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The Laboratory Methods and Data Exchange Programme

Interim Report on the Exchange Round 86-1

L.K. Pleijsier

INTERNATIONAL SOIL REFERENCE AND INFORMATION CENTRE

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1 Introduction

As described in Interim report 85-1 the objectives of the Laboratory Exchange Programme are: a) to reduce the large variability in soil analytical data and b) to provide a reference base for soil laboratories.
In the exchange round 86-1 the participating laboratories analysed 10 soil samples, sent to them by ISRIC, for texture, pH, exchangeable cations and CEC. The participants were asked to follow the analytical procedures as provided by ISRIC. These procedures are given in paragraph 2 of this report. In a few cases participants were not able to follow these procedures and used their own instead. The figures resulting from these analyses have been kept separate from the other figures.
In paragraph 3 a short description is given of the soil samples.
The main objective of this report is to give an overview of the data of the Labex exchange round 86-1 received at ISRICup to the 3rd week of July 1986. It will enable participants to compare their own results against those of others, not too long after having submitted them. Some simple statistics have been applied to indicate outlying values and outlying laboratories. These calculations have been explained in paragraph 4.
The results are given here without comments, except for some short prelimnary conclusions. It is up to the participants to see what their figures look like. A more in depth-treatment of the data will appear in due time.
In the Labex programme the number of participating laboratories is 89. All are listed in the annex. For various reasons, but probably mainly because of the workload, only 49 of them were able to produce their data of 86-1 before July 25th.
For good order we mention that the order of listing in the annex does not correspond with the numbering of the laboratories in the tables with the data.

2 Analytical Procedures

Particle Size Analysis

1.1 Apparatus

1.1.1 Water bath
1.1.2 Hot plate
1.1.3 Reciprocating shaking machine
1.1.4 50 micron sieve
1.1.5 Glass sedimentation cylinders, marked at 1 litre (1 l measuring cylinders can be used)

1.1.6 Drying oven
1.1.7 Moisture tins
1.1.8 Pipet 20 ml

1.2 Reagents

1.2.1 H_2O_2 30%
1.2.2 Acetate buffer solution ca. 1M.
Dissolve 136 g Na-Acetate.3 H_2O in approx. 0.9 l water. Adjust to pH 5.0 with approx. 50 ml glacial acetic acid (use pH meter). Make to 1 l.
1.2.3 Dispersion agent
Sodium pyrophosphate solution 5%
Dissolve 50.0 g $Na_4P_2O_7.10\ H_2O$ in water in 1 l volumetric flask and make up to volume.
Alternatively: Sodium hexa meta phosphate solution 3%
Dissolve 30.0 g $(NaPO_3)_6$ in water in a 1 l volumetric flask and make up to volume.

1.3 Procedure
A distinction is made on the basis of the presence or absence of calcite: 1. Calcareous soils : pH-H_2O > 6.8
2. Non-calcareous soils : pH-H_2O <= 6.8

1.3.1 Calcareous soils (removal of carbonate)

1.3.1.1 Weigh out approx. 20 g fine earth into a 1 l beaker (at carbonate contents exceeding 10%, weigh out proportionally more soil)
1.3.1.2 Add approx. 100 ml buffer solution and heat on water bath (100°C). After effervescence has stopped, add increments of approx. 25 ml buffer until effervescence does not recur after addition of new buffer. In case of very high carbonate contents, 5 ml increments of glacial acetic acid can be used instead of buffer. In this case the pH should be monitored with calibrated indicator paper.
1.3.1.3 Centrifuge and decant or let stand overnight and siphon off the supernatant solution.
1.3.1.4 Add approx. 250 ml (when centrifuging) or 500 ml (when siphoning) of water and repeat 3. In case of (partial) peptization, add a few ml saturated NaCl solution.
Note: This washing procedure is to remove calcium acetate from the suspension as this may be transformed into the insoluble calcium oxalate during the ensuing oxidation procedure.
1.3.1.5 Proceed with oxidation of organic matter.

