
HAMELN	(15)	10.0		19.1		45.7		6.99		C| CB
SCSF	(21)	10.4		24.7		46.6		7.38		A| CB
ABMCE	(56)	10.1		21.3		48.4		6.91		C| CB
IRNASE	(63)	14.1		25.8		50.7		10.83		D| CB
LABAMB	(878)	7.2		17.5		41.0		5.20		T| CB
Median		10.25	(1)	23.00	(1)	47.50	(1)	7.185	(1)	
MAD		1.67		3.35		2.05		1.130		
N		6		6		6		6		
As (mg/kg)										
POLASP	(9)	9.31		5.91		9.4		7.11		
HAMELN	(15)	6.45		-		12.5		-		C| D
IUNGPUL	(26)	6.92		6.59		10.8		3.50		
SOVAJETSVK	(48)	17.00		13.00		22.0		10.00		E|CB
ABMCE	(56)	6.48		8.53		11.2		4.30	<	C| CB
OOSTERBEEK	(66)	6.51		6.74		12.5		4.97		D| CB
LABAMB	(878)	7.00		6.50		11.5		4.70		T| CB
Median		6.920	(1)	6.665	(1)	11.50	(1)	4.966	(1)	
MAD		0.440		0.460		0.96		1.466		
N		7		6		7		5		
B (mg/kg)										
IUNGPUL	(26)	14.3		26.8		19.7		18.4		
IRNASE	(63)	16.9		18.7		19.5		17.4		D| CB
LABAMB	(878)	14.0		24.0		18.0		15.0		T| CB
Median		14.30	(1)	24.00	(1)	19.50	(1)	17.40	(1)	
MAD		0.30		2.80		0.20		1.00		
N		3		3		3		3		
Ba (mg/kg)										
HAMELN	(15)	83.9		524		485		71.2		C| CB
SOVAJETSVK	(48)	104.0		611		620		76.0		E|CB
IRNASE	(63)	87.4		477		437		78.8		D| CB
LABAMB	(878)	80.0		560		500		70.0		T| CB
Median		85.65	(1)	542.0	(1)	492.5	(1)	73.60	(1)	
MAD		3.70		41.7		31.5		3.00		
N		4		4		4		4		
Be (µg/kg)										
HAMELN	(15)	320		320		2340		310		C| D
ABMCE	(56)	600	<	600	<	2710		600	<	C| CB
LABAMB	(878)	400		250		2300		300		T| CB
Median		360.0	(1)	285.0	(1)	2340	(1)	305.0	(1)	
MAD		40.0		35.0		40		5.0		
N		2		2		3		2		
Bi (µg/kg)										
HAMELN	(15)	180		4440		3740		160		C| D
Median		180.0	(1)	4440	(1)	3740	(1)	160.0	(1)	
MAD		-		-		-		-		
N		1		1		1		1		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Bi (µg/kg) (cont.)										
Median		180.0	(1)	4440	(1)	3740	(1)	160.0	(1)	
MAD		-		-		-		-		
N		1		1		1		1		
C (g/kg)										
POLASP	(9)	154		227		284.0		184		
IUNGPUL	(26)	160		227		282.0		188		
SOVAJETSVK	(48)	161		229		281.6		197		H|Z
ATVC	(62)	138		210		285.0		161		Z| H
LABAMB	(878)	152		185		250.8		160		Z| O
MICHAEL	(904)	154		215		291.0		189		Z| O
Median		154.0	(1)	221.0	(1)	283.00	(1)	186.0	(1)	
MAD		4.3		7.2		1.71		7.1		
N		6		6		6		6		
Ca (g/kg)										
SIRNACH	(5)	45.5		64.3		29.4		70.2		A|AAB
POLASP	(9)	50.8	**	68.8		33.5		73.6		
HAMELN	(15)	45.6		65.1		30.7		72.1		C| CB
KSKO ZH	(16)	47.4		68.3		32.3		70.8		F| CB
HIDU	(20)	50.9	**	70.2		33.4		74.5		Q| CB
SCSF	(21)	46.8		67.7		32.0		72.9		A| CB
AGROCH	(22)	45.3		65.6		30.4		71.7		A|AAA
GALLEN	(23)	46.2		66.0		31.7		72.3		F| CB
LAN-8899	(24)	46.2		65.8		31.3		71.9		A|CB
IUNGPUL	(26)	48.9	*	63.5		32.7		73.2		
BOANALHOAG	(28)	44.3		63.4		30.9		72.3		Q| CB
FRIBOURG	(37)	44.6		63.1		29.9		67.9		T|CB
CH-SAMEN	(40)	45.5		67.3		32.2		73.6		T|CB
BERN-7	(43)	50.2	**	71.1		33.0		75.5		Z|CB
UFAG	(44)	46.1		67.5		32.8		70.4		T| CB
KLGCHUR	(54)	46.1		63.8		31.5		67.3	**	Q|
ABMCE	(56)	45.8		67.7		31.5		72.1		C| CB
HAUERT+CO	(59)	47.2		66.6		30.5		73.7		A|AAA
IRNASE	(63)	42.8	*	62.4		28.4		68.6		D| CB
HILA	(79)	49.3	*	67.8		32.5		74.4		I| CB
ANALGIR	(639)	47.0		66.6		29.9		72.8		D| CB
CUP Analab	(870)	55.2	**	71.5		32.6		75.5		A|AAA
LABAMB	(878)	42.0	**	60.8		28.0		68.0		T| CB
NDA mean		46.14		66.29		31.57		72.43		
NDA st dev		1.55		2.63		1.60		2.13		
NDA N		23		23		23		23		
	Old statistics									
Median		46.10	(3)	66.60	(3)	31.50	(3)	72.30	(3)	
MAD		0.60		1.70		1.10		1.35		
Mean		45.97		66.30		31.35		72.18		
St Dev		0.89		2.77		1.52		2.17		
N		15		23		23		22		
Cd (mg/kg)										
SIRNACH	(5)	0.370		2.03		1.60		0.340		T|D
POLASP	(9)	0.270		2.07		1.73	*	0.300		
HAMELN	(15)	0.330		1.78		1.42		0.290		C| CB
KSKO ZH	(16)	0.366		1.92		1.56		0.330		F| CB
WELE-136	(18)	0.310		1.87		1.48		0.210		A|AAC
HIDU	(20)	0.310		1.96		1.61		0.300		Q| D
SCSF	(21)	0.343		2.01		1.52		0.252		A| CB
AGROCH	(22)	0.280		1.88		1.53		0.220		A|BAC
GALLEN	(23)	0.420		2.00		1.58		0.320		F| CB
LAN-8899	(24)	0.360		1.94		1.48		0.290		A|CB
NDA mean		0.3575		1.899		1.503		0.3077		(cont.)
NDA st dev		0.0564		0.161		0.097		0.0460		
NDA N		20		24		23		20		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Cd (mg/kg) (cont.)										
IUNGPUL	(26)	0.360		1.97		1.50		0.400	*	C|CB
BOANALHOAG	(28)	0.570	**	2.06		1.51		0.460	**	Q| CB
FRIBOURG	(37)	1.000	<	1.75		1.00	**	1.000	<	T|CB
CH-SAMEN	(40)	0.410		1.71		1.39		0.360		T|BAC
BERN-7	(43)	0.500	*	2.38	**	2.12	**	0.410	*	Z|CB
UFAG	(44)	0.390		1.76		1.45		0.350		T|BAC
SOVAJETSVK	(48)	-		2.00		-		-		E|CB
KLGCHUR	(54)	0.700	**	2.22		1.72	*	0.490	**	Z| CB
ABMCE	(56)	1.100	<	1.90		1.50		1.100	<	C|AAA
HAUERT+CO	(59)	0.380		1.74		1.43		0.280		A|AAC
ATVC	(62)	0.500	<	1.82		1.39		0.500	<	Z| CB
OOSTERBEEK	(66)	0.323		1.65		1.03	**	0.289		D| CB
ANALGIR	(639)	0.370		1.68		1.47		0.310		D|BAC
LABAMB	(878)	0.400		1.90		1.50		0.300		T| CB
NDA mean		0.3575		1.899		1.503		0.3077		
NDA st dev		0.0564		0.161		0.097		0.0460		
NDA N		20		24		23		20		
	Old statistics									
Median		0.3600	(3)	1.900	(3)	1.500	(3)	0.3000	(3)	
MAD		0.0300		0.110		0.040		0.0200		
Mean		0.3525		1.896		1.496		0.2963		
St Dev		0.0435		0.144		0.065		0.0420		
N		17		23		18		16		
Co (mg/kg)										
SIRNACH	(5)	6.18		9.43		114		5.50		T|D
POLASP	(9)	5.51		8.30		107		5.07		
HAMELN	(15)	5.02	**	8.39		105		5.12		C| D
KSKO ZH	(16)	5.98		9.95		109		5.25		F| CB
WELE-136	(18)	5.75		8.55		110		4.91		A|AAC
HIDU	(20)	6.99	**	10.72		123	**	5.67		Q| D
SCSF	(21)	5.95		10.30		108		5.30		A| CB
AGROCH	(22)	5.74		8.39		109		5.28		A|BAC
GALLEN	(23)	6.02		9.44		107		5.30		F| CB
LAN-8899	(24)	5.96		8.71		108		5.01		A|CB
BOANALHOAG	(28)	5.55		10.00		106		4.66		Q| CB
FRIBOURG	(37)	6.04		9.27		111		4.94		T|CB
CH-SAMEN	(40)	5.24	*	7.91		116	*	4.36		T|CB
BERN-7	(43)	6.30		9.98		144	**	4.98		Z|CB
UFAG	(44)	5.85		9.26		116	*	6.00	<	T| CB
SOVAJETSVK	(48)	7.00	**	9.00		106		5.00		E|CB
KLGCHUR	(54)	6.71	*	10.10		109		5.31		Z| CB
ABMCE	(56)	5.87		8.04		104		4.91		C| CB
HAUERT+CO	(59)	6.04		8.68		105		5.16		A|AAA
IRNASE	(63)	5.14	*	6.80		82	**	4.46		D| CB
LABAMB	(878)	5.30	*	8.00		91	**	4.40		T| CB
NDA mean		5.856		9.033		108.3		5.078		
NDA st dev		0.365		1.029		4.2		0.331		
NDA N		21		21		21		20		
	Old statistics									
Median		5.955	(3)	9.000	(3)	108.0	(3)	5.040	(3)	
MAD		0.095		0.700		2.0		0.225		
Mean		5.910		9.010		107.9		5.030		
St Dev		0.220		0.970		2.6		0.351		
N		14		21		15		20		
Cr (mg/kg)										
SIRNACH	(5)	105.0		58.8		151		80.3	*	T|D
POLASP	(9)	67.0		59.1		144		56.2		
HAMELN	(15)	76.4		53.8		134		57.2		C| CB
NDA mean		78.07		54.14		137.0		61.22		(cont.)
NDA st dev		12.23		5.00		10.7		8.73		
NDA N		25		25		25		25		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Cr (mg/kg)	(cont.)									
KSKO ZH	(16)	82.4		55.2		136		65.3		F| CB
WELE-136	(18)	77.4		50.8		131		62.0		A|AAC
HIDU	(20)	114.9	**	67.1	**	164	**	87.4	**	Q| CB
SCSF	(21)	61.7		52.6		128		57.9		A| CB
AGROCH	(22)	52.5		42.7	**	113	*	42.7	*	A|AAB
GALLEN	(23)	110.0	**	55.4		139		74.4		F| CB
LAN-8899	(24)	79.8		48.3		135		61.5		A|CB
IUNGPUL	(26)	79.3		56.8		136		65.4		C|CB
BOANALHOAG	(28)	73.5		50.0		127		52.9		Q| CB
FRIBOURG	(37)	84.5		56.2		138		70.6		T|CB
CH-SAMEN	(40)	63.8		53.0		148		49.0		T|CB
BERN-7	(43)	91.8		56.9		142		62.5		Z|CB
UFAG	(44)	74.2		57.8		142		53.1		T| CB
SOVAJETSVK	(48)	105.0		55.0		175	**	59.0		E|CB
KLGCHUR	(54)	86.5		43.2	**	144		69.3		Z| CB
ABMCE	(56)	78.0		59.6		136		59.8		C| CB
HAUERT+CO	(59)	65.5		55.7		135		63.4		A|AAB
ATVC	(62)	92.0		50.6		145		72.8		| CB
IRNASE	(63)	86.4		48.1		112	*	65.9		D| CB
OOSTERBEEK	(66)	71.5		48.0		129		54.3		D| CB
ANALGIR	(639)	83.0		58.4		140		63.2		D|AAA
LABAMB	(878)	62.0		52.0		119		46.0		T| CB
NDA mean		78.07		54.14		137.0		61.22		
NDA st dev		12.23		5.00		10.7		8.73		
NDA N		25		25		25		25		
	Old statistics									
Median		78.00	(3)	55.10	(3)	136.0	(3)	61.75	(3)	
MAD		8.40		2.90		6.0		4.35		
Mean		78.23		54.18		137.1		60.99		
St Dev		13.16		3.72		7.7		7.40		
N		23		22		21		22		
Cu (mg/kg)										
SIRNACH	(5)	43.7		352		334		43.7		T|D
POLASP	(9)	48.8	**	376		352		50.7	**	
HAMELN	(15)	41.3	*	346		327		41.3		C| CB
KSKO ZH	(16)	44.8		364		338		43.7		F| CB
WELE-136	(18)	43.0		324		319		43.1		A|AAC
HIDU	(20)	43.3		370		344		44.5		Q| CB
SCSF	(21)	43.0		312		273	**	41.9		A| CB
AGROCH	(22)	43.4		313		262	**	41.7		A|AAA
GALLEN	(23)	43.9		360		353		42.5		F| CB
LAN-8899	(24)	43.9		329		328		42.5		A|CB
IUNGPUL	(26)	43.0		342		318		42.6		C|CB
BOANALHOAG	(28)	42.0		357		342		39.8		Q| CB
FRIBOURG	(37)	100.0	<	345		333		100.0	<	T|CB
CH-SAMEN	(40)	43.6		388		366		44.0		T|CB
BERN-7	(43)	39.8	**	383		279	*	38.1	**	Z|CB
UFAG	(44)	43.9		360		337		43.2		T| CB
SOVAJETSVK	(48)	50.0	**	369		373		50.0	**	E|CB
KLGCHUR	(54)	43.0		333		334		42.2		Z| CB
ABMCE	(56)	43.6		347		331		42.3		C| CB
HAUERT+CO	(59)	42.1		354		309		43.3		A|AAA
ATVC	(62)	42.5		360		355		43.3		| CB
IRNASE	(63)	38.7	**	312		273	**	39.8		D| CB
OOSTERBEEK	(66)	45.8	*	391		386	*	47.9	**	D| CB
HILA	(79)	42.4		354		348		41.0		I| CB
ANALGIR	(639)	44.2		342		327		43.2		D|AAA
CUP Analab	(870)	48.3	**	290	**	248	**	48.7	**	A|AAA
LABAMB	(878)	39.0	**	340		295		42.0		T| CB
AGROADGAZA	(971)	59.0	**	474	**	365		57.0	**	I|AAA
NDA mean		43.24		351.3		335.9		42.58		(cont.)
NDA st dev		1.32		22.1		25.7		1.54		
NDA N		27		28		28		27		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Cu (mg/kg) (cont.)										
NDA mean		43.24		351.3		335.9		42.58		
NDA st dev		1.32		22.1		25.7		1.54		
NDA N		27		28		28		27		
	Old statistics									
Median		43.38	(3)	353.0	(3)	335.4	(3)	42.50	(3)	
MAD		0.45		12.0		10.5		0.80		
Mean		43.30		350.9		337.6		42.46		
St Dev		0.75		22.1		18.9		1.25		
N		18		26		22		21		
Fe (g/kg)										
POLASP	(9)	15.4		68.4		24.1		11.3		
HAMELN	(15)	14.9		65.4		22.5		10.0		C| CB
WELE-136	(18)	15.0		61.1		21.5		10.4		A|AAC
SCSF	(21)	14.2		65.5		21.7		9.9		A| CB
GALLEN	(23)	15.1		60.8		22.2		10.6		B| CB
IUNGPUL	(26)	14.8		62.0		22.5		10.9		C|CB
ABMCE	(56)	15.2		67.5		21.0		10.2		C| CB
HAUERT+CO	(59)	14.1		62.1		21.0		10.2		A|AAA
IRNASE	(63)	15.4		59.8		20.6		11.1		D| CB
HILA	(79)	16.0		63.5		22.2		11.3		I| CB
CUP Analab	(870)	15.2		63.1		21.6		11.0		A|AAA
LABAMB	(878)	13.1	**	54.0	**	19.0		9.0		T| CB
AGROADGAZA	(971)	14.0		66.0		25.0	**	12.0		I|AAA
NDA mean		15.00		63.50		21.75		10.65		
NDA st dev		0.54		3.39		1.02		0.77		
NDA N		13		13		13		13		
	Old statistics									
Median		15.05	(3)	63.31	(3)	21.67	(3)	10.60	(3)	
MAD		0.28		2.20		0.67		0.53		
Mean		14.94		63.77		21.67		10.61		
St Dev		0.59		2.77		1.24		0.77		
N		12		12		12		13		
Hg (µg/kg)										
SIRNACH	(5)	94		2420		2840		241		T|G
POLASP	(9)	116		2210		2480		212		
HAMELN	(15)	100		1900		2510		190		C| G
KSKO ZH	(16)	96		2150		2770		194		F| F
WELE-136	(18)	105		2030		3110		200		Z|Z
HIDU	(20)	86		1930		2830		195		Q| G
SCSF	(21)	115		2520		2910		223		F| G
AGROCH	(22)	105		2830		3070		238		Z|G
GALLEN	(23)	89		2240		2960		193		F| G
LAN-8899	(24)	101		2240		2920		210		E|G
IUNGPUL	(26)	94		2100		2640		237		
BOANALHOAG	(28)	130	**	2450		2700		205		Q| G
FRIBOURG	(37)	104		2300		2980		242		T|CB
CH-SAMEN	(40)	108		1990		3290		273		T|G
BERN-7	(43)	71	**	2330		2970		173		Z|G
UFAG	(44)	94		2410		2830		181		T| G
SOVAJETSVK	(48)	81		1390	**	1990	**	224		E|CB
KLGCHUR	(54)	152	**	2540		3440		276		Q| Z
HAUERT+CO	(59)	50	<	2200		3160		123	*	N|G
OOSTERBEEK	(66)	61	**	2110		2930		116	**	D| F
ANALGIR	(639)	102		2070		3080		252		
LABAMB	(878)	100		2000		2500		300		T| CB
NDA mean		99.5		2207		2902		216.0		(cont.)
NDA st dev		9.3		264		242		38.9		
NDA N		21		22		22		22		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Hg (µg/kg) (cont.)										
