WAGENINGEN EVALUATING PROGRAMS FOR
ANALYTICAL LABORATORIES

PROF. TESTING
RvA R 002

International Manure and Refuse Sample Exchange Program

Quarterly Report 2012.1 January - March 2012

WAGENINGEN UNIVERSITY
ENVIRONMENTAL SCIENCES

Introduction

Dear WEPAL-participants,

It is getting more difficult to get samples to different countries. Sometimes shipment is delayed by customs, quarantine services (or other sometimes obscure reasons). For us it is impossible to keep track of all changing regulations. Please contact us if you need special permits or other documents to receive your samples.
Our aim is to have the samples in your possession at the start of each round. Contact us if you do not receive the samples in time. Please do not wait until a few weeks before the deadline because we will not be able to send new samples in time.

Enquiry 2012
We are interested in your ideas and questions about the WEPAL proficiency testing programmes. To make it easier for your to give your response we have placed an enquiry on our website. We have kept it short so it will not take up much of your time. Your feedback is much appreciated.

We decided to remove the section new members from the reports because it could be possible to link new members to Labnumbers or Labcodes. Many laboratories are open with their identity in the labcode while others prefer to hide their identity. Of course this does not mean that laboratories who hide their identity do not trust there own quality. There may be many reasons not to show the identity of a laboratory. Anyway it is not allowed to use the results of the WEPAL proficiency tests for publicty or other promotional activities. Use of the results for scientific purposes is only allowed when approved by WEPAL.

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 03-04-2012 (13:43)
Approved by Bram Eijgenraam, manager WEPAL

Important Information

The results of the April - June 2012 period will be processed in the first week of July 2012. Participants are kindly requested to take care that the results of this series are in Wageningen **before the first of July 2012.** All results, which are received later, will not be reported.

The 2012.3 samples will be mailed at the end of May 2012.

General Information

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, ISO/IEC 17043). In the following table the scope is given for all WEPAL programs.

Table 1 Scope of the WEPAL programs. (Determinands in bold are in the scope of the accreditation)

IPE Group	**Determinand**
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 (as N), **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	**delta ^{13}C, delta ^{15}N**
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 Group	**Determinand**
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
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	B - Hot water, CN - Free, CN - Total, delta ^{13}C, delta ^{15}N, K - HCl, Mg - NaCl, **Moisture-content**
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

ISE Group	**Determinand**
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
UK Soil Methods	**K - NH_4NO_3 (1/5), Mg - NH_4NO_3 (1/5), P – $NaHCO_3$ (1/20), pH - H_2O (2/5)**

SETOC Group	**Determinand**
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**, pentachlorophenol, Sum tetrachlorobenzenes, Sum trichlorobenzenes, telodrin, toxaphene, trans-chlord
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
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

SETOC Group	Determinand
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 Group	Determinand
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 - NH4 (as N), N - NO3 (as N), **Na**, **Ni**, **P**, **Pb**, S, S - SO_4, Sb, Se, Si, Sn, Sr, Ti, Tl, V, **Zn**
Other determinations	**AOX**, **loss-on-ignition**

BIMEP Group	Determinand
General Analysis	**ash, calorific value, moisture**, Volatile Matter
Elementary Analysis	**Carbon (C), Cl, Hydrogen (H), Nitrogen (N), S**
Water Soluble Elements	Cl, K, Na
Major Elements	Al, Ca, Fe, K, Mg, Na, P, Si
Minor Elements	As, Ba, Be, Cd, Co, Cr, **Cu**, F, Hg, **Mn**, Mo, Ni, Pb, Sb, Se, Sn, Te, Ti, Tl, V, **Zn**

The selection of determinands included in the scope of accreditation is based on information about the homogeneity and stability of the samples. This information is available when sufficient participants have reported results for a determinand in the past 3 years. Determinands which are not reported regularly in sufficient numbers to have a statistical evaluation are not (yet) included in the scope of the accreditation.

Subcontracting
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.
The analysis for the homogeneity tests of the samples used in this proficiency test are carried out by a subctractor.

Confidentiality of results
The confidentiality of the results is extremely important in the Wepal programs. The participants may opt for a code name that indicates their laboratory, or one that ensures their anonymity. In the reports, only the code names will be mentioned.
When an accrediting body or a regulatory authority requires the proficiency test results to be provided by Wepal the participants shall be notified and asked for permission

Complaints and or remarks
The reports of WEPAL are assembled with the utmost care. Please contact us on info.wepal@wur.nl if you feel that the reports are not at a satisfactory standard or if you encountered errors in your results. Also feel free to contact us if you have any other complaints, remarks and or suggestions.

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 determinands is chosen for the tests. The results of the homogeneity tests are published in the annual reports.
All samples used in this round of the proficiency test have passed the homogeneity test.

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 determinands. The variations between laboratories and concentrations are compared with the patterns as found in the previous 5 years. 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 determinand.

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, five 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 $^{\circ}$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 $^{\circ}$C and let cool down in a desiccator before weighing.

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 r2009 made 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 was needed that does not rely on arbitrary outlier removal or subjective manual interpretations. Ideally the used methodology must provide the characteristics of the highest mode of the dataset.
The model that is chosen tcalculates 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 basic set 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

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

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

- When the NDA approximation is used the variance calculated by the model represents the sum of the estimates for the within-laboratory and between-laboratory variances, i.e.

$$s_i^2 = s_{between\ labs,i}^2 + s_{within\ labs,i}^2$$

Median and MAD

For each determinand a median value and a median of absolute deviations (MAD) are calculated using all reported data except the reported '<' values. Deviating results like stragglers and outliers are not removed. The median is the middle observation of the sorted observations. In the case of an even number of observations it is the mean of the two middle observations. Using the median instead of mean, extreme data have less influence. MAD is the median of the absolute values of the observations minus their median.

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

Evaluation of results

For the evaluation of results the absolute value of the Z-score is used. Questionable results $2 < |Z| < 3$ are marked as stragglers (*). Deviating results with $|Z| > 3$ are marked as outliers (**).

Results reported as 'smaller than' (<) are also evaluated. When this 'smaller than' value is lower than the mean a Z-score is calculated. Based on this z-score these 'smaller than' values can also be marked as straggler or outlier. In these cases the 'smaller than' value is set too low.

Uncertainty of the assigned value

The aim of this proficiency testing scheme is to establish comparability among laboratories. Results for measurands in this scheme are dependent on the methods which are used. It is not feasible to establish metrological traceability of the assigned value. Assigned values are therefore based on consensus values.
In this proficiency test the robust standard deviation is used as standard deviation for proficiency assessment. The uncertainty in the assigned value is calculated as :

$$\mathbf{u_x = s / \sqrt{N}}$$

s = robust standard deviation
N = number of results

The uncertainty in the assigned value may influence the evaluation of the results (calculated Z-scores). This influence is considered to be negligible if the following conditions is met:

$$\mathbf{u_x \leq 0.3 * \sigma_{pt}}$$

u_x = uncertainty in the assigned value
σ_{pt} = standard deviation for proficiency assessment (= s)

Because σ_{pt} = s this evaluation reverts to :

$s / \sqrt{N} \leq 0.3 * s$ or $\mathbf{\sqrt{N} \geq 3}$

The influence of uncertainty on the evaluation of the results is therefore dependent on the number of results. Above 10 results of uncertainty on the assigned value is negligible. From 8 to 10 results uncertainty of the consensus value is larger than 0.3 σ_{pt} and therefore may influence the evaluation of the results. Below 8 results no consensus value is given.

Rounding of results

Rounding interval is set to have at least three significant digits for the results. This is based on the value of the mean. If no mean value is available (less than 8 results) the median is used. In cases where between laboratory variation is small (based on the standard deviation) an extra digiti shown. 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).

Materials Analysed

Table 3 Materials analysed in this period.

Sample	Sample ID	Type	Country
1	250	Sewage Sludge	Netherlands
2	264	Compost	Switzerland
3	234	Sewage Sludge	Switzerland
4	238	Organic Fertilizer	Grobbendonk / Belgium

Method Indicating Code (MIC)

In order to evaluate the analytical results for each reported determinand (see **Table 4** 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 5**. The last three characters (see **Table 6**) 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 4 *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 5 *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 6 *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
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)

Code	Method
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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Used abbrevations and symbols

Table 7 *Used abbreviations and symbols*

Where	Abbreviation	Explanation
Results	MIC	method indicating code
Results	MAD	median absolute deviation
Results	Sd	standard deviation
Results, Z-scores	<	value smaller than
Results, Z-scores	*	straggler
Results, Z-scores	**	outlier
Results, Z-scores	-	no result was submitted
Results statistical values	-	not calculated
Z-scores	#	less than 8 values, no mean and Sd calculated
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 2012.1

MARSEP 2012.1 - Real totals

Sample		250	264	234	238	MIC
C (g/kg)						
IUNGPUL	(26)	320	178	157	390	Z|Z
RIOJALAB	(98)	357	209	175	434	Z| Z
CRC	(884)	344	173	153	389	
		==========	Statistical Results (no NDA)		==========	
N		3	3	3	3	
Median		343.7	178.0	157.0	390.0	
MAD		13.3	5.5	4.1	1.3	
Hg (µg/kg)						
ATVC	(62)	1810	224	224	50.0 <	E|CB
		==========	No Statistical Results		==========	
K (g/kg)						
LABZIB	(1013)	2.55	10.8	4.90	27.8	T|CA
		==========	No Statistical Results		==========	
Mg (g/kg)						
LABZIB	(1013)	3.72	9.42	5.07	2.24	T|AAA
		==========	No Statistical Results		==========	
Pb (mg/kg)						
UFAG	(44)	172	34.0	68.0	12.0 <	
		==========	No Statistical Results		==========	
S (mg/kg)						
IUNGPUL	(26)	14860	1600	1145	25100	Z|Z
ELML	(657)	13070	1681	1400	24080	T| CB
		==========	Statistical Results (no NDA)		==========	
N		2	2	2	2	
Median		13966	1641	1273	24588	
MAD		895	41	128	512	
V (mg/kg)						
IRNASE	(63)	14.9	23.8	25.4	1.86	D| CB
		==========	No Statistical Results		==========	

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Ag (µg/kg)						
FRIDOLIN	(5)	14570	277	181	24.5	T| D
KSKO ZH	(16)	15200	1000 <	1000 <	1000.0 <	T| CB
LABAMB	(878)	13500	100 <	100 <	100.0 <	T| CB
		==========	Statistical Results (no NDA)		==========	
N		3	1	1	1	
Median		14568	277.0	181.0	24.50	
MAD		632	-	-	-	
Al (g/kg)						
FRIDOLIN	(5)	23.7	11.22 **	13.30 *	1.000	T| D
HAMELN	(15)	21.6	7.21	8.87	0.720	C| CB
SCSF	(21)	22.2	6.57	6.63	0.729	A| CB
ABMCE	(56)	20.5	6.85	8.65	0.913	C| CB
IRNASE	(63)	18.5	9.04 *	10.95	0.780	D| CB
ELML	(657)	30.7 **	6.08	8.96	0.485	T| CB
LABAMB	(878)	19.0	6.10	7.35	0.400	T| CB
NRM	(1002)	21.0	5.11	6.94	0.322	Z|CB
		==========	Statistical Results		==========	
NDA mean		20.92	6.442	8.509	0.6770	
NDA st dev		2.21	0.897	2.260	0.2989	
N		8	8	8	8	
Median		21.29	6.710	8.760	0.7245	
MAD		1.60	0.620	1.614	0.2140	
As (mg/kg)						
FRIDOLIN	(5)	10.7	4.94	4.73	0.490	T| D
POLASP	(9)	10.4	5.02	4.89	0.370	
VILJAVUUSP	(13)	8.5 *	3.22 *	2.56 *	0.449	F| CB
HAMELN	(15)	9.9	4.95	4.40	0.445	C| D
IUNGPUL	(26)	11.1	3.75	3.78	0.177	C|F
ABMCE	(56)	10.0	4.04	5.25	1.500 <	C| CB
IRNASE	(63)	10.2	5.11	4.45	0.160	D| CB
HILA	(79)	10.3	4.63	4.44	0.264	T| D
ELML	(657)	11.3	4.89	4.91	1.040 **	T| CB
LABAMB	(878)	8.5 *	4.30	3.70	0.500 <	T| CB
CRC	(884)	8.6 *	4.34	4.19	0.630 <	I|CB
NRM	(1002)	10.6	5.30	5.96 *	0.010 < *	Z|CB
		==========	Statistical Results		==========	
NDA mean		10.36	4.691	4.520	0.3454	
NDA st dev		0.68	0.575	0.667	0.1625	
N		12	12	12	8	
Median		10.25	4.760	4.445	0.4075	
MAD		0.43	0.385	0.455	0.1130	
B (mg/kg)						
VILJAVUUSP	(13)	35.9	19.2	22.5	18.5	F| CB
IRNASE	(63)	28.1	18.7	20.9	12.4	D| CB
ELML	(657)	36.2	19.2	23.8	21.4	T| CB
LABAMB	(878)	26.0	17.0	18.5	15.6	T| CB
NRM	(1002)	30.0	14.4	16.6	14.5	Z|CB
		==========	Statistical Results (no NDA)		==========	
N		5	5	5	5	
Median		30.00	18.70	20.90	15.60	
MAD		4.00	0.55	2.40	2.92	