1.3.2 Non-calcareous soils

1.3.2.1 Weigh out approx. 20 g of soil into a 1 l beaker
1.3.2.2 Add 15 ml water
1.3.2.3 Proceed with oxidation of organic matter.

1.3.3 Oxidation of organic matter

1.3.3.1 Add 15 ml H_2O_2 30%
1.3.3.2 Let stand overnight. In case of strong frothing place beaker in basin with cold water. In addition frothing can

be tempered by adding a few drops of alcohol.

1.3.3.3 The next day place beaker on a warm water bath (approx.80°C) and regularly add small increments of H_2O_2 30% until decomposition of organic material has been completed (usually supernatant is clear then).

1.3.3.4 Add H_2O to a volume of approx 300 ml.

1.3.3.5 Place on hot plate and boil for 1 hour to remove any remaining H_2O_2.

1.3.3.6 Remove beaker from hot plate and allow to cool.

1.3.3.7 Centrifuge and decant or allow material to settle in the beaker and siphon off.

1.3.3.8 Add approx. 300 ml water and redisperse sediment.

1.3.3.9 Repeat .7 and .8 until peptization is achieved. Should this take more than 4 washings then add a few ml saturated NaCl solution to promote peptization. With gypsiferous soils many washings are sometimes needed to dissolve all the gypsum.

1.3.4 Dispersion

1.3.4.1 Transfer suspension quantitatively to a 1 l polythene bottle.

1.3.4.2 Add 25.00 ml dispersing agent, make up the volume to approx. 400 ml water and cap the bottle.

1.3.4.3 Shake overnight (16 hours) on a reciprocating shaker at 125 str./min.

1.3.5 Separation of fractions

1.3.5.1 Pass the suspension trough a 50 micron sieve which is placed in a funnel positioned above a sedimentation cylinder with a lab stand. Use a small brush or policeman with rubber slap.

1.3.5.2 Make up to the 1 l mark with H_2O.

1.3.5.3 Wash the sand fraction remaining on the sieve into a tared porcelain dish, evaporate on waterbath and dry at 105 °C.

1.3.5.4 Weigh with 0.01 g accuracy (wt. A sand fraction)

1.3.6 Determination of silt and clay

1.3.6.1 Close the sedimentation cylinder with a rubber stopper and shake well.

1.3.6.2 Place the cylinder on the table, remove stopper and immediately pipette 20 ml from the centre of the cylinder (see note).

1.3.6.3 Transfer the aliquot to a tared moisture tin, dry overnight at 105 °C.

1.3.6.4 Remove tin from drying oven, close with lid and cool in dessicator. Weigh with 0.01 g accuracy (wt. B for fraction < 50 micron).

1.3.6.5 Again stopper the cylinder and shake well.

1.3.6.6 Place the cylinder on a vibration-free table under the pipette-assembly.

1.3.6.7 After 5 minutes pipette 20 ml at depth indicated in table 1.

1.3.6.8 Transfer aliquot to tared moisture tin, dry overnight at 105°C.

1.3.6.9 Remove tin from drying oven, close with lid and cool in dessicator. Weigh with 0.001 g accuracy (wt. C for fraction < 20 micron).

1.3.6.10 Repeat .5 and .6

1.3.6.11 After 5.5 hours pipette 20 ml at a depth indicated in table 1.

1.3.6.12 Transfer aliquot to tared moisture tin, dry overnight at 105 °C and weigh with 0.001 g accuracy (wt. D for fraction < 2 microns).

1.4 Calculation

The calculation base is the oven dry sample weight after all the treatments. It is obtained by summation of all individual fractions:

clay (<2 micron) = (D * 50) - 0.75 g (wt. K)
silt (2-20 micron) = (C * 50) - 0.75 g - K (wt. L)
silt (20-50 micron) = (B * 50) - 0.75 g - K - L (wt. M)
sand (50-2000 micron) = wt. A

0.75 g = correction for dispersing agent

Sample weight = K + L + M + A

The proportional amounts (in %) of the fractions are now calculated by:

% clay (<2 micron) = (K/sampleweight) * 100
% silt (2-20 micron) = (L/sampleweight) * 100
% silt (20-50 micron) = (M/sampleweight) * 100
% sand (50-2000 micron) = (A/sampleweight) * 100

Note: When a 20 ml pipette is not available, a 25 ml one can be used. In that case the multiplication factor of 50 should be changed into 40.