NDA mean		99.5		2207		2902		216.0		
NDA st dev		9.3		264		242		38.9		
NDA N		21		22		22		22		
	Old statistics									
Median		100.0	(3)	2206	(3)	2920	(3)	217.5	(3)	
MAD		5.9		175		155		23.5		
Mean		99.4		2236		2901		223.0		
St Dev		9.4		233		251		34.2		
N		17		21		21		20		
K (g/kg)										
SIRNACH	(5)	11.8		2.39		3.72	*	12.4		T|CA
POLASP	(9)	11.0		1.30		2.41		12.0		
HAMELN	(15)	10.6		1.27		2.45		11.6		C| CB
KSKO ZH	(16)	11.5		1.77		3.26		11.9		F| CB
HIDU	(20)	13.5	*	2.50	*	5.57	**	14.8		C| CB
SCSF	(21)	10.0		1.60		2.51		10.7		A| CB
AGROCH	(22)	9.7		1.47		2.34		10.6		A|AAA
GALLEN	(23)	10.7		1.54		2.81		11.4		F| JB
LAN-8899	(24)	10.4		1.48		2.75		11.7		A|CB
IUNGPUL	(26)	10.4		1.52		2.92		11.7		
BOANALHOAG	(28)	12.5		1.20		2.50		12.9		Q| CB
FRIBOURG	(37)	11.7		1.28		3.20		12.9		T|CB
CH-SAMEN	(40)	10.8		1.05		1.89		11.5		T|CA
BERN-7	(43)	11.9		2.53	*	5.33	**	12.9		Z|CB
UFAG	(44)	10.8		1.37		2.44		11.5		T| CB
KLGCHUR	(54)	12.7		3.57	**	5.53	**	14.0		Z| CB
ABMCE	(56)	11.1		1.20		2.53		11.8		C| CB
HAUERT+CO	(59)	10.1		1.72		3.12		11.0		A|AAA
IRNASE	(63)	11.8		1.82		3.66	*	12.8		D| CB
OOSTERBEEK	(66)	13.9	**	3.11	**	5.36	**	13.8		M| CB
HILA	(79)	12.2		1.64		3.15		13.0		I| CB
ANALGIR	(639)	10.5		1.90		2.85		10.9		D|AAA
CUP Analab	(870)	9.4		2.08		2.59		10.3		A| CA
LABAMB	(878)	9.7		0.89		1.44	*	10.5		T| CB
AGROADGAZA	(971)	10.8		2.50	*	5.80	**	16.6	**	I|CA
NDA mean		11.00		1.572		2.740		11.92		
NDA st dev		1.19		0.479		0.580		1.43		
NDA N		25		25		25		25		
	Old statistics									
Median		10.80	(3)	1.500	(3)	2.585	(3)	11.75	(3)	
MAD		0.70		0.225		0.225		0.95		
Mean		10.96		1.524		2.689		12.03		
St Dev		0.92		0.359		0.366		1.18		
N		23		20		17		24		
Li (mg/kg)										
HAMELN	(15)	12.8		9.10		16.2		10.10		C| CB
LABAMB	(878)	11.0		5.50		13.0		9.00		T| CB
Median		11.90	(1)	7.300	(1)	14.60	(1)	9.550	(1)	
MAD		0.90		1.800		1.60		0.550		
N		2		2		2		2		
Mg (g/kg)										
SIRNACH	(5)	7.61		7.01		5.62		10.5		T|AAC
POLASP	(9)	7.78		7.18		5.79		10.7		
HAMELN	(15)	7.58		6.60		5.29		10.5		C| CB
KSKO ZH	(16)	8.28	*	7.39		6.08		10.9		F| CB
WELE-136	(18)	7.58		6.95		5.38		10.4		B|AA
HIDU	(20)	8.59	**	7.84	**	6.44	**	11.7	*	Q| CB
NDA mean		7.570		6.961		5.487		10.59		(cont.)
NDA st dev		0.395		0.372		0.371		0.54		
NDA N		26		26		26		26		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Mg (g/kg) (cont.)										
SCSF	(21)	7.49		6.88		5.31		10.3		A| CB
AGROCH	(22)	7.48		6.72		4.87		10.6		A|AAA
GALLEN	(23)	7.70		6.76		5.52		10.4		F| CB
LAN-8899	(24)	7.46		6.79		5.37		10.4		A|CB
IUNGPUL	(26)	8.08	*	7.14		5.40		11.5		
BOANALHOAG	(28)	7.32		6.69		4.80	*	9.8		Q| CB
FRIBOURG	(37)	8.46	**	7.43		5.97		11.7	*	T|CB
CH-SAMEN	(40)	7.23		6.90		5.34		10.2		T|CB
BERN-7	(43)	8.02	*	7.15		5.71		10.9		Z|CB
UFAG	(44)	7.30		6.84		5.53		10.0		T| CB
KLGCHUR	(54)	6.77	*	6.18		5.74		7.6	**	Z| CB
ABMCE	(56)	7.70		7.17		5.52		10.7		C| CB
HAUERT+CO	(59)	7.47		6.86		5.43		10.7		A|AAA
IRNASE	(63)	7.63		6.69		5.58		10.7		D| CB
OOSTERBEEK	(66)	5.92	**	4.59	**	2.46	**	8.3	**	M| CB
HILA	(79)	8.41	*	7.48		6.06		11.3		I| CB
ANALGIR	(639)	7.12	*	5.97	**	4.98		11.0		D|AAA
CUP Analab	(870)	7.55		7.11		5.13		10.0		A|AAA
LABAMB	(878)	6.60	**	6.10	*	4.30	**	9.1	**	T| CB
AGROADGAZA	(971)	6.60	**	7.20		7.20	**	15.1	**	I|AAA
NDA mean		7.570		6.961		5.487		10.59		
NDA st dev		0.395		0.372		0.371		0.54		
NDA N		26		26		26		26		
	Old statistics									
Median		7.550	(3)	6.925	(3)	5.520	(3)	10.53	(3)	
MAD		0.080		0.220		0.190		0.22		
Mean		7.525		6.960		5.506		10.57		
St Dev		0.156		0.306		0.319		0.43		
N		15		22		21		20		
Mn (mg/kg)										
POLASP	(9)	685		649		619		468	*	
HAMELN	(15)	602		583		553		415		C| CB
WELE-136	(18)	624		603		569		432		A|AAC
SCSF	(21)	625		633		563		417		A| CB
IUNGPUL	(26)	628		635		582		437		C|CB
SOVAJETSVK	(48)	744	**	676		635	**	488	**	E|CB
ABMCE	(56)	647		626		584		440		C| CB
HAUERT+CO	(59)	645		632		572		439		A|AAA
IRNASE	(63)	494	**	497	**	427	**	343	**	D| CB
HILA	(79)	643		610		564		434		I| CB
CUP Analab	(870)	623		607		548		422		A|AAA
LABAMB	(878)	615		600		540		410		T| CB
AGROADGAZA	(971)	527	**	633		501		430		I|AAA
NDA mean		630.5		622.4		566.3		429.2		
NDA st dev		27.1		26.9		26.3		13.8		
NDA N		13		13		13		13		
	Old statistics									
Median		626.5	(3)	629.0	(3)	564.0	(3)	431.0	(3)	
MAD		14.0		19.5		15.5		8.3		
Mean		633.7		623.9		563.2		427.6		
St Dev		22.8		25.0		29.6		10.8		
N		10		12		11		10		
Mo (mg/kg)										
SIRNACH	(5)	4.15		6.61		10.70		3.60		T|D
POLASP	(9)	3.38		4.56		9.96		4.69		
KSKO ZH	(16)	2.85		5.73		8.08		2.90		F| CB
HIDU	(20)	3.70		6.02		10.22		3.64		Q| D
SCSF	(21)	3.05		4.98		8.20		2.58		A| CB
NDA mean		3.241		5.031		8.946		2.991		(cont.)
NDA st dev		0.512		1.084		1.133		0.653		
NDA N		16		16		17		16		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Mo (mg/kg) (cont.)										
AGROCH	(22)	2.36		3.53		8.35		2.53		A|AAB
GALLEN	(23)	3.36		5.24		9.31		3.02		F| CB
LAN-8899	(24)	3.20		5.40		8.80		3.10		A|CB
BOANALHOAG	(28)	1.97	**	4.78		7.80		1.97		Q| CB
FRIBOURG	(37)	3.00	<	3.00	<	7.23		3.00	<	T|CB
CH-SAMEN	(40)	3.30		3.96		8.82		2.86		T|BAD
BERN-7	(43)	2.29	*	5.13		8.68		2.33		Z|CB
UFAG	(44)	3.43		6.00		9.68		3.52		T|BAD
KLGCHUR	(54)	3.95		5.91		10.20		3.31		Z| CB
ABMCE	(56)	3.43		3.79		9.03		3.08		C| CB
HAUERT+CO	(59)	3.27		4.66		9.59		3.24		A|AAB
LABAMB	(878)	2.50		4.00		7.50		2.50		T| CB
NDA mean		3.241		5.031		8.946		2.991		
NDA st dev		0.512		1.084		1.133		0.653		
NDA N		16		16		17		16		
	Old statistics									
Median		3.330	(3)	5.055	(3)	8.820	(3)	3.050	(3)	
MAD		0.205		0.765		0.770		0.470		
Mean		3.281		5.019		8.950		3.054		
St Dev		0.492		0.905		1.016		0.643		
N		14		16		17		16		
N (g/kg)										
SIRNACH	(5)	13.3		27.9		35.4		13.4		S|O
POLASP	(9)	14.0		28.3		35.5		14.0		
KSKO ZH	(16)	13.8		27.5		35.0		13.3		Z| Z
HIDU	(20)	13.6		28.1		35.0		14.7	**	S| O
SCSF	(21)	13.1		26.8		34.2		12.7		S| O
AGROCH	(22)	13.2		27.1		34.4		13.2		Z|O
GALLEN	(23)	13.6		27.1		34.9		13.4		S| O
LAN-8899	(24)	13.8		27.3		34.6		12.9		Z|O
IUNGPUL	(26)	13.7		28.2		35.0		13.5		
BOANALHOAG	(28)	12.4		26.3		34.2		12.1	**	Z| O
FRIBOURG	(37)	12.1		27.7		33.7		12.3		T|CB
CH-SAMEN	(40)	13.1		26.7		32.8	**	12.5		M|O
BERN-7	(43)	12.9		27.8		35.4		13.1		Z|O
UFAG	(44)	13.4		27.8		35.1		13.6		S| O
SOVAJETSVK	(48)	14.1		32.2	**	35.8		14.8	**	H|Z
KLGCHUR	(54)	13.1		27.9		34.6		13.4		T|CB
ABMCE	(56)	13.6		27.2		34.8		13.4		S| O
HAUERT+CO	(59)	14.7		28.2		35.7		14.2		Z|Z
ATVC	(62)	13.1		26.9		34.9		12.9		S| O
IRNASE	(63)	12.9		26.3		32.2	**	13.0		S| E
OOSTERBEEK	(66)	13.6		27.5		34.5		13.1		M| O
ANALGIR	(639)	13.8		30.2	**	34.9		13.4		S| O
LABAMB	(878)	13.9		25.9		31.6	**	13.0		M| O
MICHAEL	(904)	12.8		25.7		31.9	**	12.8		Z| O
AGROADGAZA	(971)	15.0		29.0		36.0		14.0		S|Z
NDA mean		13.44		27.43		34.92		13.21		
NDA st dev		0.64		0.89		0.71		0.52		
NDA N		25		25		25		25		
	Old statistics									
Median		13.55	(3)	27.50	(3)	34.90	(3)	13.25	(3)	
MAD		0.45		0.60		0.40		0.29		
Mean		13.46		27.36		34.94		13.23		
St Dev		0.64		0.82		0.58		0.47		
N		25		23		21		22		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
N - NO3 (as N) (mg/kg)										
LABAMB	(878)	249		11.0		9.00		226		Z| JC
Median		249.0	(1)	11.00	(1)	9.000	(1)	226.0	(1)	
MAD		-		-		-		-		
N		1		1		1		1		
Na (g/kg)										
POLASP	(9)	0.470		0.410		2.03		0.820		
HAMELN	(15)	0.440		0.410		1.87		0.740		C| CB
IUNGPUL	(26)	0.520		0.420		1.90		0.820		
ABMCE	(56)	0.420	<	0.420	<	1.92		0.796		C| CB
IRNASE	(63)	0.680		0.650		1.96		1.120		D| CB
HILA	(79)	0.420		0.370		1.85		0.750		I| CB
LABAMB	(878)	0.430		0.360		1.60		0.770		T| CB
Median		0.4550	(1)	0.4100	(1)	1.900	(1)	0.7960	(1)	
MAD		0.0300		0.0250		0.050		0.0260		
N		6		6		7		7		
Ni (mg/kg)										
SIRNACH	(5)	26.7		29.9		136		21.1		T|D
POLASP	(9)	26.3		33.8		140		21.7		
HAMELN	(15)	28.1		32.5		131		20.9		C| CB
KSKO ZH	(16)	22.6	**	33.0		135		18.6		F| CB
WELE-136	(18)	26.0		28.3		133		20.1		A|AAC
HIDU	(20)	30.7	*	37.0		147		23.7		Q| D
SCSF	(21)	28.1		32.3		132		22.7		A| CB
AGROCH	(22)	25.1		26.1		117		18.9		A|AAC
GALLEN	(23)	30.5	*	35.4		148		22.7		F| CB
LAN-8899	(24)	26.9		29.9		129		19.9		A|CB
IUNGPUL	(26)	27.4		34.9		133		19.9		C|CB
BOANALHOAG	(28)	19.9	**	29.2		125		15.2	**	Q| CB
FRIBOURG	(37)	28.4		33.0		133		20.3		T|CB
CH-SAMEN	(40)	26.2		30.7		144		19.5		T|CB
BERN-7	(43)	23.5	*	33.1		141		17.6		Z|CB
UFAG	(44)	28.0		32.3		144		19.1		T| CB
SOVAJETSVK	(48)	25.0		33.0		130		16.0	**	E|CB
KLGCHUR	(54)	27.7		30.7		139		21.5		Z| CB
ABMCE	(56)	27.0		31.3		130		19.9		C| CB
HAUERT+CO	(59)	27.3		30.2		135		21.4		A|AAC
ATVC	(62)	27.5		31.8		142		21.5		| CB
IRNASE	(63)	24.7		28.7		104	**	19.0		D| CB
OOSTERBEEK	(66)	23.3	*	26.1		115	*	17.5		D| CB
ANALGIR	(639)	27.5		29.2		130		20.0		D|BAC
LABAMB	(878)	25.0		31.0		120		20.0		T| CB
NDA mean		26.76		31.40		134.4		20.17		
NDA st dev		1.82		2.53		8.8		1.66		
NDA N		25		25		25		25		
	Old statistics									
Median		27.00	(3)	31.30	(3)	133.0	(3)	20.00	(3)	
MAD		0.80		1.70		4.0		1.07		
Mean		26.79		31.33		134.5		20.33		
St Dev		1.17		2.65		8.0		1.57		
N		19		25		23		23		
P (g/kg)										
SIRNACH	(5)	3.21		26.9		28.5		2.89		T|E
POLASP	(9)	3.27		27.1		29.5		3.19		
HAMELN	(15)	2.97		24.9		26.5		2.77		C| CB
KSKO ZH	(16)	3.24		27.8		29.8		2.86		F| CB
HIDU	(20)	3.28		28.0		30.1		3.05		Q| CB
NDA mean		3.189		26.40		28.46		2.890		(cont.)
NDA st dev		0.127		1.59		1.60		0.160		
NDA N		25		25		25		25		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262	217	273	264	MIC
P (g/kg) (cont.)						
SCSF	(21)	3.25	26.6	28.6	2.87	A| CB
AGROCH	(22)	3.32	27.4	29.5	3.02	A|P
GALLEN	(23)	3.24	25.5	29.5	2.84	B| CB
LAN-8899	(24)	3.15	25.8	28.1	2.81	A|CB
IUNGPUL	(26)	3.10	25.0	26.2	2.68	
BOANALHOAG	(28)	3.00	24.4	27.0	2.60	Q| CB
FRIBOURG	(37)	3.01	26.5	28.4	2.87	T|CB
CH-SAMEN	(40)	3.45	29.6	31.6	3.16	T|CB
BERN-7	(43)	3.39	28.2	29.2	3.01	Z|CB
UFAG	(44)	3.10	26.3	28.4	2.78	T| CB
KLGCHUR	(54)	3.13	28.3	30.2	2.85	T|CB
ABMCE	(56)	3.28	26.2	28.2	3.02	C| CB
HAUERT+CO	(59)	3.16	26.0	27.8	2.91	A|E
IRNASE	(63)	3.01	25.0	27.0	2.69	D| CB
OOSTERBEEK	(66)	3.17	26.1	28.4	2.89	M| CB
HILA	(79)	3.42	27.8	30.6	3.12	I| CB
ANALGIR	(639)	3.14	26.5	27.4	2.95	D| E
CUP Analab	(870)	3.30	23.9	25.9	2.92	A| E
LABAMB	(878)	3.15	26.0	27.5	2.90	T| CB
AGROADGAZA	(971)	3.10	22.3 **	23.1 **	2.60	I|P
NDA mean		3.189	26.40	28.46	2.890	
NDA st dev		0.127	1.59	1.60	0.160	
NDA N		25	25	25	25	
	Old statistics					
Median		3.167 (3)	26.40 (3)	28.40 (3)	2.890 (3)	
MAD		0.083	0.96	1.09	0.110	
Mean		3.193	26.49	28.49	2.890	
St Dev		0.130	1.37	1.45	0.156	
N		25	24	24	25	
Pb (mg/kg)						
SIRNACH	(5)	39.1	154	235	34.3	T|D
POLASP	(9)	49.5 **	147	233	35.3	
HAMELN	(15)	39.7	140	215	32.6	C| CB
KSKO ZH	(16)	43.4	145	226	34.4	F| CB
WELE-136	(18)	39.5	145	219	32.0	A|AAC
HIDU	(20)	43.6	171 **	255	41.6 **	Q| D
SCSF	(21)	39.6	143	223	28.8	A| CB
AGROCH	(22)	45.0 *	148	208	37.8	A|AAC
GALLEN	(23)	42.9	147	232	34.2	F| CB
LAN-8899	(24)	39.3	142	218	33.2	A|CB
IUNGPUL	(26)	41.1	148	213	35.5	
BOANALHOAG	(28)	38.0	135	222	32.9	Q| CB
FRIBOURG	(37)	33.4 **	127	188	25.7	T|CB
CH-SAMEN	(40)	37.9	119 **	202	28.6	T|CB
BERN-7	(43)	43.2	148	234	30.8	Z|CB
UFAG	(44)	40.7	127	211	29.0	T| CB
SOVAJETSVK	(48)	36.0	156	246	39.0	E|CB
KLGCHUR	(54)	37.5	129	221	30.2	Z| CB
ABMCE	(56)	40.9	136	221	33.1	C| CB
HAUERT+CO	(59)	37.9	142	234	28.1	A|AAA
ATVC	(62)	39.0	-	235	32.5	| CB
OOSTERBEEK	(66)	41.2	116 **	188	28.7	D| CB
ANALGIR	(639)	39.5	141	215	33.9	D|BAC
LABAMB	(878)	41.0	120 **	185	35.0	T| CB
NDA mean		40.00	142.3	221.7	32.63	(cont.)
NDA st dev		2.38	9.4	16.7	3.40	
NDA N		24	23	24	24	