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Ba (mg/kg)						
FRIDOLIN	(5)	383	89.2	103.0	25.5	T| D
HAMELN	(15)	349	71.2	78.6	23.8	C| CB
IRNASE	(63)	389	91.8	101.0	23.9	D| CB
ELML	(657)	309	67.1	74.1	24.6	T| CB
LABAMB	(878)	320	72.0	73.0	21.0	T| CB
NRM	(1002)	255	66.0	68.0	20.4	Z|CB
		==========	Statistical Results (no NDA)		==========	
N		6	6	6	6	
Median		334.5	71.60	76.35	23.85	
MAD		37.0	5.05	5.85	1.20	
Be (µg/kg)						
FRIDOLIN	(5)	253	490	619	28.6	T| D
HAMELN	(15)	267	454	505	48.4	C| D
ABMCE	(56)	180	300	420	70.0 <	C| CB
LABAMB	(878)	200	280	400	100.0 <	T| CB
NRM	(1002)	1000 <	1000 <	1000 <	1000.0 <	Z|CB
		==========	Statistical Results (no NDA)		==========	
N		4	4	4	2	
Median		226.5	377.0	462.5	38.50	
MAD		33.5	87.0	52.5	9.90	
Bi (µg/kg)						
FRIDOLIN	(5)	5885	186	225	5.45	T| D
HAMELN	(15)	5623	-	192	-	C| D
		==========	Statistical Results (no NDA)		==========	
N		2	1	2	1	
Median		5754	186.0	208.5	5.450	
MAD		131	-	16.5	-	
C (g/kg)						
POLASP	(9)	323	191	171	397	
ATVC	(62)	336	178	145	391	Z|O
ELML	(657)	301	167	141	387	Z| P
LABAMB	(878)	317	177	134	387	Z| O
NRM	(1002)	298	181	152	372	Z
		==========	Statistical Results (no NDA)		==========	
N		5	5	5	5	
Median		316.6	178.0	145.0	387.0	
MAD		15.6	3.0	7.0	4.0	
Ca (g/kg)						
FRIDOLIN	(5)	39.2	72.0	55.5	41.7	T| D
POLASP	(9)	39.2	69.4 *	55.3	40.9	
VILJAVUUSP	(13)	41.1 *	77.2 **	56.4	42.4	F| CB
HAMELN	(15)	37.9	72.6	56.1	42.4	C| CB
KSKO ZH	(16)	40.0	72.0	55.6	41.7	T| CB
VERITAS	(17)	39.6	73.1	56.7	42.6	T| CB
HIDU	(20)	39.1	72.3	54.6	40.5	T| CB
SCSF	(21)	38.8	71.5	53.7	42.1	A| CB
AGROCH	(22)	38.2	71.9	53.5	40.6	A|AAA
GALLEN	(23)	39.2	71.5	54.2	42.5	F| CB
LAN-8899	(24)	39.2	72.6	55.5	40.9	A|CB
		==========	Summary Statistics		==========	
NDA mean		39.18	72.44	55.43	42.09	
NDA st dev		0.74	1.19	1.18	1.13	
N		28	28	28	28	(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250		264		234		238		MIC
Ca (g/kg) (cont.)										
IUNGPUL	(26)	39.1		77.0	**	54.7		50.3	**	C|AAB
BOANALHOAG	(28)	38.0		73.0		55.0		43.0		Q| CB
ULS	(36)	38.8		72.1		55.1		41.2		T| CB
FRIBOURG	(37)	39.6		73.3		56.6		42.7		T|CB
CH-SAMEN	(40)	39.3		73.6		55.4		41.6		T|CB
BERN-7	(43)	38.9		74.5		55.1		43.7		Z|CB
UFAG	(44)	38.2		72.3		43.0	**	41.6		T| CB
KLGCHUR	(54)	39.5		71.1		53.0	*	44.1		Q|
ABMCE	(56)	38.7		73.5		55.8		41.5		C| CB
HAUERT+CO	(59)	37.5	*	71.0		55.7		41.3		A|AAA
IRNASE	(63)	40.1		74.7		54.1		42.4		D| CB
HILA	(79)	40.7	*	72.5		56.6		43.9		T| CB
ELML	(657)	42.0	**	72.4		55.8		44.2		T| CB
PASCAnalab	(870)	40.3		72.5		55.8		41.9		A|AAA
LABAMB	(878)	38.5		70.0	*	52.5	*	39.0	*	T| CB
CRC	(884)	39.6		73.3		56.9		42.8		I|CB
NRM	(1002)	40.3		76.3	**	57.9	*	43.2		Z|CB
		==========		Statistical Results		==========				
NDA mean		39.18		72.44		55.43		42.09		
NDA st dev		0.74		1.19		1.18		1.13		
N		28		28		28		28		
Median		39.20		72.48		55.45		42.23		
MAD		0.47		0.82		0.80		0.75		
		==========								
Cd (mg/kg)										
FRIDOLIN	(5)	2.25	*	0.330		0.460	*	0.0560		T| D
POLASP	(9)	2.00		0.360		0.390		0.0520		
VILJAVUUSP	(13)	2.14		0.325		0.409		0.0110	**	F|BAE
HAMELN	(15)	1.96		0.330		0.430		-		C| CB
KSKO ZH	(16)	1.84		0.323		0.402		0.0550		T| CB
VERITAS	(17)	1.92		0.474	**	0.414		0.1000	<	T| CB
HIDU	(20)	1.85		0.364		0.481	**	0.0620		T| D
SCSF	(21)	2.09		0.277		0.401		0.1000	<	A| CB
AGROCH	(22)	1.83		0.250	*	0.410		0.0500		A|BAC
GALLEN	(23)	1.94		0.320		0.400		0.1000	<	F| CB
LAN-8899	(24)	1.88		0.300		0.420		0.0580		A|CB
IUNGPUL	(26)	2.04		0.332		0.384		0.0960	**	C|AAE
BOANALHOAG	(28)	2.00		0.350		0.450	*	0.0800	*	Q| CB
ULS	(36)	1.89		0.306		0.396		0.0770	*	T| CB
FRIBOURG	(37)	2.10		1.000	<	1.000	<	-		T|CB
CH-SAMEN	(40)	1.61	*	0.313		0.334	**	0.1010	**	T|BAC
BERN-7	(43)	2.15		0.310		0.310	**	0.2500	<	Z|CB
UFAG	(44)	1.93		0.244	*	0.261	**	0.1000	<	T| CB
KLGCHUR	(54)	1.91		0.320		0.410		0.0552		Z| CB
ABMCE	(56)	2.04		0.310		0.400		0.1200	<	C|AAC
HAUERT+CO	(59)	1.86		0.280		0.400		0.0600		A|AAC
ATVC	(62)	2.00		1.000	<	1.000	<	1.0000	<	E|CB
IRNASE	(63)	2.08		0.380	*	0.470	**	0.2000	<	D| CB
HILA	(79)	1.77		0.320		0.390		0.2000	<	T| D
RIOJALAB	(98)	1.69		0.281		0.406		0.0450		T| D
ELML	(657)	1.96		0.258	*	0.375		0.0480		T| CB
LABAMB	(878)	1.70		0.300		0.350	*	0.1000	<	T| CB
CRC	(884)	1.82		0.600	<	0.620	<	0.6300	<	I|CB
NRM	(1002)	1.85		0.270		0.370		0.0400		Z|CB
		==========		Statistical Results		==========				
NDA mean		1.937		0.3130		0.4017		0.05445		
NDA st dev		0.141		0.0270		0.0221		0.01014		
N		29		26		26		16		
Median		1.934		0.3165		0.4005		0.05560		
MAD		0.094		0.0165		0.0150		0.00700		
		==========								