Table 1 Depth (in cm) at which fraction <20 micron and <2 micron are pipetted as a function of the temperature and after indicated settling time

Temperature °C	5 mins. <20 micron	5.5 hours <2 micron
15	9.6	6.2
16	9.8	6.4
17	10.1	6.6
18	10.3	6.7
19	10.6	6.9
20	10.9	7.1
21	11.1	7.2
22	11.4	7.4
23	11.7	7.6
24	12.0	7.8
25	12.2	8.0

pH-H_2O and pH-KCl

2.1 Apparatus

2.1.1 pH meter with appropriate electrode(s)
2.1.2 Reciprocating shaking machine
2.1.3 Polythene bottles, 100 ml wide mouth (or equivalent)

2.2 Reagents

2.2.1 Potassium Chloride 1 M.
2.2.2 Buffer solutions pH 4.0, 7.0, and 10.0 (or 9.0).

2.3 Procedure

2.3.1 Weigh 20.0 g fine earth into 100 ml polythene bottle.
2.3.2 Add 50 ml liquid and cap the bottle.
2.3.3 Shake for 2 hours.
2.3.4 Calibrate pH meter with buffer solutions
2.3.5 Before opening the bottles for measurement, shake by hand.
2.3.6 Immerse electrode(s) in upper part of suspension.
2.3.7 Read pH when reading has stabilized.

Note: After pH-H_2O measurement, also measure the electrical conductivity of this extract for exchangeable bases determination (to decide whether or not prewashing is required. See procedure for CEC).

Cation Exchange Capacity and Exchangeable Bases (I)
(using percolation tubes)

Principle
The sample is percolated with ammonium acetate and the exchangeable bases are measured in the percolate. The excess salt is washed out with ethanol and the adsorbed ammonium is exchanged by potassium. This ammonium is determined by the distillation method as a measure for the CEC.

3.1 Apparatus

3.1.1 Percolation tubes, 2-2.5 cm diameter
3.1.2 Distillation unit or steam distillation unit
3.1.3 Burette
3.1.4 Various glassware

3.2 Reagents

3.2.1 Ammonium acetate solution, 1 M, adjusted to pH 7.0
3.2.2 Potassium chloride solution, 1 M, acidified with 50 ml 1 M HCl per litre
3.2.3 Ethanol, 96%
3.2.4 Ethanol, 48% (ethanol 96%, diluted 1:1 with water)
3.2.5 Celite or ignited and washed sea-sand (e.g. Baker 0252)
3.2.6 Cotton wool
3.2.7 Sodium hydroxide solution, 35%

3.2.8 Boric acid solution, 2%
3.2.9 Standard hydrochloric acid, 0.010 M
3.2.10 Mixed indicator solution:
Dissolve 0.13 g of methyl red and 0.20 g of bromocresol green in 200 ml of 95% ethanol.

3.3 Procedure

3.3.1 Preparation

3.3.1.1 'Close' the bottom of the percolation tube with some cotton wool, compress with a plunger. Add a spoonful of sea-sand or celite (giving a layer of about 0.5 cm thick).
3.3.1.2 Weigh 5 g of sample (accuracy 0.01 g) into a porcelain dish, add approx. 10 g of sea-sand or 3 g of celite (here sea-sand is preferred because of its higher specific density) and mix well with a spatula.
3.3.1.3 Transfer quantitatively to the percolation tube. Include a blank (sand or celite without sample).

3.3.2 Prewashing
If $EC_{2.5}$ > 0.5 mS apply prewashing
If $EC_{2.5}$ <= 0.5 mS omit prewashing
Prewash by percolating with 100 ml ethanol 48%

3.3.3 Saturation with Ammonium

3.3.3.1 Percolate with 100 ml NH_4Ac 1 M, pH 7, collect percolate in 100 ml volumetric flask.
3.3.3.2 Make to volume with NH_4Ac 1 M and measure exchangeable K, Na, Ca and Mg.