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Pb (mg/kg) (cont.)										
NDA mean		40.00		142.3		221.7		32.63		
NDA st dev		2.38		9.4		16.7		3.40		
NDA N		24		23		24		24		
	Old statistics									
Median		39.60	(3)	143.0	(3)	221.0	(3)	32.90	(3)	
MAD		1.50		5.0		11.5		2.10		
Mean		40.04		142.1		219.9		32.42		
St Dev		2.07		8.2		17.5		3.28		
N		21		19		24		23		
S (mg/kg)										
POLASP	(9)	0		10		0		0		
HAMELN	(15)	1760		6280		9600		1780		C| CB
IUNGPUL	(26)	1810		8000		10900		2040		
SOVAJETSVK	(48)	3470		6850		13300		4210		E|CB
IRNASE	(63)	2020		7260		10900		2180		D| CB
Median		1810	(1)	6854	(1)	10850	(1)	2040	(1)	
MAD		209		577		1280		265		
N		5		5		5		5		
S - SO4 (as S) (mg/kg)										
LABAMB	(878)	513		2600		6600		438		Z| JC
Median		513.0	(1)	2595	(1)	6598	(1)	438.0	(1)	
MAD		-		-		-		-		
N		1		1		1		1		
Sb (µg/kg)										
HAMELN	(15)	650		4490		10100		990		C| D
LABAMB	(878)	900		4300		9300		1000		T| CB
Median		775.0	(1)	4395	(1)	9700	(1)	995.0	(1)	
MAD		125.0		95		400		5.0		
N		2		2		2		2		
Se (µg/kg)										
HAMELN	(15)	160		1520		1910		150		C| F
LABAMB	(878)	300		1700		1800		200		T| CB
Median		230.0	(1)	1610	(1)	1855	(1)	175.0	(1)	
MAD		70.0		90		55		25.0		
N		2		2		2		2		
Sn (mg/kg)										
HAMELN	(15)	3.50		32.1		16.6		3.09		C| D
IRNASE	(63)	5.00	<	25.1		30.5		5.00	<	D| CB
LABAMB	(878)	2.90		28.0		31.0		2.60		T| CB
Median		3.200	(1)	28.00	(1)	30.50	(1)	2.845	(1)	
MAD		0.300		2.90		0.50		0.245		
N		2		3		3		2		
Sr (mg/kg)										
HAMELN	(15)	92.0		300		156		133		C| CB
IRNASE	(63)	89.3		268		139		130		D| CB
LABAMB	(878)	115.0		340		170		170		T| CB
Median		92.00	(1)	300.0	(1)	156.0	(1)	133.0	(1)	
MAD		2.70		32.0		14.0		2.6		
N		3		3		3		3		