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Co (mg/kg)						
FRIDOLIN	(5)	5.38	5.27	5.25	0.370	T| D
POLASP	(9)	4.89	4.62	4.59	0.440	
VILJAVUUSP	(13)	4.68	4.80	4.77	0.284 *	F| CB
HAMELN	(15)	4.91	4.89	4.45	0.472	C| D
KSKO ZH	(16)	4.71	5.15	4.99	0.500 <	T| CB
VERITAS	(17)	5.35	5.37	5.38	1.000 <	T| CB
HIDU	(20)	5.94	5.76 *	5.74 **	0.550	T| D
SCSF	(21)	5.62	5.20	4.74	0.430	A| CB
AGROCH	(22)	5.60	5.00	5.14	0.480	A|BAC
GALLEN	(23)	5.22	5.13	4.99	0.470	F| CB
LAN-8899	(24)	5.18	4.99	4.89	0.450	A|CB
BOANALHOAG	(28)	5.40	4.50	5.00	0.400	Q| CB
ULS	(36)	5.18	4.98	4.96	0.449	T| CB
FRIBOURG	(37)	5.67	5.19	5.14	-	T|CB
CH-SAMEN	(40)	5.10	4.72	4.59	0.395	T|CB
BERN-7	(43)	5.01	4.91	4.82	0.350	Z|CB
UFAG	(44)	5.72	6.00 <	6.00 <	6.000 <	T| CB
KLGCHUR	(54)	5.50	4.89	4.76	0.400	Z| CB
ABMCE	(56)	5.31	4.92	4.85	1.300 <	C| CB
HAUERT+CO	(59)	5.03	5.17	5.00	0.500 <	A|AAA
IRNASE	(63)	6.76 **	6.36 **	5.05	0.550	D| CB
ELML	(657)	3.50 **	3.52 **	3.61 **	0.385	T| CB
LABAMB	(878)	4.40	4.70	4.20 *	0.500 <	T| CB
NRM	(1002)	3.73 **	4.07 **	4.20 *	0.250 *	Z|CB
		==========	Statistical Results	==========		
NDA mean		5.244	4.982	4.910	0.4267	
NDA st dev		0.442	0.300	0.246	0.0641	
N		24	23	23	17	
Median		5.200	4.980	4.890	0.4300	
MAD		0.305	0.210	0.160	0.0420	
		==========	==========	==========	==========	
Cr (mg/kg)						
FRIDOLIN	(5)	52.7	77.9	30.7	4.21	T| D
POLASP	(9)	43.7	45.4	21.0	4.15	
VILJAVUUSP	(13)	52.0	85.2	30.1	5.93 *	F|BAE
HAMELN	(15)	48.5	59.2	25.5	5.00	C| CB
KSKO ZH	(16)	52.0	85.5	37.9 **	7.00 **	T| CB
VERITAS	(17)	42.3	63.1	24.0	4.91	T| CB
HIDU	(20)	46.0	72.9	30.8	4.94	T| CB
SCSF	(21)	45.5	48.2	23.2	3.98	A| CB
AGROCH	(22)	35.3 **	48.1	24.4	4.00 <	A|AAB
GALLEN	(23)	44.9	64.7	27.4	4.58	F| CB
LAN-8899	(24)	45.9	60.8	25.1	4.52	A|CB
IUNGPUL	(26)	47.8	58.6	25.1	4.64	C|CB
BOANALHOAG	(28)	45.0	60.0	25.0	4.00	Q| CB
ULS	(36)	43.1	61.9	24.7	3.84	T| CB
FRIBOURG	(37)	46.7	58.1	26.0	7.00 <	T|CB
CH-SAMEN	(40)	45.7	67.1	28.0	4.50	T|CB
BERN-7	(43)	48.8	67.3	23.0	4.17	Z|CB
UFAG	(44)	44.8	60.8	50.0 <	50.00 <	T| CA
KLGCHUR	(54)	51.0	86.1	42.7 **	5.87 *	Z| CB
ABMCE	(56)	46.8	59.4	25.3	4.52	C| CB
HAUERT+CO	(59)	47.1	54.3	22.8	3.70	A|AAB
ATVC	(62)	49.9	81.5	37.1 *	10.00 <	E|CB
IRNASE	(63)	43.4	67.9	26.5	4.21	D| CB
HILA	(79)	49.7	80.8	31.5	4.93	T| D
RIOJALAB	(98)	52.6	76.9	33.3	5.70 *	T| CB
ELML	(657)	38.8 *	39.8	18.1	4.46	T| CB
LABAMB	(878)	43.0	54.0	22.0	3.90	T| CB
		==========	Summary Statistics	==========		
NDA mean		46.60	63.54	25.60	4.467	
NDA st dev		3.67	12.38	3.87	0.604	
N		29	29	28	25	(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Cr (mg/kg)	(cont.)					
CRC	(884)	47.5	71.9	28.5	5.55	I|CB
NRM	(1002)	44.9	42.9	22.1	4.38	Z|CB
		==========	Statistical Results	==========		
NDA mean		46.60	63.54	25.60	4.467	
NDA st dev		3.67	12.38	3.87	0.604	
N		29	29	28	25	
Median		46.00	61.85	25.40	4.520	
MAD		2.50	7.85	2.60	0.410	
		==========				
Cu (mg/kg)						
FRIDOLIN	(5)	382	42.9	37.6	15.6	T| D
POLASP	(9)	379	44.5	39.7	14.7	
VILJAVUUSP	(13)	396	44.5	38.1	15.2	F| CB
HAMELN	(15)	379	43.1	37.8	16.0	C| CB
KSKO ZH	(16)	392	43.8	37.7	14.8	T| CB
VERITAS	(17)	402	45.0	37.1	16.2	T| CB
HIDU	(20)	389	38.2 *	33.3 *	15.7	T| CB
SCSF	(21)	388	43.5	34.1	17.2	A| CB
AGROCH	(22)	387	42.5	36.7	17.8 *	A|AAA
GALLEN	(23)	393	43.9	37.5	14.7	F| CB
LAN-8899	(24)	381	42.7	36.9	15.9	A|CB
IUNGPUL	(26)	393	41.6	35.4	15.5	C|AAE
BOANALHOAG	(28)	390	40.0	37.0	15.0	Q| CB
ULS	(36)	381	42.1	36.2	14.6	T| CB
FRIBOURG	(37)	414 *	100.0 <	100.0 <	-	T|CB
CH-SAMEN	(40)	381	41.1	35.8	15.1	T|CB
BERN-7	(43)	386	40.3	34.6	15.0	Z|CB
UFAG	(44)	382	42.6	60.0 <	60.0 <	T| CB
KLGCHUR	(54)	362 *	40.0	34.7	14.6	Z| CB
ABMCE	(56)	380	41.3	35.7	15.3	C| CB
HAUERT+CO	(59)	382	44.3	31.3 **	16.0	A|AAA
ATVC	(62)	392	43.1	37.8	14.1	E|CB
IRNASE	(63)	409	45.9	39.2	17.3	D| CB
HILA	(79)	426 **	44.7	37.5	16.0	T| D
RIOJALAB	(98)	418 *	43.4	37.8	16.5	T| CB
ELML	(657)	398	41.8	37.4	16.6	T| CB
PASCAnalab	(870)	367	43.0	36.2	15.3	A|AAA
LABAMB	(878)	320 **	39.0	33.0 *	14.0	T| CB
CRC	(884)	391	40.3	35.9	14.5	I|CB
NRM	(1002)	443 **	49.9 **	42.7 **	18.7 **	Z|CB
		==========	Statistical Results	==========		
NDA mean		387.4	42.68	36.83	15.38	
NDA st dev		10.9	2.01	1.47	0.97	
N		30	29	28	28	
Median		388.5	42.93	36.95	15.40	
MAD		7.6	1.37	0.95	0.65	
		==========				
Fe (g/kg)						
FRIDOLIN	(5)	51.2	11.3	13.5	1.29	T| D
POLASP	(9)	54.3	10.1	12.8	0.92	
VILJAVUUSP	(13)	28.9 **	10.4	13.0	1.06	F| CB
HAMELN	(15)	50.8	10.3	12.6	1.11	C| CB
VERITAS	(17)	51.9	11.3	14.4 **	1.20	T| CB
HIDU	(20)	54.8	12.0 *	14.8 **	1.19	T| CB
SCSF	(21)	50.9	9.2 *	11.6 *	1.04	A| CB
GALLEN	(23)	52.7	10.5	12.8	1.16	B| CB
IUNGPUL	(26)	52.4	10.6	12.7	0.99	C|CB
		==========	Summary Statistics	==========		
NDA mean		52.01	10.58	12.78	1.110	
NDA st dev		1.95	0.66	0.44	0.120	
N		18	18	18	18	(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250		264		234		238		MIC
Fe (g/kg) (cont.)										
ULS	(36)	51.1		10.6		12.7		2.49	**	T| CB
ABMCE	(56)	53.2		10.0		12.3		1.21		C| CB
HAUERT+CO	(59)	51.3		10.9		12.9		1.14		A|AAA
IRNASE	(63)	48.5		11.8		13.8	*	1.21		D| CB
HILA	(79)	49.0		11.1		13.3		1.16		T| CB
ELML	(657)	53.4		9.8		12.4		1.02		T| CB
PASCAnalab	(870)	52.0		11.0		12.8		1.12		A|AAA
LABAMB	(878)	46.0	**	10.2		11.4	**	0.90		T| CB
NRM	(1002)	53.7		10.3		12.7		0.96		Z|CB
		==========		Statistical Results		==========				
NDA mean		52.01		10.58		12.78		1.110		
NDA st dev		1.95		0.66		0.44		0.120		
N		18		18		18		18		
Median		51.60		10.54		12.79		1.130		
MAD		1.35		0.44		0.30		0.080		
		==========								
Hg (µg/kg)										
FRIDOLIN	(5)	1852		212		239		35.0	*	T| G
POLASP	(9)	1722		202		220		23.0		
VILJAVUUSP	(13)	1820		201		200		26.2		F| F
HAMELN	(15)	1588		195		231		16.0		C| G
KSKO ZH	(16)	1860		342	**	225		19.0		T| F
VERITAS	(17)	1754		164	*	218		29.0		T| G
HIDU	(20)	2068	*	240		249	*	10.0	<	T| G
SCSF	(21)	1772		211		201		100.0	<	F| G
AGROCH	(22)	2280	**	255		203		20.0	<	Z|G
GALLEN	(23)	1769		200		202		16.3		F| G
LAN-8899	(24)	1780		214		217		20.0		E|G
IUNGPUL	(26)	1985		224		200		16.3		Z|Z
BOANALHOAG	(28)	1800		210		200		19.0		Q| G
ULS	(36)	1804		215		215		29.2		T| G
FRIBOURG	(37)	1888		212		243		19.0		T|CB
CH-SAMEN	(40)	1871		273	*	234		14.6		T|G
BERN-7	(43)	1602		107	**	50	< **	50.0	<	Z|G
UFAG	(44)	1715		216		151	**	202.0	**	T| G
KLGCHUR	(54)	1750		240		276	**	19.1		Q| Z
ABMCE	(56)	2330	**	228		209		19.0		Z| Z
HAUERT+CO	(59)	1953		196		186		50.0	<	N|G
RIOJALAB	(98)	1615		387	**	204		12.5		T| D
ELML	(657)	1657		131	**	215		29.4		T| CB
LABAMB	(878)	1600		800	**	200		100.0	<	T| CB
CRC	(884)	1683		600	<	620	<	630.0	<	I|D
NRM	(1002)	2	**	0	**	0	**	0.1	< **	Z|G
		==========		Statistical Results		==========				
NDA mean		1771		213.4		212.4		19.54		
NDA st dev		136		22.5		17.8		5.38		
N		26		25		24		18		
Median		1776		212.0		211.9		19.05		
MAD		94		16.0		11.9		3.50		
		==========								
K (g/kg)										
FRIDOLIN	(5)	2.13		12.2		4.53		32.5		T|AAA
POLASP	(9)	1.89		12.4		2.99		30.2		
VILJAVUUSP	(13)	2.10		13.1		3.56		31.6		F| CB
HAMELN	(15)	1.74		11.3		3.32		31.0		C| CB
KSKO ZH	(16)	2.22		13.9	*	5.89	**	30.8		T| CB
VERITAS	(17)	1.96		12.3		4.64		32.2		T| CB
		==========		Summary Statistics		==========				
NDA mean		1.842		11.92		3.296		31.34		
NDA st dev		0.233		0.98		0.852		1.35		
N		29		29		29		29		(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
K (g/kg) (cont.)						
HIDU	(20)	1.79	12.2	4.51	26.7 **	T| CB
SCSF	(21)	1.80	10.9	2.48	31.8	A| CB
AGROCH	(22)	1.66	10.0	2.55	30.1	A|AAA
GALLEN	(23)	1.87	11.5	3.45	31.2	F| D
LAN-8899	(24)	1.80	11.6	3.29	30.9	A|CB
IUNGPUL	(26)	1.64	10.5	3.29	30.8	C|CA
BOANALHOAG	(28)	1.80	12.0	3.20	33.0	Q| CB
ULS	(36)	1.77	11.8	3.05	27.4 *	T| CB
FRIBOURG	(37)	1.70	12.2	3.59	33.6	T|CB
CH-SAMEN	(40)	1.29 *	8.2 **	3.04	30.5	T|CA
BERN-7	(43)	1.62	12.8	2.73	31.1	Z|CB
UFAG	(44)	1.74	11.9	2.43	24.5 **	T| CB
KLGCHUR	(54)	2.31 *	13.2	5.45 *	30.6	Z| CB
ABMCE	(56)	1.78	11.5	3.21	32.2	C| CB
HAUERT+CO	(59)	1.81	11.2	3.05	30.3	A|AAA
ATVC	(62)	2.00	13.5	5.07 *	31.8	E|CB
IRNASE	(63)	2.05	12.2	4.94	24.6 **	D| CB
HILA	(79)	2.79 **	15.0 **	6.15 **	34.1 *	T| CB
ELML	(657)	1.99	11.9	2.85	33.8	T| CB
PASCAnalab	(870)	2.01	10.3	3.85	31.2	A| CA
LABAMB	(878)	1.62	10.5	2.90	29.0	T| CB
CRC	(884)	2.26	12.9	5.67 *	27.8 *	I|CB
NRM	(1002)	1.56	11.5	2.53	33.1	Z|CB
		==========	Statistical Results	==========		
NDA mean		1.842	11.92	3.296	31.34	
NDA st dev		0.233	0.98	0.852	1.35	
N		29	29	29	29	
Median		1.800	11.90	3.290	30.95	
MAD		0.160	0.65	0.560	0.88	
		==========	==========	==========	==========	
Li (mg/kg)						
HAMELN	(15)	3.82	10.4	11.6	0.890	C| CB
LABAMB	(878)	3.30	10.4	11.0	0.950	T| CB
		==========	Statistical Results (no NDA)	==========		
N		2	2	2	2	
Median		3.560	10.40	11.30	0.9200	
MAD		0.260	-	0.30	0.0300	
		==========	==========	==========	==========	
Mg (g/kg)						
FRIDOLIN	(5)	3.45	11.0	4.36	1.85	T| D
POLASP	(9)	3.30	10.6	4.17	1.82	
VILJAVUUSP	(13)	3.75 *	11.5	4.38	1.93	F| CB
HAMELN	(15)	3.32	10.5	4.06	1.77	C| CB
KSKO ZH	(16)	3.70	11.1	4.71	1.89	T| CB
VERITAS	(17)	3.53	10.1	4.63	1.88	T| CB
HIDU	(20)	3.42	10.5	4.60	1.72	T| CB
SCSF	(21)	3.53	10.8	3.90	1.99	A| CB
AGROCH	(22)	3.37	10.5	4.04	1.87	A|AAA
GALLEN	(23)	3.41	10.7	4.30	1.78	F| CB
LAN-8899	(24)	3.47	10.5	4.27	1.86	A|CB
IUNGPUL	(26)	3.38	11.6	4.80	1.92	C|AAA
BOANALHOAG	(28)	3.40	10.0	4.20	1.82	Q| CB
ULS	(36)	3.38	10.8	4.16	1.65	T| CB
FRIBOURG	(37)	3.52	11.6	4.70	1.75	T|CB
CH-SAMEN	(40)	3.34	9.9	4.16	1.75	T|CB
BERN-7	(43)	3.17	11.4	4.01	1.68	Z|CB
UFAG	(44)	3.25	10.0	3.11 **	1.75	T| CB
		==========	Summary Statistics	==========		
NDA mean		3.433	10.64	4.290	1.838	
NDA st dev		0.151	0.59	0.306	0.124	
N		28	28	28	28	(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Mg (g/kg) (cont.)						
KLGCHUR	(54)	3.51	10.4	4.37	1.94	Z| CB
ABMCE	(56)	3.35	10.6	4.13	1.67	C| CB
HAUERT+CO	(59)	3.33	10.5	4.15	1.76	A|AAA
IRNASE	(63)	3.70	11.0	4.73	1.93	D| CB
HILA	(79)	3.87 *	11.2	4.90	2.07	T| CB
ELML	(657)	3.61	10.3	4.16	1.94	T| CB
PASCAnalab	(870)	3.47	9.9	4.00	1.86	A|AAA
LABAMB	(878)	3.15	9.6	3.75	1.65	T| CB
CRC	(884)	3.74 *	10.7	4.68	1.92	I|CB
NRM	(1002)	3.76 *	11.5	4.43	2.00	Z|CB
		==========	Statistical Results	==========		
NDA mean		3.433	10.64	4.290	1.838	
NDA st dev		0.151	0.59	0.306	0.124	
N		28	28	28	28	
Median		3.435	10.60	4.235	1.855	
MAD		0.095	0.40	0.197	0.085	
		==========				
Mn (mg/kg)						
FRIDOLIN	(5)	508	443	539	30.4	T| D
POLASP	(9)	497	426	523	29.1	
VILJAVUUSP	(13)	533	474	553	31.9	F| CB
HAMELN	(15)	500	415	505	32.0	C| CB
HIDU	(20)	535	466	579 *	31.9	T| CB
SCSF	(21)	512	432	499	31.6	A| CB
IUNGPUL	(26)	471	445	526	29.4	C|AAE
ABMCE	(56)	505	438	519	29.0	C| CB
HAUERT+CO	(59)	514	435	525	28.2	A|AAA
IRNASE	(63)	529	471	552	34.2	D| CB
HILA	(79)	505	450	525	31.0	T| D
ELML	(657)	544	435	541	32.9	T| CB
PASCAnalab	(870)	485	426	514	30.4	A|AAA
LABAMB	(878)	450 *	410	480 *	28.0	T| CB
NRM	(1002)	542	465	543	33.2	Z|CB
		==========	Statistical Results	==========		
NDA mean		511.5	440.0	528.0	30.87	
NDA st dev		29.4	19.0	23.3	2.26	
N		15	15	15	15	
Median		508.0	438.0	525.0	31.00	
MAD		21.0	12.0	16.0	1.60	
		==========				
Mo (mg/kg)						
FRIDOLIN	(5)	7.15	3.54	1.24	0.570	T| D
POLASP	(9)	6.38	3.28	1.23	0.750	
HAMELN	(15)	6.77	3.56	1.13	0.965 **	C| D
KSKO ZH	(16)	6.42	3.33	1.05	0.580	T| CB
HIDU	(20)	6.90	3.42	1.19	0.252 *	T| D
SCSF	(21)	6.34	2.58	1.00 <	1.000 <	A| CB
AGROCH	(22)	6.23	2.49	0.94	0.460	A|AAB
GALLEN	(23)	6.76	3.22	1.08	0.590	F| CB
LAN-8899	(24)	6.20	2.90	1.00	0.500	A|CB
IUNGPUL	(26)	6.60	3.63	1.12	0.556	C|CB
BOANALHOAG	(28)	6.30	3.20	1.00	0.550	Q| CB
ULS	(36)	6.31	3.04	1.02	0.830 *	T| CB
FRIBOURG	(37)	5.33 *	3.56	-	-	T|CB
CH-SAMEN	(40)	6.19	3.00	0.93	0.654	T|BAD
BERN-7	(43)	6.29	2.39 *	1.05	0.600	Z|CB
UFAG	(44)	5.95	3.09	2.00 <	2.000 <	T| CB
		==========	Summary Statistics	==========		
NDA mean		6.362	3.165	1.071	0.5398	
NDA st dev		0.444	0.368	0.135	0.1413	
N		23	23	20	19	(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250		264		234		238		MIC
Mo (mg/kg) (cont.)										
KLGCHUR	(54)	7.37	*	3.60		1.16		0.540		Z| CB
ABMCE	(56)	6.21		2.96		1.08		0.600	<	C| CB
HAUERT+CO	(59)	6.20		3.03		1.23		0.280		A|AAB
HILA	(79)	6.72		3.43		1.15		0.607		T| D
ELML	(657)	5.02	**	2.51		0.77	*	0.384		T| CB
LABAMB	(878)	5.70		3.00		0.85		0.450		T| CB
NRM	(1002)	5.24	*	2.92		0.84		0.410		Z|CB
		==========		Statistical Results		==========				
NDA mean		6.362		3.165		1.071		0.5398		
NDA st dev		0.444		0.368		0.135		0.1413		
N		23		23		20		19		
Median		6.300		3.090		1.065		0.5560		
MAD		0.300		0.240		0.090		0.0960		
		==========								
N (g/kg)										
FRIDOLIN	(5)	44.2		12.8		9.98		98.7		S| O
POLASP	(9)	45.4		14.0		9.65		99.2		
VILJAVUUSP	(13)	44.9		13.2		10.02		97.8		Z| O
KSKO ZH	(16)	45.7		13.8		9.94		100.0		Z| Z
VERITAS	(17)	45.1		13.9		9.70		99.5		S| Z
HIDU	(20)	42.8		13.2		10.00		95.8		S| O
SCSF	(21)	43.6		12.8		9.40		98.1		S| O
AGROCH	(22)	45.3		13.2		9.80		99.5		Z|O
GALLEN	(23)	44.3		12.8		9.48		96.7		S| O
LAN-8899	(24)	44.2		13.1		9.95		97.9		Z|O
IUNGPUL	(26)	45.4		12.4		10.20		98.6		Z|Z
BOANALHOAG	(28)	44.4		13.4		10.00		98.4		Z| O
ULS	(36)	44.6		13.5		9.68		157.3	**	Z| E
FRIBOURG	(37)	44.2		12.9		9.10	*	96.9		T|CB
CH-SAMEN	(40)	45.9		13.8		10.70	**	99.5		M|O
BERN-7	(43)	43.8		13.3		9.69		97.0		Z|O
UFAG	(44)	43.3		13.2		9.50		98.3		S| O
KLGCHUR	(54)	42.8		12.5		10.10		97.2		T|CB
ABMCE	(56)	44.0		12.7		9.86		96.8		Z| O
HAUERT+CO	(59)	45.3		14.3		10.00		99.6		Z|Z
ATVC	(62)	45.4		14.3		11.50	**	98.0		S| O
IRNASE	(63)	44.6		12.9		9.68		98.4		S| O
RIOJALAB	(98)	46.1		13.1		9.62		102.3	*	Z| Z
ELML	(657)	43.7		12.6		9.45		97.7		S| O
PASCAnalab	(870)	45.0		13.4		9.85		96.5		Z| O
LABAMB	(878)	42.8		14.2		10.25		93.9	*	M| O
CRC	(884)	39.0	**	10.8	**	8.65	**	90.2	**	I|CB
NRM	(1002)	41.9		12.9		9.80		93.9	*	Z
LABZIB	(1013)	41.5	*	13.1		10.24		93.0	*	Z|O
		==========		Statistical Results		==========				
NDA mean		44.42		13.18		9.834		98.03		
NDA st dev		1.39		0.57		0.263		1.71		
N		29		29		29		29		
Median		44.30		13.19		9.850		98.00		
MAD		1.00		0.39		0.170		1.20		
		==========								
N - NO3 (as N) (mg/kg)										
LABAMB	(878)	43.0		240		484		538		Z| JC
		==========		No Statistical Results		==========				