3.3.4 Removal of excess Ammonium
Percolate with 100 ml ethanol 96%, discard percolate.

3.3.5 Exchange of Ammonium

3.3.5.1 Percolate with 100 ml acidified KCl 1 M solution, collect percolate in 100 ml volumetric flask.
3.3.5.2 Make to volume of percolate with water to 100 ml in volumetric flask.

3.3.6 Distillation of Ammonium

3.3.6.1 Transfer a suitable aliquot of percolate (e.g. 10 or 25 ml) to the distillation flask. Increase the volume to 150 - 200 ml with water and add a little granulated pumice.
3.3.6.2 Add 5 ml 35% NaOH solution to the distillation flask and distill for about 7 mins. boiling time into the boric acid (outlet submerged).
3.3.6.3 Titrate distillate with 0.010 M HCl until the colour changes from green to pink.

3.4 Calculation
Calculate the exchangeable bases and the CEC in meq/100 g oven dry sample from the concentrations of the bases and the ammonium found. Derive the base saturation in % of the CEC.

Note: All percolations should be made at a rate of 100 ml in 2 hours (approx. 20 drops/min.).

Remarks:-Various types of tube may serve as percolation tube, e.g. glass, plastic, syringes, used analytical concentrate ampoules. They can also be made of straight glass or plastic tubes fitted with a perforated stopper and narrow tube as outlet.

Cation Exchange Capacity and Exchangeable Bases (II)
(using automatic extractor)

Principle
The sample is extracted with ammonium acetate and the exchangeable bases are measured in the extract. The excess salt is washed out with ethanol amd the adsorbed ammonium is exchanged by potassium. This ammonium is determined by the distillation method as a measure for the CEC.

4.1 Apparatus

4.1.1 Automatic extractor (Holmgren et al.,1977, *Soil Sci. Soc. Am.J.* **41**:1207)
4.1.2 Distillation unit or steam distillation unit
4.1.3 Burette
4.1.4 Various glassware

4.2 Reagents

4.2.1 Ammonium acetate solution, 1 M, adjusted to pH 7.0
4.2.2 Potassium chloride solution, 1 M, acidified with 50 ml 1 M HCl per litre
4.2.3 Ethanol, 96%
4.2.4 Ethanol, 48% (ethanol 96%, diluted 1:1 with water)
4.2.5 Celite or ignited and washed sea-sand (e.g. Baker 0252)
4.2.6 Cotton wool and filter pulp
4.2.7 Sodium hydroxide solution, 35%
4.2.8 Boric acid solution, 2%
4.2.9 Standard hydrochloric acid, 0.010 M
4.2.10 Mixed indicator solution:
Dissolve 0.13 g of methyl red and 0.20 g of bromocresol green in 200 ml of 95% ethanol.

4.3 Procedure

4.3.1 Preparation

4.3.1.1 'Close' the bottom of the extraction tube with some cotton wool and approx. 1 g of filter pulp, compress with a plunger.
Add a spoonful of sea-sand or celite (giving a layer of about 0.5 cm thick).
4.3.1.2 Weigh 2.5 g of sample (accuracy 0.01 g) into a porcelain

dish, add approx. 5 g of sea-sand or 1.5 g of celite and mix well with a spatula.

4.3.1.3 Transfer quantitatively to the extraction tube. Include a blank (sand or celite without sample).

4.3.2 Prewashing

If $EC_{2.5}$ > 0.5 mS apply prewashing

If $EC_{2.5}$ <= 0.5 mS omit prewashing

Prewash by extracting with 65 ml ethanol 48%

4.3.3 Saturation with Ammonium

4.3.3.1 Extract with 65 ml NH_4Ac 1 M, pH 7.

4.3.3.2 Transfer extract quantitatively to 100 ml volumetric flask.

4.3.3.3 Make up to the volume with NH_4Ac 1 M and measure exchangeable K, Na, Ca and Mg.

4.3.4 Removal of excess Ammonium

Extract with 65 ml ethanol 96%, discard extract.