MARSEP 2009.1 - Acid extractable (So-called totals)

Sample		262		217		273		264		MIC
Ti (mg/kg)										
LABAMB	(878)	105		72.0		30.0		85.0		T| CB
Median		105.0	(1)	72.00	(1)	30.00	(1)	85.00	(1)	
MAD		-		-		-		-		
N		1		1		1		1		
Tl (µg/kg)										
HAMELN	(15)	120		-		220		90.0		C| D
LABAMB	(878)	100	<	100.0	<	100		100.0	<	T| CB
Median		120.0	(1)	-	(0)	160.0	(1)	90.00	(1)	
MAD		-		-		60.0		-		
N		1		-		2		1		
V (mg/kg)										
HAMELN	(15)	21.8		13.6		26.6		17.1		C| D
SOVAJETSVK	(48)	31.0		20.0		38.0		19.0		E|CB
ABMCE	(56)	23.4		17.6		29.2		22.1		C| CB
LABAMB	(878)	20.0		13.3		23.0		13.5		T| CB
Median		22.60	(1)	15.60	(1)	27.90	(1)	18.05	(1)	
MAD		1.70		2.15		3.10		2.50		
N		4		4		4		4		
Zn (mg/kg)										
SIRNACH	(5)	142		985		739		136		T|D
POLASP	(9)	146		55	**	764	*	161	**	
HAMELN	(15)	135		909		698		130		C| CB
KSKO ZH	(16)	145		985		762	*	140		F| CB
WELE-136	(18)	134		949		708		134		A|AAC
HIDU	(20)	149	*	1044		785	**	155	**	Q| CB
SCSF	(21)	147	*	978		718		134		A| CB
AGROCH	(22)	136		949		693		131		A|AAC
GALLEN	(23)	139		929		710		132		F| CB
LAN-8899	(24)	136		939		701		127		A|CB
IUNGPUL	(26)	133		964		715		129		
BOANALHOAG	(28)	147	*	1058		787	**	139		Q| CB
FRIBOURG	(37)	250	<	915		671		250	<	T|CB
CH-SAMEN	(40)	110	**	937		712		106	**	T|CB
BERN-7	(43)	133		1016		728		129		Z|CB
UFAG	(44)	136		1077		800	**	128		T| CB
SOVAJETSVK	(48)	159	**	1066		817	**	152	**	E|CB
KLGCHUR	(54)	129		840		697		124		Z| CB
ABMCE	(56)	135		891		692		128		C| CB
HAUERT+CO	(59)	135		908		670		129		A|AAA
ATVC	(62)	135		-		730		130		| CB
IRNASE	(63)	155	*	680	**	549	**	118		D| CB
OOSTERBEEK	(66)	122	*	737	**	604	**	115	*	D| CB
HILA	(79)	137		898		708		138		I| CB
ANALGIR	(639)	137		920		699		130		D|BAC
CUP Analab	(870)	142		1003		696		130		A|AAA
LABAMB	(878)	125	*	950		720		125		T| CB
CRC	(884)	119	*	763	**	646	**	119		I|CB
AGROADGAZA	(971)	163	**	1027		770	*	143	*	I|AAA
NDA mean		137.5		957.4		710.4		130.4		
NDA st dev		8.6		65.5		28.1		6.7		
NDA N		28		28		29		28		
	Old statistics									
Median		136.0	(3)	949.7	(3)	708.0	(3)	130.0	(3)	
MAD		1.5		38.0		11.0		2.7		
Mean		136.9		964.1		705.5		130.0		
St Dev		4.3		61.3		18.0		5.7		
N		18		24		19		22		