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250		264		234		238		MIC
Na (g/kg)										
POLASP	(9)	1.14		0.800		0.120		9.8		
VILJAVUUSP	(13)	1.48	**	0.997	**	0.305	**	10.5		A| CB
HAMELN	(15)	1.14		0.740		0.120		10.0		C| CB
IUNGPUL	(26)	1.10		0.819		0.111		10.6		C|CA
ABMCE	(56)	1.14		0.785		0.200	<	10.5		C| CB
IRNASE	(63)	1.17		0.830		0.210	**	9.4		D| CB
HILA	(79)	1.29		0.956	**	0.303	**	10.6		T| CB
ELML	(657)	1.26		0.792		0.123		10.2		T| CB
LABAMB	(878)	1.03		0.735		0.140		9.5		T| CB
NRM	(1002)	1.19		0.781		0.089		10.9		Z
		==========		Statistical Results		==========				
NDA mean		1.157		0.7881		0.1184		10.29		
NDA st dev		0.069		0.0401		0.0226		0.48		
N		10		10		9		10		
Median		1.155		0.7960		0.1230		10.34		
MAD		0.046		0.0285		0.0170		0.30		
		==========								
Ni (mg/kg)										
FRIDOLIN	(5)	40.0		22.4		18.9		2.47		T| D
POLASP	(9)	37.9		20.6		16.5		3.03		
VILJAVUUSP	(13)	40.9		21.6		18.5		3.20	*	F| CB
HAMELN	(15)	39.7		22.0		18.1		2.35		C| CB
KSKO ZH	(16)	39.8		23.7		19.1	*	3.25	*	T| CB
VERITAS	(17)	39.4		22.3		17.2		3.18	*	T| CB
HIDU	(20)	38.0		22.5		18.6		4.11	**	T| D
SCSF	(21)	38.7		21.1		15.5		2.59		A| CB
AGROCH	(22)	35.1		20.1		16.7		8.00	<	A|AAC
GALLEN	(23)	38.3		21.2		17.4		2.63		F| CB
LAN-8899	(24)	37.3		20.3		16.9		2.60		A|CB
IUNGPUL	(26)	41.0		22.3		17.5		2.76		C|AAE
BOANALHOAG	(28)	36.0		18.0		17.0		2.50		Q| CB
ULS	(36)	36.0		19.7		16.7		2.61		T| CB
FRIBOURG	(37)	37.6		20.6		16.6		-		T|CB
CH-SAMEN	(40)	36.7		20.7		16.6		2.54		T|CB
BERN-7	(43)	38.0		17.7		16.5		2.46		Z|CB
UFAG	(44)	36.7		19.3		13.4	**	3.00	<	T| CB
KLGCHUR	(54)	38.7		21.2		17.3		2.58		Z| CB
ABMCE	(56)	37.2		19.9		16.6		2.54		C| CB
HAUERT+CO	(59)	37.2		19.1		15.2		2.60		A|AAC
ATVC	(62)	37.6		22.5		17.1		10.00	<	E|CB
IRNASE	(63)	39.4		23.6		18.3		2.83		D| CB
HILA	(79)	37.4		22.5		18.0		2.97		T| D
RIOJALAB	(98)	40.3		22.4		19.2	*	3.14	*	T| CB
ELML	(657)	31.7	*	16.1	*	13.6	**	2.59		T| CB
LABAMB	(878)	33.0	*	19.5		15.0	*	2.10	*	T| CB
CRC	(884)	34.9		19.5		16.1		3.73	**	I|CB
NRM	(1002)	39.4		18.7		16.9		2.80		Z|CB
		==========		Statistical Results		==========				
NDA mean		38.05		20.89		17.09		2.638		
NDA st dev		2.13		2.00		0.96		0.235		
N		29		29		29		25		
Median		37.90		20.70		16.90		2.610		
MAD		1.50		1.40		0.60		0.150		
		==========								
P (g/kg)										
FRIDOLIN	(5)	31.9		2.84		2.13		24.5		T| D
POLASP	(9)	31.4		2.80		2.13		22.5	*	
		==========		Summary Statistics		==========				
NDA mean		32.57		2.888		2.095		24.46		
NDA st dev		1.15		0.137		0.080		0.82		
N		28		28		28		28		(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250		264		234		238		MIC
P (g/kg) (cont.)										
VILJAVUUSP	(13)	21.9	**	2.88		2.03		24.0		F| CB
HAMELN	(15)	31.1		2.72		2.04		24.6		C| CB
KSKO ZH	(16)	33.1		2.76		2.05		25.0		T| CB
VERITAS	(17)	32.8		2.94		2.20		23.9		T| CB
HIDU	(20)	33.1		2.96		2.11		24.6		T| CB
SCSF	(21)	32.5		2.92		2.09		23.7		A| CB
AGROCH	(22)	32.6		2.92		2.19		24.3		A|P
GALLEN	(23)	32.9		2.88		2.03		23.7		B| CB
LAN-8899	(24)	32.4		2.83		1.98		24.1		A|CB
BOANALHOAG	(28)	33.0		2.90		2.10		25.0		Q| CB
ULS	(36)	32.4		2.85		2.08		23.3		T| CB
FRIBOURG	(37)	34.3		3.02		2.18		26.9	*	T|CB
CH-SAMEN	(40)	31.2		2.83		1.99		24.5		T|CB
BERN-7	(43)	34.7		2.92		2.08		25.9		Z|CB
UFAG	(44)	31.7		2.66		1.59	**	24.7		T| CB
KLGCHUR	(54)	31.6		2.62		1.80	**	23.8		T|CB
ABMCE	(56)	32.6		3.03		2.13		24.2		C| CB
HAUERT+CO	(59)	33.5		3.00		2.10		24.5		A|E
ATVC	(62)	33.3		3.39	**	2.45	**	25.7		E|CB
IRNASE	(63)	33.2		3.08		2.16		25.2		D| CB
HILA	(79)	33.6		3.10		2.25		27.1	**	T| CB
ELML	(657)	31.3		2.54	*	1.86	*	73.3	**	T| CB
PASCAnalab	(870)	32.4		2.80		2.04		24.2		A| E
LABAMB	(878)	28.5	**	2.55	*	1.73	**	22.0	**	T| CB
CRC	(884)	33.6		3.01		2.17		25.7		I|CB
NRM	(1002)	30.6		2.92		2.04		25.0		Z
		==========		Statistical Results		==========				
NDA mean		32.57		2.888		2.095		24.46		
NDA st dev		1.15		0.137		0.080		0.82		
N		28		28		28		28		
Median		32.55		2.890		2.085		24.52		
MAD		0.80		0.093		0.054		0.55		
		==========								
Pb (mg/kg)										
FRIDOLIN	(5)	170		34.1		79.4		1.77		T| D
POLASP	(9)	166		45.4	**	78.4		2.15		
VILJAVUUSP	(13)	173		37.1		78.9		0.80	**	F|BAE
HAMELN	(15)	158		32.6		82.8		-		C| CB
KSKO ZH	(16)	167		35.7		84.5		2.00	<	T| CB
VERITAS	(17)	165		39.0	*	76.7		1.90		T| CB
HIDU	(20)	159		35.1		82.5		1.93		T| D
SCSF	(21)	166		33.7		76.1		2.50	<	A| CB
AGROCH	(22)	163		32.2		85.5		8.00	<	A|AAC
GALLEN	(23)	164		33.9		83.0		2.00		F| CB
LAN-8899	(24)	162		33.1		76.1		1.98		A|CB
IUNGPUL	(26)	176	*	34.0		82.3		2.43	*	C|CB
BOANALHOAG	(28)	160		33.0		77.0		2.00		Q| CB
ULS	(36)	159		32.6		77.2		1.64		T| CB
FRIBOURG	(37)	149	*	29.0		66.4		-		T|CB
CH-SAMEN	(40)	164		33.9		68.9		2.91	**	T|CB
BERN-7	(43)	158		33.4		61.1		10.00	<	Z|CB
KLGCHUR	(54)	156		31.9		70.9		1.93		Z| CB
ABMCE	(56)	169		33.2		77.2		1.98		C|AAC
HAUERT+CO	(59)	152		30.1		76.1		2.00		A|AAA
ATVC	(62)	162		31.3		70.6		10.00	<	E|CB
IRNASE	(63)	164		35.8		65.8		1.95		D| CB
HILA	(79)	166		34.9		-		1.99		T| D
RIOJALAB	(98)	182	**	36.9		79.0		1.76		T| CB
ELML	(657)	120	**	24.6	**	65.1		1.74		T| CB
		==========		Summary Statistics		==========				
NDA mean		162.9		33.52		75.91		1.942		
NDA st dev		6.2		2.40		8.18		0.210		
N		28		28		27		21		(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Pb (mg/kg)	(cont.)					
LABAMB	(878)	145 *	30.0	65.0	1.70	T| CB
CRC	(884)	150 *	36.8	69.9	2.13	I|CB
NRM	(1002)	163	29.8	158.0 **	2.38 *	Z|CB
		==========	Statistical Results	==========		
NDA mean		162.9	33.52	75.91	1.942	
NDA st dev		6.2	2.40	8.18	0.210	
N		28	28	27	21	
Median		163.1	33.55	77.00	1.980	
MAD		4.1	1.60	5.80	0.150	
		==========		==========		
S (mg/kg)						
HAMELN	(15)	12540	1727	1411	23540	C| CB
IUNGPUL	(26)	14500	2200	1592	25240	C|CB
IRNASE	(63)	15490	2087	1534	26930	D| CB
NRM	(1002)	12630	3398	2656	23390	Z|CB
		==========	Statistical Results (no NDA)	==========		
N		4	4	4	4	
Median		13564	2144	1563	24393	
MAD		979	237	91	928	
		==========		==========		
S - SO4 (as S) (mg/kg)						
LABAMB	(878)	3740	518	361	48360	Z| JC
		==========	No Statistical Results	==========		
Sb (µg/kg)						
FRIDOLIN	(5)	3409	1109	1078	45.2	T| D
HAMELN	(15)	2960	1005	906	98.9	C| D
LABAMB	(878)	3100	1000	850	100.0 <	T| CB
NRM	(1002)	2000	700	1100	100.0 <	Z|D
		==========	Statistical Results (no NDA)	==========		
N		4	4	4	2	
Median		3030	1003	992.0	72.05	
MAD		225	55	97.0	26.85	
		==========		==========		
Se (µg/kg)						
POLASP	(9)	1970	699	827	563	
HAMELN	(15)	1494	151	133	362	C| F
IUNGPUL	(26)	900 <	900 <	900 <	1292	C|CB
LABAMB	(878)	1500	220	250	350	T| CB
CRC	(884)	1959	600 <	620 <	630 <	I|D
NRM	(1002)	1430	200	140	330	Z|F
		==========	Statistical Results (no NDA)	==========		
N		5	4	4	5	
Median		1500	210.0	195.0	362.0	
MAD		70	34.5	58.5	32.0	
		==========		==========		
Sn (mg/kg)						
FRIDOLIN	(5)	37.7	3.34	5.24	0.190	T| D
HAMELN	(15)	29.4	2.40	3.91	-	C| D
IRNASE	(63)	34.1	3.68	6.58	1.000 <	D| CB
LABAMB	(878)	25.0	2.40	3.80	0.700	T| CB
NRM	(1002)	27.5	1.99	8.55	0.170	Z|D
		==========	Statistical Results (no NDA)	==========		
N		5	5	5	3	
Median		29.41	2.400	5.240	0.1900	
MAD		4.41	0.410	1.340	0.0200	