4.3.5 Exchange of Ammonium

4.3.5.1 Extract with 65 ml acidified KCl 1 M solution, transfer extract in 100 ml volumetric flask.

4.3.5.2 Make to volume of with water to 100 ml in volumetric flask.

4.3.6. Distillation of Ammonium

4.3.6.1 Transfer a suitable aliquot of extract (e.g. 10 or 25 ml) to the distillation flask. Increase the volume to 150 - 200 ml with water and add a little granulated pumice.

4.3.6.2 Add 5 ml 35% NaOH solution to the distillation flask and distill for about 7 mins. boiling time into the boric acid (outlet submerged).

4.3.6.3 Titrate distillate with 0.010 M HCl until the colour changes from green to pink.

4.4 Calculation

Calculate the exchangeable bases and the CEC in meq/100 g oven dry sample from the concentrations of the bases and the ammonium found. Derive the base saturation in % of the CEC.

Note: All extractions should be made at a rate of 65 ml in 2 hours.

3 *Soil samples in exchange round 86-1*

sample no.	soiltype	horizon
13	Ferric Acrisol	B2t
29	Humic Ferralsol	A1
30	Humic Ferralsol	B2t
31	Humic Nitosol	A
32	Humic Nitosol	B2t
33	Orthic Solonetz	A
34	Orthic Solonetz	B
35	Ferric Acrisol	B2t
36	Calcaric Fluvisol	C
37	Pellic Vertisol	C

4 *The Data*

4.1 Results and outlying individual data

The results are given in table 2. This table has been divided in subtables for each soil characteristic. The data that were obtained with the analytical procedures from paragraph 2, are given in the first part of the subtable under the heading 'ISRIC"s prescribed analytical methods'. Data obtained with deviating methods are given in the 2nd part of each subtable under the heading 'Other analytical methods'. In each subtable-part the median of the data from each sample is given. The median is the 'half-way'-value. This means that the number of laboratories reporting a lower value equals the number of labs reporting a higher value for that particular soil and soil characteristic. These medians are given in the row marked MED1. Next, this median is subtracted from all the values in its column and from these so-called residuals the absolute value is taken. The median of these absolute residuals is the 'median absolute deviation' or MAD. The MAD's are given in the row marked MAD1. Values in the subtable higher than (MED1 + F*MAD1) or lower than (MED1 - F*MAD1) are marked with a double asterix '**'. Next, these earmarked values are deleted from the subtable and the median and median absolute deviation are calculated again, and given in the rows MED2 and MAD2 respectively. Values differing more than F* MAD2 from MED2 are marked with a single asterix '*'. This factor F intends to earmark 5% of the data in the Gauss-case. F decreases as N, the number of rows in a subtable, increases.
(Dr.M.A.J.v.Montfort,Math.Dept.Agric.Univ.Wageningen,pers.comm.)
Some values of F and N are:

N	10	25	50	100
F	2.1	1.7	1.60	1.58

In the subtables the current value of F is indicated.
In the 3rd part of each subtable the MED's and MAD's calculated on all data are given under the heading 'All methods'.

4.2 Outlying laboratories

Outlying laboratories can be identified by the rank-sum-test for outliers as described by Thompson and Willke(1963) and Youden(1975). In this test the data in a subtable column are replaced by their rank in the column. Rank 1 is given to the lowest value, rank 2 to the one but lowest value etc. and rank N to the highest value, when N is the number of rows. When ties occur ranks are averaged. Rows from which one ore more values are missing, are skipped. Next the ranks in each row are summed. This gives a score for each laboratory and these scores are given in the last column. When M is the number of samples the lowest possible score equals M and the highest possible score is N*M. A laboratory that reports the lowest value on every sample will get the score M. This score is obviously associated with a lab that consistently gets low results and the presumption arises that this lab has a pronounced systematic error. Under the null-hypothesis that no laboratory has a systematic error the scores will cluster round M*(N+1)/2. An upper and a lower limit can be calculated, so that there is a 5% chance that a rank-sum score will fall below the lower limit or will exceed the upper limit, when in reality the null-hypothesis is valid. In table 3 the ranks, rank-sums and upper- and lower-limit are given. Rank-sums outside the upper-lower limit interval are marked with '**'. This is an indication that the laboratories concerned produce figures consistently higher or lower than others. Table 3 gives data for clay%, pH-H_2O and CEC. for these no differentiation has been made to the employed analytical methods