MARSEP 2009.1 - Other determinations

Sample		262		217		273		264		MIC
AOX (mg/kg)										
SIRNACH	(5)	60.0		290		420		70.0		Z|Z
HAMELN	(15)	51.4		283		345		46.3		Z| O
HIDU	(20)	41.2		274		389		44.7		R| O
GALLEN	(23)	43.3		293		373		42.5		R| O
BOANALHOAG	(28)	68.2	**	358		559	**	65.7		R| O
FRIBOURG	(37)	41.0		265		364		34.0		R|O
CH-SAMEN	(40)	45.0		306		365		72.0		R|O
UFAG	(44)	50.0	<	316		380		50.0	<	R| O
KLGCHUR	(54)	44.4		232		320		39.7		
NDA mean		44.11		288.0		369.8		48.57		
NDA st dev		5.00		24.7		23.5		14.29		
NDA N		8		9		9		8		
	Old statistics									
Median		44.38	(2)	290.0	(3)	369.0	(3)	45.50	(3)	
MAD		3.14		16.4		15.3		8.65		
Mean		-		290.7		369.4		51.86		
St Dev		-		35.1		29.6		14.94		
N		7		9		8		8		
loss-on-ignition (%)										
SIRNACH	(5)	28.9		41.9		52.3		32.9		Z|P
POLASP	(9)	28.0		39.7	*	51.3		30.7		
KSKO ZH	(16)	29.3		42.7		52.2		32.1		Z| P
HIDU	(20)	27.9		42.8		53.3		32.7		Z| P
SCSF	(21)	28.7		42.6		53.1		32.0		Z| P
AGROCH	(22)	28.4		42.2		52.6		31.7		
GALLEN	(23)	28.8		41.3		51.8		32.8		Z| P
LAN-8899	(24)	28.7		41.9		52.2		32.2		
BOANALHOAG	(28)	27.5		41.1		51.8		31.1		| P
FRIBOURG	(37)	27.7		40.9		51.7		31.0		Z|P
CH-SAMEN	(40)	29.7		41.4		52.4		32.5		Z|P
BERN-7	(43)	28.2		42.3		51.6		32.7		
UFAG	(44)	28.6		41.7		52.4		31.7		Z| P
KLGCHUR	(54)	27.4		41.6		52.1		32.4		T|CB
HAUERT+CO	(59)	28.5		41.3		52.2		32.1		Z|P
ATVC	(62)	28.0		40.6		51.3		31.9		| P
IRNASE	(63)	32.1	**	47.1	**	55.0	**	39.7	**	A|
OOSTERBEEK	(66)	29.0		42.1		52.5		32.2		Z| P
HILA	(79)	28.6		41.6		52.1		31.9		| P
ANALGIR	(639)	28.9		41.1		51.7		31.8		
CUP Analab	(870)	30.0	*	42.9		52.8		33.3		Z| P
LABAMB	(878)	30.8	**	46.3	**	57.1	**	35.2	**	| P
CRC	(884)	28.3		41.3		51.9		31.3		|P
NDA mean		28.50		41.70		52.12		32.08		
NDA st dev		0.61		0.84		0.55		0.67		
NDA N		23		23		23		23		
	Old statistics									
Median		28.55	(3)	41.65	(3)	52.20	(3)	32.10	(3)	
MAD		0.37		0.49		0.36		0.40		
Mean		28.46		41.76		52.16		32.04		
St Dev		0.59		0.66		0.53		0.67		
N		20		20		21		21		