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250	264	234	238	MIC
Sr (mg/kg)						
HAMELN	(15)	296	137	148	47.1	C| CB
IRNASE	(63)	343	167	176	52.8	D| CB
LABAMB	(878)	263	145	132	49.0	T| CB
		==========	Statistical Results (no NDA)		==========	
N		3	3	3	3	
Median		296.0	145.0	148.0	49.00	
MAD		33.0	8.0	16.0	1.90	
Ti (mg/kg)						
FRIDOLIN	(5)	359	334	398	41.4	T| D
LABAMB	(878)	140	140	160	10.5	T| CB
		==========	Statistical Results (no NDA)		==========	
N		2	2	2	2	
Median		249.5	237.0	279.0	25.95	
MAD		109.5	97.0	119.0	15.45	
Tl (µg/kg)						
FRIDOLIN	(5)	96.9	130	148	18.0	T| D
HAMELN	(15)	110.0	85	101	27.5	C| D
LABAMB	(878)	73.0	100 <	100 <	100.0 <	T| CB
NRM	(1002)	100.0 <	100 <	100 <	100.0 <	Z|D
		==========	Statistical Results (no NDA)		==========	
N		3	2	2	2	
Median		96.90	107.7	124.7	22.75	
MAD		13.10	22.3	23.3	4.75	
V (mg/kg)						
FRIDOLIN	(5)	11.8	18.3	21.6	0.33	T| D
VILJAVUUSP	(13)	14535.7	19629.4	19506.3	2620.66	F|BAE
HAMELN	(15)	13.6	17.9	18.2	1.88	C| D
ABMCE	(56)	13.2	22.2	19.1	6.50 <	C| CB
HILA	(79)	13.9	23.1	25.4	1.66	T| D
LABAMB	(878)	11.2	15.5	17.0	0.90	T| CB
NRM	(1002)	14.0	13.5	16.2	2.35	Z|CB
		==========	Statistical Results (no NDA)		==========	
N		7	7	7	6	
Median		13.56	18.30	19.10	1.770	
MAD		0.44	3.90	2.50	0.725	
Zn (mg/kg)						
FRIDOLIN	(5)	1139	130	244	92.5	T| D
POLASP	(9)	1148	131	238	90.3	
VILJAVUUSP	(13)	1233 *	137	232	120.9 **	F| CB
HAMELN	(15)	1124	135	231	101.0	C| CB
KSKO ZH	(16)	1160	140	235	98.8	T| CB
VERITAS	(17)	1188	138	219	107.0 *	T| CB
HIDU	(20)	1151	137	245	97.9	T| CB
SCSF	(21)	1135	132	224	94.3	A| CB
AGROCH	(22)	1005 **	129	226	97.8	A|AAC
GALLEN	(23)	1146	134	228	98.5	F| CB
LAN-8899	(24)	1138	127	217	94.9	A|CB
IUNGPUL	(26)	1176	140	235	92.3	C|AAE
BOANALHOAG	(28)	1140	130	227	95.0	Q| CB
		==========	Summary Statistics		==========	
NDA mean		1155	132.3	228.8	96.93	
NDA st dev		39	7.5	11.3	4.28	
N		29	28	28	28	(cont.)

MARSEP 2012.1 - Acid extractable (So-called totals)

Sample		250		264		234		238		MIC
Zn (mg/kg)	(cont.)									
ULS	(36)	1160		128		225		96.4		T| CB
FRIBOURG	(37)	1107		250	<	250	<	-		T|CB
CH-SAMEN	(40)	1136		130		222		96.4		T|CB
BERN-7	(43)	1164		127		210		89.0		Z|CB
UFAG	(44)	1177		121		178	**	89.0		T| CB
KLGCHUR	(54)	1254	*	142		238		105.0		Z| CB
ABMCE	(56)	1180		132		233		97.0		C| CB
HAUERT+CO	(59)	1208		141		234		100.0		A|AAA
ATVC	(62)	1160		151	*	247		101.0		E|CB
IRNASE	(63)	1207		144		236		98.2		D| CB
HILA	(79)	1110		152	*	236		102.0		T| D
RIOJALAB	(98)	1171		124		222		98.2		T| CB
PASCAnalab	(870)	1039	**	132		220		97.3		A|AAA
LABAMB	(878)	1040	*	122		205	*	81.0	**	T| CB
CRC	(884)	1095		128		220		96.8		I|CB
NRM	(1002)	1264	*	115	*	210		87.1	*	Z|CB

Statistical Results

	250	264	234	238
NDA mean	1155	132.3	228.8	96.93
NDA st dev	39	7.5	11.3	4.28
N	29	28	28	28
Median	1151	131.8	227.5	97.13
MAD	26	5.0	7.6	2.85