MARSEP 2009.1
Z - Scores

MARSEP 2009.1 Z - Scores - Per Participant

Sample	262	217	273	264
SIRNACH (5)				
Ca (AE)	-0.42	-0.76	-1.36	-1.05
Cd (AE)	0.22	0.81	1.00	0.70
Co (AE)	0.89	0.39	1.36	1.27
Cr (AE)	2.20	0.93	1.30	2.19
Cu (AE)	0.35	0.03	-0.07	0.73
Hg (AE)	-0.59	0.80	-0.25	0.64
K (AE)	0.67	1.71	1.69	0.33
Mg (AE)	0.10	0.13	0.36	-0.17
Mo (AE)	1.78	1.46	1.55	0.93
N (AE)	-0.21	0.53	0.68	0.37
Ni (AE)	-0.03	-0.59	0.18	0.56
P (AE)	0.17	0.31	0.03	0.00
Pb (AE)	-0.38	1.25	0.79	0.49
Zn (AE)	0.52	0.42	1.02	0.84
AOX (OD)	3.18	0.08	2.14	1.50
loss-on-ignition (OD)	0.66	0.23	0.33	1.23
POLASP (9)				
Al (AE)	#	#	#	#
As (AE)	#	#	#	#
C (AE)	#	#	#	#
Ca (AE)	3.01	0.95	1.21	0.55
Cd (AE)	-1.55	1.06	2.33	-0.17
Co (AE)	-0.95	-0.71	-0.30	-0.03
Cr (AE)	-0.90	0.99	0.65	-0.57
Cu (AE)	4.21	1.12	0.63	5.27
Fe (AE)	0.74	1.45	2.29	0.85
Hg (AE)	1.78	0.00	-1.74	-0.10
K (AE)	0.00	-0.57	-0.57	0.05
Mg (AE)	0.53	0.59	0.82	0.20
Mn (AE)	2.01	0.99	2.00	2.82
Mo (AE)	0.27	-0.43	0.89	2.60
N (AE)	0.89	0.97	0.82	1.54
Na (AE)	#	#	#	#
Ni (AE)	-0.25	0.95	0.64	0.92
P (AE)	0.64	0.44	0.65	1.87
Pb (AE)	4.00	0.50	0.67	0.79
S (AE)	#	#	#	#
Zn (AE)	0.99	-13.77	1.91	4.60
loss-on-ignition (OD)	-0.82	-2.39	-1.49	-2.06
HAMELN (15)				
Al (AE)	#	#	#	#
As (AE)	#	-	#	-
Ba (AE)	#	#	#	#
Be (AE)	#	#	#	#
Bi (AE)	#	#	#	#
Ca (AE)	-0.35	-0.45	-0.55	-0.15
Cd (AE)	-0.49	-0.74	-0.85	-0.38
Co (AE)	-2.29	-0.62	-0.78	0.13
Cr (AE)	-0.14	-0.07	-0.28	-0.46
Cu (AE)	-1.46	-0.24	-0.34	-0.83
Fe (AE)	-0.18	0.56	0.73	-0.84
Hg (AE)	0.06	-1.16	-1.62	-0.67
K (AE)	-0.34	-0.63	-0.50	-0.23
Li (AE)	#	#	#	#
Mg (AE)	0.02	-0.97	-0.53	-0.17
Mn (AE)	-1.05	-1.46	-0.50	-1.03
Na (AE)	#	#	#	#
Ni (AE)	0.74	0.43	-0.38	0.44
P (AE)	-1.72	-0.95	-1.22	-0.75
Pb (AE)	-0.13	-0.24	-0.40	-0.01
S (AE)	#	#	#	#
Sb (AE)	#	#	#	#
Se (AE)	#	#	#	#
Sn (AE)	#	#	#	#

(cont)

MARSEP 2009.1 Z - Scores - Per Participant

Sample	262	217	273	264	
HAMELN (15) (cont.)					
Sr (AE)	#	#	#	#	
Tl (AE)	#	-	#	#	
V (AE)	#	#	#	#	
Zn (AE)	-0.30	-0.74	-0.44	-0.06	
AOX (OD)	1.46	-0.20	-1.05	-0.16	
KSKO ZH (16)					
Ca (AE)	0.81	0.76	0.45	-0.77	
Cd (AE)	0.15	0.13	0.59	0.48	
Co (AE)	0.34	0.89	0.17	0.52	
Cr (AE)	0.35	0.21	-0.10	0.47	
Cu (AE)	1.18	0.58	0.08	0.73	
Hg (AE)	-0.40	-0.22	-0.53	-0.57	
K (AE)	0.42	0.41	0.90	-0.02	
Mg (AE)	1.80	1.15	1.60	0.57	
Mo (AE)	-0.77	0.64	-0.76	-0.14	
N (AE)	0.57	0.08	0.11	0.18	
Ni (AE)	-2.29	0.63	0.07	-0.95	
P (AE)	0.40	0.88	0.84	-0.19	
Pb (AE)	1.43	0.29	0.26	0.52	
Zn (AE)	0.87	0.42	1.84	1.45	
loss-on-ignition (OD)	1.32	1.19	0.15	0.03	
WELE-136 (18)					
Cd (AE)	-0.84	-0.18	-0.23	-2.12	
Co (AE)	-0.29	-0.47	0.41	-0.51	
Cr (AE)	-0.05	-0.67	-0.56	0.09	
Cu (AE)	-0.18	-1.23	-0.65	0.34	
Fe (AE)	0.00	-0.71	-0.25	-0.32	
Hg (AE)	0.60	-0.67	0.86	-0.41	
Mg (AE)	0.02	-0.03	-0.29	-0.35	
Mn (AE)	-0.24	-0.72	0.10	0.21	
Ni (AE)	-0.42	-1.22	-0.16	-0.04	
Pb (AE)	-0.21	0.29	-0.16	-0.19	
Zn (AE)	-0.41	-0.13	-0.08	0.54	
HIDU (20)					
Ca (AE)	3.09	1.47	1.14	0.98	
Cd (AE)	-0.84	0.38	1.10	-0.17	
Co (AE)	3.11	1.64	3.39	1.79	
Cr (AE)	3.01	2.60	2.50	2.99	
Cu (AE)	0.06	0.83	0.30	1.25	
Hg (AE)	-1.47	-1.05	-0.29	-0.53	
K (AE)	2.06	1.93	4.88	2.03	
Mg (AE)	2.59	2.36	2.57	2.10	
Mo (AE)	0.90	0.91	1.12	0.99	
N (AE)	0.27	0.76	0.14	2.80	
Ni (AE)	2.18	2.21	1.43	2.11	
P (AE)	0.72	0.97	1.01	1.00	
Pb (AE)	1.51	3.06	1.99	2.63	
Zn (AE)	1.39	1.32	2.65	3.70	
AOX (OD)	-0.57	-0.58	0.80	-0.27	
loss-on-ignition (OD)	-0.98	1.31	2.16	0.93	
SCSF (21)					
Al (AE)	#	#	#	#	
Ca (AE)	0.42	0.54	0.27	0.22	
Cd (AE)	-0.26	0.69	0.18	-1.21	
Co (AE)	0.26	1.23	-0.06	0.67	
Cr (AE)	-1.34	-0.31	-0.84	-0.38	
Cu (AE)	-0.18	-1.78	-2.44	-0.44	
Fe (AE)	-1.47	0.59	-0.05	-0.93	
Hg (AE)	1.68	1.20	0.03	0.18	
K (AE)	-0.86	0.06	-0.40	-0.86	
Mg (AE)	-0.20	-0.22	-0.48	-0.54	
Mn (AE)	-0.20	0.40	-0.12	-0.88	(cont)

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Sample	262	217	273	264	
SCSF (21) (cont.)					
Mo (AE)	-0.37	-0.05	-0.66	-0.63	
N (AE)	-0.53	-0.71	-1.02	-0.99	
Ni (AE)	0.74	0.36	-0.27	1.52	
P (AE)	0.48	0.12	0.09	-0.13	
Pb (AE)	-0.17	0.08	0.08	-1.13	
Zn (AE)	1.10	0.31	0.27	0.54	
loss-on-ignition (OD)	0.33	1.07	1.79	-0.12	
AGROCH (22)					
Ca (AE)	-0.54	-0.26	-0.73	-0.34	
Cd (AE)	-1.37	-0.12	0.28	-1.91	
Co (AE)	-0.32	-0.62	0.21	0.61	
Cr (AE)	-2.09	-2.30	-2.23	-2.12	
Cu (AE)	0.15	-1.75	-2.87	-0.57	
Hg (AE)	0.58	2.34	0.71	0.56	
K (AE)	-1.11	-0.21	-0.69	-0.92	
Mg (AE)	-0.23	-0.65	-1.66	-0.06	
Mo (AE)	-1.72	-1.38	-0.53	-0.71	
N (AE)	-0.37	-0.37	-0.73	-0.02	
Ni (AE)	-0.90	-2.09	-1.95	-0.75	
P (AE)	1.03	0.63	0.63	0.81	
Pb (AE)	2.11	0.61	-0.82	1.53	
Zn (AE)	-0.16	-0.12	-0.61	0.12	
loss-on-ignition (OD)	-0.14	0.58	0.84	-0.64	
GALLEN (23)					
Ca (AE)	0.04	-0.11	0.08	-0.06	
Cd (AE)	1.11	0.63	0.79	0.27	
Co (AE)	0.45	0.40	-0.30	0.67	
Cr (AE)	2.61	0.25	0.18	1.51	
Cu (AE)	0.50	0.39	0.67	-0.05	
Fe (AE)	0.19	-0.80	0.44	-0.06	
Hg (AE)	-1.10	0.11	0.23	-0.59	
K (AE)	-0.26	-0.07	0.12	-0.37	
Mg (AE)	0.33	-0.54	0.09	-0.35	
Mo (AE)	0.23	0.19	0.32	0.04	
N (AE)	0.26	-0.37	-0.03	0.37	
Ni (AE)	2.06	1.58	1.54	1.52	
P (AE)	0.40	-0.57	0.65	-0.31	
Pb (AE)	1.22	0.50	0.62	0.46	
Zn (AE)	0.17	-0.43	-0.01	0.24	
AOX (OD)	-0.16	0.20	0.14	-0.42	
loss-on-ignition (OD)	0.50	-0.48	-0.58	1.08	
LAN-8899 (24)					
Ca (AE)	0.04	-0.19	-0.17	-0.25	
Cd (AE)	0.05	0.25	-0.23	-0.38	
Co (AE)	0.28	-0.31	-0.06	-0.21	
Cr (AE)	0.14	-1.17	-0.19	0.03	
Cu (AE)	0.50	-1.01	-0.31	-0.05	
Hg (AE)	0.17	0.13	0.08	-0.15	
K (AE)	-0.51	-0.19	0.02	-0.16	
Mg (AE)	-0.28	-0.46	-0.32	-0.35	
Mo (AE)	-0.08	0.34	-0.13	0.17	
N (AE)	0.57	-0.15	-0.45	-0.60	
Ni (AE)	0.08	-0.59	-0.61	-0.16	
P (AE)	-0.30	-0.38	-0.22	-0.50	
Pb (AE)	-0.30	-0.03	-0.22	0.17	
Zn (AE)	-0.18	-0.28	-0.33	-0.51	
loss-on-ignition (OD)	0.33	0.23	0.15	0.18	
IUNGPUL (26)					
As (AE)	#	#	#	#	
B (AE)	#	#	#	#	
C (AE)	#	#	#	#	
Ca (AE)	1.78	-1.06	0.70	0.36	(cont)

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Sample	262	217	273	264	
IUNGPUL (26) (cont.)					
Cd (AE)	0.05	0.44	-0.03	2.01	
Cr (AE)	0.10	0.53	-0.10	0.48	
Cu (AE)	-0.18	-0.42	-0.69	0.01	
Fe (AE)	-0.37	-0.44	0.73	0.33	
Hg (AE)	-0.58	-0.40	-1.08	0.54	
K (AE)	-0.51	-0.11	0.31	-0.16	
Mg (AE)	1.29	0.48	-0.23	1.67	
Mn (AE)	-0.09	0.47	0.60	0.57	
N (AE)	0.41	0.86	0.11	0.57	
Na (AE)	#	#	#	#	
Ni (AE)	0.35	1.38	-0.16	-0.16	
P (AE)	-0.70	-0.88	-1.41	-1.31	
Pb (AE)	0.46	0.61	-0.52	0.84	
S (AE)	#	#	#	#	
Zn (AE)	-0.53	0.10	0.17	-0.21	
BOANALHOAG (28)					
Ca (AE)	-1.19	-1.10	-0.42	-0.06	
Cd (AE)	3.77	1.00	0.08	3.31	
Co (AE)	-0.84	0.94	-0.54	-1.26	
Cr (AE)	-0.37	-0.83	-0.94	-0.95	
Cu (AE)	-0.94	0.26	0.22	-1.80	
Hg (AE)	3.30	0.92	-0.83	-0.28	
K (AE)	1.26	-0.78	-0.41	0.68	
Mg (AE)	-0.63	-0.73	-1.85	-1.46	
Mo (AE)	-2.49	-0.23	-1.01	-1.56	
N (AE)	-1.63	-1.27	-1.02	-2.15	
Ni (AE)	-3.78	-0.87	-1.06	-3.00	
P (AE)	-1.48	-1.26	-0.91	-1.81	
Pb (AE)	-0.84	-0.77	0.02	0.08	
Zn (AE)	1.10	1.54	2.72	1.30	
AOX (OD)	4.81	2.83	8.05	1.20	
loss-on-ignition (OD)	-1.64	-0.76	-0.51	-1.52	
FRIBOURG (37)					
Ca (AE)	-1.00	-1.21	-1.05	-2.13	
Cd (AE)	<	-0.93	-5.16	<	
Co (AE)	0.50	0.23	0.65	-0.42	
Cr (AE)	0.53	0.41	0.09	1.07	
Cu (AE)	<	-0.28	-0.11	<	
Hg (AE)	0.49	0.36	0.31	0.67	
K (AE)	0.59	-0.61	0.79	0.68	
Mg (AE)	2.26	1.26	1.30	2.04	
Mo (AE)	<	<	-1.51	<	
N (AE)	-2.10	0.30	-1.72	-1.76	
Ni (AE)	0.90	0.63	-0.16	0.08	
P (AE)	-1.40	0.06	-0.04	-0.13	
Pb (AE)	-2.78	-1.62	-2.01	-2.04	
Zn (AE)	<	-0.65	-1.40	<	
AOX (OD)	-0.62	-0.93	-0.25	-1.02	
loss-on-ignition (OD)	-1.31	-0.96	-0.76	-1.61	
CH-SAMEN (40)					
Ca (AE)	-0.42	0.38	0.39	0.55	
Cd (AE)	0.93	-1.18	-1.16	1.14	
Co (AE)	-1.69	-1.09	1.84	-2.17	
Cr (AE)	-1.17	-0.23	1.02	-1.40	
Cu (AE)	0.28	1.66	1.17	0.92	
Hg (AE)	0.92	-0.84	1.61	1.47	
K (AE)	-0.17	-1.09	-1.46	-0.30	
Mg (AE)	-0.86	-0.16	-0.40	-0.72	
Mo (AE)	0.11	-0.99	-0.11	-0.20	
N (AE)	-0.53	-0.82	-2.99	-1.37	
Ni (AE)	-0.31	-0.28	1.09	-0.41	
P (AE)	2.06	2.01	1.96	1.68	
Pb (AE)	-0.89	-2.47	-1.18	-1.19	(cont)

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Sample	262	217	273	264	
CH-SAMEN (40) (cont.)					
Zn (AE)	-3.21	-0.31	0.06	-3.66	
AOX (OD)	0.18	0.73	-0.20	1.64	
loss-on-ignition (OD)	1.97	-0.36	0.52	0.63	
BERN-7 (43)					
Ca (AE)	2.62	1.83	0.89	1.45	
Cd (AE)	2.53	2.99	6.33	2.22	
Co (AE)	1.22	0.92	8.50	-0.30	
Cr (AE)	1.12	0.55	0.46	0.15	
Cu (AE)	-2.60	1.44	-2.21	-2.91	
Hg (AE)	-3.07	0.46	0.28	-1.11	
K (AE)	0.75	2.00	4.47	0.68	
Mg (AE)	1.14	0.51	0.60	0.57	
Mo (AE)	-1.86	0.09	-0.24	-1.01	
N (AE)	-0.84	0.41	0.68	-0.21	
Ni (AE)	-1.80	0.67	0.75	-1.55	
P (AE)	1.58	1.13	0.46	0.75	
Pb (AE)	1.35	0.61	0.73	-0.54	
Zn (AE)	-0.53	0.89	0.63	-0.21	
loss-on-ignition (OD)	-0.49	0.71	-0.95	0.93	
UFAG (44)					
Ca (AE)	-0.03	0.46	0.77	-0.95	
Cd (AE)	0.58	-0.87	-0.54	0.92	
Co (AE)	-0.02	0.22	1.91	<	
Cr (AE)	-0.32	0.73	0.48	-0.93	
Cu (AE)	0.50	0.41	0.04	0.40	
Hg (AE)	-0.59	0.75	-0.30	-0.90	
K (AE)	-0.17	-0.42	-0.52	-0.30	
Mg (AE)	-0.68	-0.33	0.12	-1.09	
Mo (AE)	0.37	0.89	0.65	0.81	
N (AE)	-0.06	0.41	0.26	0.76	
Ni (AE)	0.68	0.36	1.10	-0.65	
P (AE)	-0.70	-0.06	-0.04	-0.69	
Pb (AE)	0.29	-1.61	-0.66	-1.07	
Zn (AE)	-0.19	1.83	3.19	-0.40	
AOX (OD)	<	1.13	0.43	<	
loss-on-ignition (OD)	0.17	0.00	0.52	-0.57	
SOVAJETSVK (48)					
As (AE)	#	#	#	#	
Ba (AE)	#	#	#	#	
C (AE)	#	#	#	#	
Cd (AE)	-	0.63	-	-	
Co (AE)	3.13	-0.03	-0.54	-0.24	
Cr (AE)	2.20	0.17	3.55	-0.25	
Cu (AE)	5.12	0.80	1.44	4.82	
Hg (AE)	-1.99	-3.10	-3.77	0.21	
Mn (AE)	4.19	1.99	2.61	4.27	
N (AE)	1.01	5.29	1.30	3.07	
Ni (AE)	-0.97	0.63	-0.49	-2.51	
Pb (AE)	-1.69	1.46	1.45	1.87	
S (AE)	#	#	#	#	
V (AE)	#	#	#	#	
Zn (AE)	2.50	1.66	3.79	3.25	
KLGCHUR (54)					
Ca (AE)	-0.03	-0.95	-0.05	-2.41	
Cd (AE)	6.07	1.99	2.23	3.96	
Co (AE)	2.34	1.04	0.17	0.70	
Cr (AE)	0.69	-2.19	0.65	0.93	
Cu (AE)	-0.18	-0.83	-0.07	-0.25	
Hg (AE)	5.67	1.28	2.22	1.54	
K (AE)	1.43	4.17	4.81	1.45	
Mg (AE)	-2.03	-2.10	0.68	-5.59	
Mo (AE)	1.39	0.81	1.11	0.49	(cont)