MARSEP 2012.1 - Other determinations

Sample		250		264		234		238		MIC
AOX (mg/kg)										
FRIDOLIN	(5)	226		33.3		77.5		24.6		R| O
HAMELN	(15)	240		50.3		68.8		-		Z| O
VERITAS	(17)	234		55.0		67.0		37.0		R| O
HIDU	(20)	234		40.9		69.6		37.1		R| O
GALLEN	(23)	251		43.9		60.4		26.0		R| O
BOANALHOAG	(28)	240		45.0		65.0		30.0		R| O
FRIBOURG	(37)	210	*	31.7		50.5		30.0	<	R|O
CH-SAMEN	(40)	109	**	108.0	**	110.0	**	205.0	**	R|O
UFAG	(44)	245		39.0		54.0		27.0		R| O
KLGCHUR	(54)	271	*	44.4		71.9		31.3		
		==========		Statistical Results		==========				
NDA mean		238.2		42.55		66.17		30.18		
NDA st dev		13.7		8.12		8.55		7.10		
N		10		10		10		8		
Median		237.0		44.15		67.90		30.65		
MAD		9.5		5.65		5.75		5.35		
		==========								
loss-on-ignition (%)										
FRIDOLIN	(5)	60.5		31.0		27.1		77.1		Z| P
POLASP	(9)	60.7		32.3		27.2		77.2		
KSKO ZH	(16)	60.5		31.0		26.1		76.7		Z| P
VERITAS	(17)	60.1		30.9		26.5		76.6		T| G
HIDU	(20)	60.7		30.9		25.0	*	76.8		Z| P
SCSF	(21)	61.0		31.1		26.0		76.7		Z| P
AGROCH	(22)	61.2		31.2		27.3		77.0		
GALLEN	(23)	60.0		32.3		26.6		76.7		Z| P
LAN-8899	(24)	60.6		31.9		26.9		77.2		
BOANALHOAG	(28)	60.6		32.0		27.0		76.9		| P
ULS	(36)	60.5		32.8		27.3		77.0		Z| P
FRIBOURG	(37)	59.7		30.7		25.6		76.3	**	Z|P
CH-SAMEN	(40)	61.1		30.9		27.1		77.0		Z|P
BERN-7	(43)	60.0		32.0		26.9		76.8		
UFAG	(44)	60.4		31.7		26.3		77.1		Z| P
KLGCHUR	(54)	61.0		30.3		27.6		77.1		T|CB
HAUERT+CO	(59)	60.1		31.1		27.2		76.9		Z|P
ATVC	(62)	60.1		32.8		26.0		77.1		Z|P
IRNASE	(63)	59.6		30.4		26.1		77.0		A| P
RIOJALAB	(98)	60.0		30.7		27.5		77.0		Z| P
ELML	(657)	60.2		33.4		28.3		77.3		Z| P
PASCAnalab	(870)	61.3		33.8	*	28.4	*	77.7	**	Z| P
LABAMB	(878)	61.5		32.7		26.6		77.0		| P
NRM	(1002)	63.0	**	33.5		30.6	**	78.5	**	Z|P
		==========		Statistical Results		==========				
NDA mean		60.48		31.53		26.83		76.98		
NDA st dev		0.62		1.02		0.74		0.21		
N		24		24		24		24		
Median		60.50		31.44		26.95		77.00		
MAD		0.44		0.66		0.49		0.15		
		==========								

MARSEP 2012.1 Z - Scores

MARSEP 2012.1 Z - Scores - Per Participant

Sample	250	264	234	238
FRIDOLIN (5)				
Ag (AE)	#	#	#	#
Al (AE)	1.25	5.33 **	2.12 *	1.08
As (AE)	0.56	0.43	0.31	0.89
Ba (AE)	#	#	#	#
Be (AE)	#	#	#	#
Bi (AE)	#	#	#	#
Ca (AE)	0.09	-0.40	0.08	-0.38
Cd (AE)	2.22 *	0.63	2.64 *	0.15
Co (AE)	0.31	0.96	1.38	-0.88
Cr (AE)	1.65	1.16	1.32	-0.43
Cu (AE)	-0.49	0.12	0.50	0.20
Fe (AE)	-0.41	1.04	1.69	1.51
Hg (AE)	0.59	-0.06	1.50	2.87 *
K (AE)	1.24	0.25	1.45	0.87
Mg (AE)	0.11	0.59	0.23	0.10
Mn (AE)	-0.12	0.16	0.47	-0.21
Mo (AE)	1.78	1.02	1.25	0.21
N (AE)	-0.16	-0.67	0.55	0.39
Ni (AE)	0.92	0.76	1.89	-0.72
P (AE)	-0.60	-0.35	0.44	0.08
Pb (AE)	1.07	0.23	0.42	-0.82
Sb (AE)	#	#	#	#
Sn (AE)	#	#	#	#
Ti (AE)	#	#	#	#
Tl (AE)	#	#	#	#
V (AE)	#	#	#	#
Zn (AE)	-0.41	-0.29	1.34	-1.04
AOX (OD)	-0.89	-1.14	1.33	-0.79
loss-on-ignition (OD)	0.04	-0.52	0.37	0.58
POLASP (9)				
As (AE)	-0.01	0.57	0.55	0.15
C (AE)	#	#	#	#
Ca (AE)	0.03	-2.56 *	-0.11	-1.06
Cd (AE)	0.45	1.74	-0.53	-0.24
Co (AE)	-0.80	-1.21	-1.30	0.21
Cr (AE)	-0.79	-1.47	-1.19	-0.53
Cu (AE)	-0.77	0.90	1.96	-0.70
Fe (AE)	1.17	-0.73	0.05	-1.59
Hg (AE)	-0.36	-0.50	0.43	0.64
K (AE)	0.21	0.49	-0.36	-0.84
Mg (AE)	-0.88	-0.07	-0.39	-0.14
Mn (AE)	-0.49	-0.74	-0.21	-0.78
Mo (AE)	0.04	0.31	1.17	1.49
N (AE)	0.70	1.45	-0.70	0.68
Na (AE)	-0.25	0.30	0.07	-1.06
Ni (AE)	-0.07	-0.15	-0.61	1.67
P (AE)	-1.02	-0.64	0.44	-2.40 *
Pb (AE)	0.50	4.95 **	0.30	0.99
Se (AE)	#	#	#	#
Zn (AE)	-0.18	-0.18	0.82	-1.55
loss-on-ignition (OD)	0.36	0.76	0.51	1.05
VILJAVUUSP (13)				
As (AE)	-2.79 *	-2.57 *	-2.95 *	0.64
B (AE)	#	#	#	#
Ca (AE)	2.64 *	4.04 **	0.80	0.24
Cd (AE)	1.43	0.44	0.33	-4.29 **
Co (AE)	-1.28	-0.60	-0.55	-2.22 *
Cr (AE)	1.47	1.75	1.15	2.42 *
Cu (AE)	0.81	0.88	0.85	-0.19
Fe (AE)	-11.84 **	-0.26	0.50	-0.40
Hg (AE)	0.35	-0.55	-0.70	1.24
K (AE)	1.11	1.25	0.31	0.18
Mg (AE)	2.07 *	1.42	0.30	0.72
Mn (AE)	0.74	1.77	1.06	0.43

(cont)

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Sample	250	264	234	238
VILJAVUUSP (13) (cont.)				
N (AE)	0.34	0.01	0.69	-0.12
Na (AE)	4.69 **	5.21 **	8.27 **	0.41
Ni (AE)	1.36	0.37	1.42	2.41 *
P (AE)	-9.29 **	-0.09	-0.78	-0.53
Pb (AE)	1.58	1.51	0.36	-5.41 **
V (AE)	#	#	#	#
Zn (AE)	2.01 *	0.61	0.31	5.59 **
HAMELN (15)				
Al (AE)	0.29	0.86	0.16	0.14
As (AE)	-0.71	0.45	-0.18	0.61
Ba (AE)	#	#	#	#
Be (AE)	#	#	#	#
Bi (AE)	#	-	#	-
Ca (AE)	-1.68	0.10	0.59	0.26
Cd (AE)	0.17	0.63	1.28	-
Co (AE)	-0.75	-0.31	-1.87	0.71
Cr (AE)	0.52	-0.35	-0.03	0.88
Cu (AE)	-0.77	0.21	0.66	0.64
Fe (AE)	-0.61	-0.42	-0.34	0.00
Hg (AE)	-1.35	-0.81	1.05	-0.66
K (AE)	-0.44	-0.68	0.03	-0.29
Li (AE)	#	#	#	#
Mg (AE)	-0.75	-0.33	-0.75	-0.55
Mn (AE)	-0.39	-1.32	-0.99	0.50
Mo (AE)	0.92	1.07	0.43	3.01 **
Na (AE)	-0.25	-1.20	0.07	-0.58
Ni (AE)	0.77	0.55	1.05	-1.23
P (AE)	-1.30	-1.22	-0.68	0.11
Pb (AE)	-0.79	-0.39	0.84	-
S (AE)	#	#	#	#
Sb (AE)	#	#	#	#
Se (AE)	#	#	#	#
Sn (AE)	#	#	#	-
Sr (AE)	#	#	#	#
Tl (AE)	#	#	#	#
V (AE)	#	#	#	#
Zn (AE)	-0.80	0.36	0.20	0.95
AOX (OD)	0.13	0.95	0.31	-
KSKO ZH (16)				
Ag (AE)	#	< #	< #	< #
Ca (AE)	1.12	-0.37	0.14	-0.35
Cd (AE)	-0.69	0.37	0.01	0.05
Co (AE)	-1.21	0.56	0.32	<
Cr (AE)	1.47	1.77	3.18 **	4.20 **
Cu (AE)	0.42	0.56	0.59	-0.60
Hg (AE)	0.65	5.71 **	0.71	-0.10
K (AE)	1.62	2.02 *	3.05 **	-0.40
Mg (AE)	1.77	0.78	1.38	0.42
Mo (AE)	0.13	0.45	-0.16	0.28
N (AE)	0.92	1.10	0.40	1.15
Ni (AE)	0.82	1.41	2.09 *	2.61 *
P (AE)	0.46	-0.93	-0.56	0.66
Pb (AE)	0.67	0.91	1.05	<
Zn (AE)	0.13	1.02	0.55	0.44
loss-on-ignition (OD)	0.04	-0.52	-0.98	-1.29
VERITAS (17)				
Ca (AE)	0.58	0.56	1.08	0.45
Cd (AE)	-0.12	5.97 **	0.56	<
Co (AE)	0.24	1.30	1.91	<
Cr (AE)	-1.17	-0.04	-0.41	0.73
Cu (AE)	1.34	1.15	0.18	0.85
Fe (AE)	-0.06	1.09	3.69 **	0.75
Hg (AE)	-0.13	-2.19 *	0.32	1.76

(cont)

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Sample	250	264	234	238
VERITAS (17) (cont.)				
K (AE)	0.51	0.39	1.58	0.64
Mg (AE)	0.64	-0.92	1.11	0.34
N (AE)	0.49	1.27	-0.51	0.86
Ni (AE)	0.63	0.71	0.12	2.31 *
P (AE)	0.20	0.38	1.32	-0.69
Pb (AE)	0.34	2.28 *	0.10	-0.20
Zn (AE)	0.85	0.76	-0.87	2.35 *
AOX (OD)	-0.31	1.53	0.10	0.96
loss-on-ignition (OD)	-0.61	-0.62	-0.44	-1.76
HIDU (20)				
Ca (AE)	-0.10	-0.11	-0.71	-1.41
Cd (AE)	-0.62	1.89	3.59 **	0.74
Co (AE)	1.58	2.60 *	3.37 **	1.92
Cr (AE)	-0.16	0.76	1.34	0.78
Cu (AE)	0.15	-2.23 *	-2.41 *	0.33
Fe (AE)	1.43	2.14 *	4.60 **	0.67
Hg (AE)	2.18 *	1.18	2.06 *	<
K (AE)	-0.22	0.29	1.43	-3.44 **
Mg (AE)	-0.09	-0.24	1.02	-0.95
Mn (AE)	0.80	1.37	2.19 *	0.45
Mo (AE)	1.21	0.69	0.88	-2.04 *
N (AE)	-1.17	0.04	0.63	-1.30
Ni (AE)	-0.03	0.81	1.57	6.28 **
P (AE)	0.46	0.53	0.19	0.17
Pb (AE)	-0.63	0.66	0.81	-0.06
Zn (AE)	-0.10	0.62	1.44	0.23
AOX (OD)	-0.31	-0.20	0.40	0.97
loss-on-ignition (OD)	0.36	-0.62	-2.46 *	-0.82
SCSF (21)				
Al (AE)	0.58	0.14	-0.83	0.17
Ca (AE)	-0.51	-0.79	-1.47	0.01
Cd (AE)	1.09	-1.33	-0.03	<
Co (AE)	0.85	0.73	-0.69	0.05
Cr (AE)	-0.30	-1.24	-0.62	-0.81
Cu (AE)	0.06	0.41	-1.87	1.88
Fe (AE)	-0.57	-2.16 *	-2.69 *	-0.58
Hg (AE)	0.00	-0.11	-0.64	<
K (AE)	-0.18	-1.04	-0.96	0.34
Mg (AE)	0.64	0.27	-1.27	1.22
Mn (AE)	0.02	-0.42	-1.24	0.32
Mo (AE)	-0.05	-1.59	<	<
N (AE)	-0.59	-0.67	-1.65	0.04
Ni (AE)	0.30	0.10	-1.65	-0.20
P (AE)	-0.07	0.23	-0.06	-0.93
Pb (AE)	0.50	0.07	0.02	<
Zn (AE)	-0.52	-0.04	-0.43	-0.61
loss-on-ignition (OD)	0.85	-0.42	-1.11	-1.29
AGROCH (22)				
Ca (AE)	-1.32	-0.45	-1.64	-1.33
Cd (AE)	-0.76	-2.34 *	0.38	-0.44
Co (AE)	0.81	0.06	0.93	0.83
Cr (AE)	-3.09 **	-1.25	-0.30	<
Cu (AE)	-0.05	-0.08	-0.07	2.53 *
Hg (AE)	3.73 **	1.83	-0.52	<
K (AE)	-0.78	-1.92	-0.88	-0.94
Mg (AE)	-0.42	-0.28	-0.82	0.26
Mo (AE)	-0.30	-1.83	-0.97	-0.56
N (AE)	0.63	0.04	-0.13	0.86
Ni (AE)	-1.41	-0.38	-0.39	<
P (AE)	0.01	0.23	1.20	-0.16
Pb (AE)	0.06	-0.57	1.17	<
Zn (AE)	-3.89 **	-0.51	-0.23	0.21
loss-on-ignition (OD)	1.16	-0.34	0.64	-0.03