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Sample	262	217	273	264	
KLGCHUR (54) (cont.)					
N (AE)	-0.53	0.53	-0.45	0.37	
Ni (AE)	0.52	-0.28	0.52	0.80	
P (AE)	-0.46	1.19	1.09	-0.25	
Pb (AE)	-1.05	-1.41	-0.04	-0.72	
Zn (AE)	-1.00	-1.79	-0.47	-0.96	
AOX (OD)	0.05	-2.27	-2.12	-0.62	
loss-on-ignition (OD)	-1.80	-0.12	-0.03	0.48	
ABMCE (56)					
Al (AE)	#	#	#	#	
As (AE)	#	#	#	<	
Be (AE)	<	<	#	<	
Ca (AE)	-0.22	0.54	-0.05	-0.15	
Cd (AE)	<	0.00	-0.03	<	
Co (AE)	0.04	-0.96	-1.02	-0.51	
Cr (AE)	-0.01	1.09	-0.10	-0.16	
Cu (AE)	0.28	-0.19	-0.19	-0.18	
Fe (AE)	0.37	1.18	-0.74	-0.58	
K (AE)	0.08	-0.78	-0.36	-0.09	
Mg (AE)	0.33	0.56	0.09	0.20	
Mn (AE)	0.61	0.14	0.67	0.79	
Mo (AE)	0.37	-1.14	0.07	0.14	
N (AE)	0.26	-0.26	-0.17	0.37	
Na (AE)	<	<	#	#	
Ni (AE)	0.13	-0.04	-0.49	-0.16	
P (AE)	0.72	-0.13	-0.16	0.81	
Pb (AE)	0.38	-0.67	-0.04	0.14	
V (AE)	#	#	#	#	
Zn (AE)	-0.30	-1.01	-0.65	-0.36	
HAUERT+CO (59)					
Ca (AE)	0.68	0.12	-0.67	0.60	
Cd (AE)	0.40	-0.99	-0.74	-0.60	
Co (AE)	0.50	-0.34	-0.78	0.25	
Cr (AE)	-1.03	0.31	-0.19	0.25	
Cu (AE)	-0.86	0.12	-1.04	0.47	
Fe (AE)	-1.66	-0.41	-0.74	-0.58	
Hg (AE)	<	-0.01	1.07	-2.39	
K (AE)	-0.76	0.31	0.66	-0.65	
Mg (AE)	-0.25	-0.27	-0.15	0.20	
Mn (AE)	0.54	0.36	0.22	0.71	
Mo (AE)	0.06	-0.34	0.57	0.38	
N (AE)	1.99	0.86	1.10	1.93	
Ni (AE)	0.30	-0.47	0.07	0.74	
P (AE)	-0.22	-0.25	-0.41	0.12	
Pb (AE)	-0.89	-0.03	0.73	-1.33	
Zn (AE)	-0.30	-0.75	-1.43	-0.21	
loss-on-ignition (OD)	0.00	-0.48	0.15	0.03	
ATVC (62)					
C (AE)	#	#	#	#	
Cd (AE)	<	-0.49	-1.16	<	
Cr (AE)	1.14	-0.71	0.74	1.33	
Cu (AE)	-0.56	0.39	0.74	0.47	
N (AE)	-0.53	-0.60	-0.03	-0.60	
Ni (AE)	0.41	0.16	0.86	0.80	
Pb (AE)	-0.42	-	0.79	-0.04	
Zn (AE)	-0.30	-	0.70	-0.06	
loss-on-ignition (OD)	-0.82	-1.32	-1.49	-0.27	
IRNASE (63)					
Al (AE)	#	#	#	#	
B (AE)	#	#	#	#	
Ba (AE)	#	#	#	#	
Ca (AE)	-2.16	-1.48	-1.99	-1.80	
Co (AE)	-1.96	-2.17	-6.20	-1.87	(cont)

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Sample	262	217	273	264
IRNASE (63) (cont.)				
Cr (AE)	0.68	-1.22	-2.36	0.54
Cu (AE)	-3.43	-1.79	-2.43	-1.80
Fe (AE)	0.65	-1.10	-1.09	0.63
K (AE)	0.68	0.52	1.59	0.63
Mg (AE)	0.15	-0.73	0.25	0.25
Mn (AE)	-5.04	-4.65	-5.29	-6.25
N (AE)	-0.80	-1.31	-3.84	-0.46
Na (AE)	#	#	#	#
Ni (AE)	-1.14	-1.07	-3.41	-0.71
P (AE)	-1.40	-0.91	-0.89	-1.25
S (AE)	#	#	#	#
Sn (AE)	<	#	#	<
Sr (AE)	#	#	#	#
Zn (AE)	2.05	-4.23	-5.75	-1.86
loss-on-ignition (OD)	5.86	6.37	5.19	11.39
OOSTERBEEK (66)				
As (AE)	#	#	#	#
Cd (AE)	-0.61	-1.57	-4.81	-0.41
Cr (AE)	-0.54	-1.23	-0.80	-0.80
Cu (AE)	1.90	1.81	1.95	3.47
Hg (AE)	-4.11	-0.37	0.11	-2.56
K (AE)	2.47	3.20	4.52	1.32
Mg (AE)	-4.18	-6.36	-8.16	-4.20
N (AE)	0.18	0.09	-0.59	-0.13
Ni (AE)	-1.92	-2.11	-2.19	-1.62
P (AE)	-0.17	-0.22	-0.07	0.02
Pb (AE)	0.49	-2.76	-2.04	-1.17
Zn (AE)	-1.86	-3.37	-3.80	-2.35
loss-on-ignition (OD)	0.76	0.45	0.70	0.12
HILA (79)				
Ca (AE)	2.04	0.57	0.58	0.93
Cu (AE)	-0.63	0.12	0.47	-1.03
Fe (AE)	1.85	0.00	0.44	0.85
K (AE)	1.01	0.14	0.71	0.75
Mg (AE)	2.13	1.39	1.54	1.30
Mn (AE)	0.46	-0.46	-0.09	0.35
Na (AE)	#	#	#	#
P (AE)	1.82	0.88	1.34	1.43
Zn (AE)	-0.06	-0.91	-0.08	1.15
loss-on-ignition (OD)	0.17	-0.12	-0.03	-0.27
ANALGIR (639)				
Ca (AE)	0.55	0.12	-1.05	0.17
Cd (AE)	0.22	-1.36	-0.33	0.05
Cr (AE)	0.40	0.85	0.28	0.23
Cu (AE)	0.73	-0.42	-0.34	0.40
Hg (AE)	0.27	-0.50	0.73	0.93
K (AE)	-0.42	0.69	0.19	-0.72
Mg (AE)	-1.14	-2.66	-1.36	0.75
N (AE)	0.57	3.10	-0.03	0.37
Ni (AE)	0.41	-0.87	-0.49	-0.10
P (AE)	-0.38	0.06	-0.66	0.37
Pb (AE)	-0.21	-0.13	-0.40	0.37
Zn (AE)	-0.06	-0.57	-0.40	-0.06
loss-on-ignition (OD)	0.73	-0.71	-0.69	-0.49
CUP Analab (870)				
Ca (AE)	5.87	1.97	0.66	1.44
Cu (AE)	3.81	-2.78	-3.40	3.99
Fe (AE)	0.34	-0.11	-0.10	0.44
K (AE)	-1.39	1.06	-0.27	-1.15
Mg (AE)	-0.05	0.41	-0.96	-1.18
Mn (AE)	-0.27	-0.57	-0.67	-0.49
P (AE)	0.88	-1.56	-1.63	0.19

(cont)

MARSEP 2009.1 Z - Scores - Per Participant

Sample	262	217	273	264
CUP Analab (870) (cont.)				
Zn (AE)	0.47	0.70	-0.51	0.00
loss-on-ignition (OD)	2.42	1.41	1.24	1.83
LABAMB (878)				
Ag (AE)	<	#	#	<
Al (AE)	#	#	#	#
As (AE)	#	#	#	#
B (AE)	#	#	#	#
Ba (AE)	#	#	#	#
Be (AE)	#	#	#	#
C (AE)	#	#	#	#
Ca (AE)	-2.68	-2.08	-2.24	-2.08
Cd (AE)	0.75	0.00	-0.03	-0.17
Co (AE)	-1.52	-1.00	-4.11	-2.05
Cr (AE)	-1.31	-0.43	-1.68	-1.74
Cu (AE)	-3.21	-0.51	-1.59	-0.38
Fe (AE)	-3.50	-2.81	-2.69	-2.13
Hg (AE)	0.06	-0.78	-1.66	2.16
K (AE)	-1.10	-1.42	-2.24	-0.99
Li (AE)	#	#	#	#
Mg (AE)	-2.46	-2.31	-3.20	-2.75
Mn (AE)	-0.57	-0.83	-1.00	-1.39
Mo (AE)	-1.45	-0.95	-1.28	-0.75
N (AE)	0.68	-1.68	-4.72	-0.48
N - NO3 (as N) (AE)	#	#	#	#
Na (AE)	#	#	#	#
Ni (AE)	-0.97	-0.16	-1.63	-0.10
P (AE)	-0.30	-0.25	-0.60	0.06
Pb (AE)	0.42	-2.36	-2.19	0.70
S - SO4 (as S) (AE)	#	#	#	#
Sb (AE)	#	#	#	#
Se (AE)	#	#	#	#
Sn (AE)	#	#	#	#
Sr (AE)	#	#	#	#
Ti (AE)	#	#	#	#
Tl (AE)	<	<	#	<
V (AE)	#	#	#	#
Zn (AE)	-1.46	-0.11	0.34	-0.81
loss-on-ignition (OD)	3.78	5.48	9.10	4.66
CRC (884)				
Zn (AE)	-2.22	-2.96	-2.28	-1.77
loss-on-ignition (OD)	-0.29	-0.46	-0.49	-1.13
MICHAEL (904)				
Cr (RT)	#	#	#	#
Cu (RT)	#	#	#	#
Ni (RT)	#	#	#	-
Pb (RT)	#	#	#	#
Zn (RT)	#	#	#	#
C (AE)	#	#	#	#
N (AE)	-1.00	-1.94	-4.26	-0.79
AGROADGAZA (971)				
Cu (AE)	11.93	5.55	1.13	9.36
Fe (AE)	-1.84	0.74	3.17	1.75
K (AE)	-0.17	1.94	5.28	3.26
Mg (AE)	-2.46	0.64	4.61	8.30
Mn (AE)	-3.82	0.40	-2.48	0.06
N (AE)	2.46	1.76	1.53	1.54
P (AE)	-0.70	-2.58	-3.34	-1.81
Zn (AE)	2.97	1.06	2.12	1.90

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