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Sample	250	264	234	238
GALLEN (23)				
Ca (AE)	0.03	-0.79	-1.05	0.36
Cd (AE)	0.02	0.26	-0.08	<
Co (AE)	-0.05	0.50	0.32	0.68
Cr (AE)	-0.46	0.09	0.47	0.19
Cu (AE)	0.51	0.61	0.45	-0.70
Fe (AE)	0.35	-0.12	0.05	0.42
Hg (AE)	-0.02	-0.59	-0.58	-0.60
K (AE)	0.12	-0.42	0.18	-0.10
Mg (AE)	-0.15	0.10	0.03	-0.47
Mo (AE)	0.90	0.15	0.07	0.36
N (AE)	-0.09	-0.67	-1.35	-0.78
Ni (AE)	0.12	0.15	0.33	-0.03
P (AE)	0.28	-0.06	-0.81	-0.93
Pb (AE)	0.18	0.16	0.87	0.28
Zn (AE)	-0.23	0.22	-0.07	0.37
AOX (OD)	0.93	0.17	-0.68	-0.59
loss-on-ignition (OD)	-0.78	0.76	-0.30	-1.29
LAN-8899 (24)				
Ca (AE)	0.03	0.14	0.06	-1.06
Cd (AE)	-0.40	-0.48	0.83	0.35
Co (AE)	-0.14	0.03	-0.08	0.36
Cr (AE)	-0.19	-0.22	-0.13	0.09
Cu (AE)	-0.58	0.01	0.05	0.54
Hg (AE)	0.06	0.03	0.26	0.09
K (AE)	-0.18	-0.32	-0.01	-0.32
Mg (AE)	0.24	-0.24	-0.06	0.18
Mo (AE)	-0.37	-0.72	-0.53	-0.28
N (AE)	-0.16	-0.14	0.44	-0.08
Ni (AE)	-0.35	-0.30	-0.19	-0.16
P (AE)	-0.15	-0.42	-1.44	-0.44
Pb (AE)	-0.14	-0.18	0.02	0.18
Zn (AE)	-0.44	-0.71	-1.05	-0.47
loss-on-ignition (OD)	0.20	0.36	0.10	1.05
IUNGPUL (26)				
C (RT)	#	#	#	#
S (RT)	#	#	#	#
As (AE)	1.09	-1.64	-1.11	-1.04
Ca (AE)	-0.10	3.84 **	-0.62	7.29 **
Cd (AE)	0.73	0.70	-0.80	4.10 **
Cr (AE)	0.33	-0.40	-0.13	0.29
Cu (AE)	0.51	-0.54	-0.98	0.12
Fe (AE)	0.20	0.03	-0.18	-0.99
Hg (AE)	1.57	0.47	-0.70	-0.60
K (AE)	-0.87	-1.44	-0.01	-0.40
Mg (AE)	-0.35	1.63	1.67	0.66
Mn (AE)	-1.38	0.26	-0.08	-0.65
Mo (AE)	0.54	1.26	0.36	0.11
N (AE)	0.70	-1.37	1.39	0.33
Na (AE)	-0.82	0.77	-0.33	0.66
Ni (AE)	1.38	0.71	0.43	0.52
Pb (AE)	2.12 *	0.20	0.78	2.32 *
S (AE)	#	#	#	#
Se (AE)	< #	< #	< #	#
Zn (AE)	0.54	1.02	0.55	-1.08
BOANALHOAG (28)				
Ca (AE)	-1.60	0.47	-0.37	0.81
Cd (AE)	0.45	1.37	2.18 *	2.52 *
Co (AE)	0.35	-1.61	0.36	-0.42
Cr (AE)	-0.44	-0.29	-0.15	-0.77
Cu (AE)	0.24	-1.33	0.11	-0.39
Hg (AE)	0.21	-0.15	-0.70	-0.10
K (AE)	-0.18	0.08	-0.11	1.23
Mg (AE)	-0.22	-1.09	-0.29	-0.14

(cont)

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Sample	250	264	234	238
BOANALHOAG (28) (cont.)				
Mo (AE)	-0.14	0.10	-0.53	0.07
N (AE)	-0.02	0.39	0.63	0.21
Ni (AE)	-0.96	-1.45	-0.09	-0.59
P (AE)	0.37	0.09	0.07	0.66
Pb (AE)	-0.46	-0.22	0.13	0.28
Zn (AE)	-0.39	-0.31	-0.16	-0.45
AOX (OD)	0.13	0.30	-0.14	-0.03
loss-on-ignition (OD)	0.25	0.46	0.24	-0.35
ULS (36)				
Ca (AE)	-0.55	-0.32	-0.27	-0.81
Cd (AE)	-0.33	-0.26	-0.26	2.22 *
Co (AE)	-0.14	-0.01	0.20	0.35
Cr (AE)	-0.95	-0.14	-0.24	-1.04
Cu (AE)	-0.59	-0.31	-0.43	-0.80
Fe (AE)	-0.45	-0.02	-0.25	11.54 **
Hg (AE)	0.24	0.06	0.14	1.80
K (AE)	-0.31	-0.10	-0.29	-2.90 *
Mg (AE)	-0.35	0.18	-0.42	-1.51
Mo (AE)	-0.12	-0.34	-0.38	2.05 *
N (AE)	0.14	0.59	-0.59	34.60 **
Ni (AE)	-0.95	-0.59	-0.45	-0.12
P (AE)	-0.19	-0.28	-0.18	-1.48
Pb (AE)	-0.63	-0.39	0.16	-1.43
Zn (AE)	0.12	-0.63	-0.37	-0.13
loss-on-ignition (OD)	0.02	1.20	0.60	0.26
FRIBOURG (37)				
Ca (AE)	0.58	0.73	0.99	0.54
Cd (AE)	1.16	<	<	-
Co (AE)	0.96	0.70	0.93	-
Cr (AE)	0.03	-0.44	0.10	<
Cu (AE)	2.44 *	<	<	-
Hg (AE)	0.86	-0.06	1.72	-0.10
K (AE)	-0.61	0.29	0.35	1.68
Mg (AE)	0.58	1.63	1.34	-0.71
Mo (AE)	-2.33 *	1.07	-	-
N (AE)	-0.16	-0.49	-2.79 *	-0.66
Ni (AE)	-0.21	-0.15	-0.50	-
P (AE)	1.50	0.96	1.07	2.98 *
Pb (AE)	-2.24 *	-1.89	-1.16	-
Zn (AE)	-1.24	<	<	-
AOX (OD)	-2.05 *	-1.34	-1.83	<
loss-on-ignition (OD)	-1.26	-0.82	-1.65	-3.16 **
CH-SAMEN (40)				
Ca (AE)	0.17	0.98	-0.03	-0.44
Cd (AE)	-2.32 *	0.00	-3.06 **	4.59 **
Co (AE)	-0.32	-0.87	-1.30	-0.49
Cr (AE)	-0.25	0.29	0.62	0.05
Cu (AE)	-0.58	-0.79	-0.71	-0.29
Hg (AE)	0.73	2.65 *	1.22	-0.92
K (AE)	-2.37 *	-3.79 **	-0.30	-0.62
Mg (AE)	-0.62	-1.32	-0.42	-0.71
Mo (AE)	-0.39	-0.45	-1.04	0.81
N (AE)	1.06	1.10	3.29 **	0.86
Ni (AE)	-0.64	-0.10	-0.50	-0.42
P (AE)	-1.20	-0.42	-1.31	0.05
Pb (AE)	0.18	0.16	-0.86	4.60 **
Zn (AE)	-0.49	-0.31	-0.60	-0.12
AOX (OD)	-9.40 **	8.06 **	5.13 **	24.62 **
loss-on-ignition (OD)	1.01	-0.62	0.37	0.12

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Sample	250	264	234	238
BERN-7 (43)				
Ca (AE)	-0.37	1.74	-0.28	1.43
Cd (AE)	1.51	-0.11	-4.14 **	<
Co (AE)	-0.53	-0.24	-0.37	-1.20
Cr (AE)	0.60	0.30	-0.67	-0.49
Cu (AE)	-0.13	-1.18	-1.52	-0.39
Hg (AE)	-1.24	-4.72 **	-9.13 < **	<
K (AE)	-0.95	0.90	-0.66	-0.18
Mg (AE)	-1.74	1.29	-0.91	-1.27
Mo (AE)	-0.16	-2.11 *	-0.16	0.43
N (AE)	-0.45	0.22	-0.55	-0.60
Ni (AE)	-0.03	-1.60	-0.61	-0.76
P (AE)	1.85	0.23	-0.18	1.76
Pb (AE)	-0.79	-0.05	-1.81	<
Zn (AE)	0.23	-0.71	-1.67	-1.85
loss-on-ignition (OD)	-0.74	0.47	0.03	-0.77
UFAG (44)				
Pb (RT)	#	#	#	< #
Ca (AE)	-1.32	-0.11	-10.56 **	-0.44
Cd (AE)	-0.02	-2.56 *	-6.36 **	<
Co (AE)	1.08	<	<	<
Cr (AE)	-0.50	-0.22	<	<
Cu (AE)	-0.49	-0.04	<	<
Hg (AE)	-0.41	0.12	-3.45 **	33.89 **
K (AE)	-0.44	-0.02	-1.02	-5.07 **
Mg (AE)	-1.24	-1.09	-3.86 **	-0.71
Mo (AE)	-0.93	-0.20	<	<
N (AE)	-0.81	0.04	-1.27	0.16
Ni (AE)	-0.64	-0.80	-3.83 **	<
P (AE)	-0.76	-1.66	-6.33 **	0.29
Zn (AE)	0.57	-1.51	-4.51 **	-1.85
AOX (OD)	0.49	-0.44	-1.42	-0.45
loss-on-ignition (OD)	-0.13	0.17	-0.71	0.58
KLGCHUR (54)				
Ca (AE)	0.44	-1.12	-2.06 *	1.78
Cd (AE)	-0.19	0.26	0.38	0.07
Co (AE)	0.58	-0.31	-0.61	-0.42
Cr (AE)	1.20	1.82	4.42 **	2.32 *
Cu (AE)	-2.32 *	-1.33	-1.46	-0.81
Hg (AE)	-0.16	1.18	3.58 **	-0.08
K (AE)	2.01 *	1.31	2.53 *	-0.55
Mg (AE)	0.51	-0.41	0.26	0.82
Mo (AE)	2.27 *	1.18	0.66	0.00
N (AE)	-1.17	-1.20	1.01	-0.49
Ni (AE)	0.30	0.15	0.22	-0.25
P (AE)	-0.85	-1.95	-3.69 **	-0.81
Pb (AE)	-1.11	-0.68	-0.61	-0.06
Zn (AE)	2.56 *	1.29	0.82	1.89
AOX (OD)	2.39 *	0.23	0.67	0.16
loss-on-ignition (OD)	0.85	-1.21	1.05	0.58
ABMCE (56)				
Al (AE)	-0.19	0.46	0.06	0.79
As (AE)	-0.61	-1.13	1.09	<
Be (AE)	#	#	#	< #
Ca (AE)	-0.65	0.90	0.31	-0.53
Cd (AE)	0.73	-0.11	-0.08	<
Co (AE)	0.15	-0.21	-0.24	<
Cr (AE)	0.05	-0.33	-0.08	0.09
Cu (AE)	-0.68	-0.69	-0.77	-0.08
Fe (AE)	0.61	-0.92	-1.09	0.84
Hg (AE)	4.10 **	0.65	-0.19	-0.10
K (AE)	-0.27	-0.42	-0.10	0.64
Mg (AE)	-0.55	-0.07	-0.52	-1.35
Mn (AE)	-0.22	-0.11	-0.39	-0.83

(cont)

MARSEP 2012.1 Z - Scores - Per Participant

Sample	250	264	234	238
ABMCE (56) (cont.)				
Mo (AE)	-0.34	-0.56	0.07	<
N (AE)	-0.32	-0.84	0.10	-0.72
Na (AE)	-0.25	-0.08	<	0.45
Ni (AE)	-0.40	-0.50	-0.50	-0.42
P (AE)	0.02	1.04	0.44	-0.32
Pb (AE)	0.99	-0.14	0.16	0.18
V (AE)	#	#	#	< #
Zn (AE)	0.65	-0.04	0.37	0.02
HAUERT+CO (59)				
Ca (AE)	-2.27 *	-1.21	0.23	-0.70
Cd (AE)	-0.54	-1.22	-0.08	0.55
Co (AE)	-0.48	0.63	0.36	<
Cr (AE)	0.14	-0.75	-0.72	-1.27
Cu (AE)	-0.49	0.80	-3.78 **	0.64
Fe (AE)	-0.37	0.48	0.27	0.25
Hg (AE)	1.33	-0.77	-1.48	<
K (AE)	-0.14	-0.73	-0.29	-0.77
Mg (AE)	-0.68	-0.24	-0.46	-0.63
Mn (AE)	0.08	-0.26	-0.13	-1.18
Mo (AE)	-0.37	-0.37	1.17	-1.84
N (AE)	0.63	1.98	0.63	0.92
Ni (AE)	-0.40	-0.90	-1.96	-0.16
P (AE)	0.81	0.82	0.07	0.05
Pb (AE)	-1.76	-1.43	0.02	0.28
Zn (AE)	1.37	1.16	0.46	0.72
loss-on-ignition (OD)	-0.61	-0.42	0.51	-0.35
ATVC (62)				
Hg (RT)	#	#	#	< #
C (AE)	#	#	#	#
Cd (AE)	0.45	<	<	<
Cr (AE)	0.90	1.45	2.97 *	<
Cu (AE)	0.42	0.21	0.66	-1.32
K (AE)	0.68	1.61	2.08 *	0.34
N (AE)	0.70	1.98	6.33 **	-0.02
Ni (AE)	-0.21	0.81	0.02	<
P (AE)	0.63	3.66 **	4.46 **	1.51
Pb (AE)	-0.14	-0.93	-0.65	<
Zn (AE)	0.13	2.49 *	1.62	0.95
loss-on-ignition (OD)	-0.61	1.25	-1.11	0.58
IRNASE (63)				
V (RT)	#	#	#	#
Al (AE)	-1.09	2.90 *	1.08	0.34
As (AE)	-0.24	0.73	-0.11	-1.14
B (AE)	#	#	#	#
Ba (AE)	#	#	#	#
Ca (AE)	1.25	1.91	-1.13	0.27
Cd (AE)	1.02	2.48 *	3.09 **	<
Co (AE)	3.43 **	4.60 **	0.57	1.92
Cr (AE)	-0.87	0.35	0.23	-0.43
Cu (AE)	1.98	1.60	1.62	1.99
Fe (AE)	-1.80	1.84	2.32 *	0.84
K (AE)	0.89	0.31	1.93	-4.99 **
Mg (AE)	1.77	0.61	1.44	0.74
Mn (AE)	0.60	1.63	1.03	1.47
N (AE)	0.13	-0.49	-0.59	0.21
Na (AE)	0.19	1.05	4.06 **	-1.84
Ni (AE)	0.63	1.36	1.26	0.82
P (AE)	0.55	1.40	0.82	0.90
Pb (AE)	0.18	0.95	-1.24	0.04
S (AE)	#	#	#	#
Sn (AE)	#	#	#	< #
Sr (AE)	#	#	#	#
Zn (AE)	1.35	1.56	0.64	0.30

(cont)

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Sample	250	264	234	238
IRNASE (63) (cont.)				
loss-on-ignition (OD)	-1.42	-1.11	-1.05	0.12
HILA (79)				
As (AE)	-0.09	-0.11	-0.12	-0.50
Ca (AE)	2.07 *	0.05	0.99	1.61
Cd (AE)	-1.18	0.26	-0.53	<
Cr (AE)	0.84	1.39	1.53	0.77
Cu (AE)	3.54 **	1.00	0.45	0.64
Fe (AE)	-1.54	0.78	1.18	0.42
K (AE)	4.07 **	3.14 **	3.35 **	2.05 *
Mg (AE)	2.89 *	0.95	2.00	1.87
Mn (AE)	-0.22	0.53	-0.13	0.06
Mo (AE)	0.81	0.72	0.58	0.48
Na (AE)	1.92	4.19 **	8.18 **	0.66
Ni (AE)	-0.31	0.81	0.95	1.42
P (AE)	0.89	1.54	1.95	3.23 **
Pb (AE)	0.50	0.57	-	0.23
V (AE)	#	#	#	#
Zn (AE)	-1.16	2.63 *	0.64	1.18
RIOJALAB (98)				
C (RT)	#	#	#	#
Cd (AE)	-1.74	-1.19	0.20	-0.93
Cr (AE)	1.63	1.08	1.98	2.04 *
Cu (AE)	2.84 *	0.34	0.67	1.21
Hg (AE)	-1.15	7.68 **	-0.47	-1.31
N (AE)	1.18	-0.18	-0.83	2.48 *
Ni (AE)	1.06	0.75	2.23 *	2.14 *
Pb (AE)	3.11 **	1.39	0.38	-0.87
Zn (AE)	0.42	-1.09	-0.62	0.29
loss-on-ignition (OD)	-0.73	-0.84	0.89	0.11
ELML (657)				
S (RT)	#	#	#	#
Al (AE)	4.42 **	-0.40	0.20	-0.64
As (AE)	1.39	0.35	0.58	4.28 **
B (AE)	#	#	#	#
Ba (AE)	#	#	#	#
C (AE)	#	#	#	#
Ca (AE)	3.83 **	-0.03	0.31	1.87
Cd (AE)	0.17	-2.04 *	-1.21	-0.64
Co (AE)	-3.95 **	-4.88 **	-5.28 **	-0.65
Cr (AE)	-2.13 *	-1.92	-1.94	-0.01
Cu (AE)	0.97	-0.44	0.39	1.26
Fe (AE)	0.71	-1.22	-0.87	-0.75
Hg (AE)	-0.84	-3.65 **	0.15	1.83
K (AE)	0.63	-0.02	-0.52	1.83
Mg (AE)	1.17	-0.58	-0.42	0.82
Mn (AE)	1.11	-0.26	0.56	0.90
Mo (AE)	-3.03 **	-1.78	-2.23 *	-1.10
N (AE)	-0.52	-1.02	-1.46	-0.19
Na (AE)	1.48	0.10	0.20	-0.18
Ni (AE)	-2.98 *	-2.40 *	-3.62 **	-0.20
P (AE)	-1.11	-2.53 *	-2.94 *	59.71 **
Pb (AE)	-6.92 **	-3.72 **	-1.32	-0.96
loss-on-ignition (OD)	-0.45	1.84	1.99	1.52
PASCAnalab (870)				
Ca (AE)	1.55	0.02	0.31	-0.18
Cu (AE)	-1.91	0.14	-0.44	-0.12
Fe (AE)	-0.03	0.61	-0.01	0.08
K (AE)	0.71	-1.67	0.65	-0.07
Mg (AE)	0.22	-1.25	-0.95	0.20
Mn (AE)	-0.89	-0.74	-0.59	-0.22
N (AE)	0.41	0.45	0.06	-0.88
P (AE)	-0.14	-0.68	-0.71	-0.28

(cont)

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Sample	250	264	234	238
PASCAnalab (870) (cont.)				
Zn (AE)	-3.01 **	-0.09	-0.80	0.08
loss-on-ignition (OD)	1.33	2.19 *	2.09 *	3.28 **
LABAMB (878)				
Ag (AE)	#	< #	< #	< #
Al (AE)	-0.87	-0.38	-0.51	-0.93
As (AE)	-2.75 *	-0.68	-1.23	<
B (AE)	#	#	#	#
Ba (AE)	#	#	#	#
Be (AE)	#	#	#	< #
C (AE)	#	#	#	#
Ca (AE)	-0.92	-2.05 *	-2.49 *	-2.75 *
Cd (AE)	-1.68	-0.48	-2.34 *	<
Co (AE)	-1.91	-0.94	-2.88 *	<
Cr (AE)	-0.98	-0.77	-0.93	-0.94
Cu (AE)	-6.17 **	-1.83	-2.62 *	-1.43
Fe (AE)	-3.08 **	-0.57	-3.14 **	-1.76
Hg (AE)	-1.26	26.03 **	-0.70	<
K (AE)	-0.95	-1.44	-0.46	-1.73
Li (AE)	#	#	#	#
Mg (AE)	-1.87	-1.78	-1.77	-1.51
Mn (AE)	-2.10 *	-1.58	-2.06 *	-1.27
Mo (AE)	-1.49	-0.45	-1.63	-0.64
N (AE)	-1.14	1.72	1.58	-2.40 *
N - NO3 (as N) (AE)	#	#	#	#
Na (AE)	-1.90	-1.32	0.96	-1.65
Ni (AE)	-2.37 *	-0.70	-2.17 *	-2.29 *
P (AE)	-3.55 **	-2.46 *	-4.57 **	-3.01 **
Pb (AE)	-2.89 *	-1.47	-1.33	-1.15
S - SO4 (as S) (AE)	#	#	#	#
Sb (AE)	#	#	#	< #
Se (AE)	#	#	#	#
Sn (AE)	#	#	#	#
Sr (AE)	#	#	#	#
Ti (AE)	#	#	#	#
Tl (AE)	#	< #	< #	< #
V (AE)	#	#	#	#
Zn (AE)	-2.98 *	-1.38	-2.11 *	-3.72 **
loss-on-ignition (OD)	1.66	1.15	-0.30	0.12
CRC (884)				
C (RT)	#	#	#	#
As (AE)	-2.66 *	-0.61	-0.50	<
Ca (AE)	0.58	0.73	1.25	0.63
Cd (AE)	-0.83	<	<	<
Cr (AE)	0.24	0.68	0.75	1.79
Cu (AE)	0.34	-1.18	-0.64	-0.91
Hg (AE)	-0.65	<	<	<
K (AE)	1.79	1.00	2.79 *	-2.62 *
Mg (AE)	2.03 *	0.10	1.28	0.66
N (AE)	-3.90 **	-4.19 **	-4.50 **	-4.57 **
Ni (AE)	-1.48	-0.70	-1.02	4.66 **
P (AE)	0.89	0.89	0.95	1.51
Pb (AE)	-2.08 *	1.37	-0.73	0.89
Se (AE)	#	< #	< #	< #
Zn (AE)	-1.55	-0.58	-0.78	-0.03
NRM (1002)				
Al (AE)	0.04	-1.48	-0.69	-1.19
As (AE)	0.35	1.06	2.16 *	-2.06 < *
B (AE)	#	#	#	#
Ba (AE)	#	#	#	#
Be (AE)	< #	< #	< #	< #
C (AE)	#	#	#	#
Ca (AE)	1.51	3.29 **	2.13 *	0.98
Cd (AE)	-0.62	-1.59	-1.43	-1.43 (cont)

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Sample	250	264	234	238
NRM (1002) (cont.)				
Co (AE)	-3.42 **	-3.04 **	-2.88 *	-2.75 *
Cr (AE)	-0.46	-1.67	-0.90	-0.14
Cu (AE)	5.09 **	3.59 **	4.00 **	3.44 **
Fe (AE)	0.88	-0.44	-0.18	-1.25
Hg (AE)	-12.98 **	-9.46 **	-11.93 **	-3.62 < **
K (AE)	-1.21	-0.37	-0.90	1.32
Mg (AE)	2.19 *	1.45	0.47	1.28
Mn (AE)	1.04	1.32	0.65	1.03
Mo (AE)	-2.53 *	-0.67	-1.71	-0.92
N (AE)	-1.81	-0.49	-0.13	-2.41 *
Na (AE)	0.49	-0.18	-1.31	1.26
Ni (AE)	0.63	-1.10	-0.19	0.69
P (AE)	-1.71	0.25	-0.73	0.63
Pb (AE)	0.02	-1.55	10.03 **	2.08 *
S (AE)	#	#	#	#
Sb (AE)	#	#	#	< #
Se (AE)	#	#	#	#
Sn (AE)	#	#	#	#
Tl (AE)	< #	< #	< #	< #
V (AE)	#	#	#	#
Zn (AE)	2.82 *	-2.32 *	-1.67	-2.29 *
loss-on-ignition (OD)	4.09 **	1.94	5.10 **	7.14 **
LABZIB (1013)				
K (RT)	#	#	#	#
Mg (RT)	#	#	#	#
N (AE)	-2.11 *	-0.22	1.54	-2.96 *

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