5 Preliminary conclusions

Although the data in this report still have to be subjected to an in-depth statistical analysis it seems justified to conclude at this stage that the variability in the data is still quite large. Also the number of asterisks(outliers) in the tables is quite high. The use of one and the same prescribed method by all participants allows direct comparison of the figures but it has not yet resulted in a reduction of the variability. This can have various causes:
-the description of the methods is not clear
-the methods deviate from participants' usual procedures, thus increasing the analytical error by the analysts' unfamiliarity with them
-the methods are not suitable for all of the soil samples, resulting in erroneous data
This last point touches on the very concept of standardization, one of the objectives of the Labex programme. Perhaps a solution

for this can be found in a differentiation of analytical methods for various types of soil samples.(A number of simple tests, suitable for all soils, should then be available to decide which of the alternative methods has to be applied.)

References:

Thompson, W.A. and T.A. Willke(1963)
'On an extreme rank sum test for outliers'
Biometrika **50**, 3 and 4, p.375

Youden, W.J. (1975)
'Statistical techniques for collaborative tests'
in *Statistical Manual of the Association of Official Analytical Chemists* by W.J. Youden and E.H. Steiner,
AOAC, Arlington, VA, USA

Table 2

CLAY (%)

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
3	37**	53	54	78	88*	35**	47	39**	23**	88
4	31	54	48*	51**	62**	35**	35**	34**	18*	83**
5	31	55	49*	63*	85	23**	44*	36*	17**	87
6	33	44**	48*	63*	67**	29	46	37**	19	86*
7	32	63	57	74	84	31	47	34*	20	88
9	20**	19**	40**	60*	63**	0**	0**	20**	4**	65**
13	33	68	64**	78	87	32*	48*	37**	20	90**
15	26**	55	41**	68*	78*	28*	39**	32**	19	85**
18	32	57	54	77	84	29	46	35	19	89*
19	33	65	59	78	86	31	47	35	20	89*
22	30**	58	39**	73	83	27**	43*	36*	19	87
26	33	67	57	79	87	32**	49*	40**	21*	88
27	33	71**	66**	79	85	28*	46	36*	20	89*
28	32	69*	60	78	87	31	47	35	20	89*
29	38**	58	45*	64*	79*	39**	52**	35	29**	84**
33	33	64	44**	78	88*	30	41**	36	18*	84**
34	30**	19**	8**	42**	65**	30	18**	34**	49**	91**
35	29**	36**	17**	71	62**	27**	44*	34**	16**	83**
37	33	71**	67**	75	85	46**	59**	35	24**	92**
38	31	31**	32**	48**	76**	30	46	36*	21*	95**
42	31	51	48*	59*	82	31	46	35*	18*	88
43	32	62	37**	78	88*	31	48*	35	16**	87
44	38**	60	50*	58*	77*	30	44*	37**	25**	78**
45	32	66	59	76	84	32*	47	36*	20	87
46	54**	46*	36**	51**	28**	46**	46	41**	37**	40**
47	31	50*	49*	44**	49**	26**	39**	33**	18*	87
48	33	59	58	48**	50**	27*	47	35	20	88
53	30*	55	61*	60*	86	29	47	35	20	88
54	31	65	54	76	84	29	45	35	19	87
59	29**	50*	56	50**	79*	29	44*	34*	18*	86*
62	32	56	51*	79	88*	29	49*	35	22*	88
63	37**	-	57	82*	76*	30	43*	39**	21*	96**
65	32	68	68**	81	91**	32*	48*	35	22*	88
68	32	60	56	59*	82	30	46	35*	20	88
76	33	66	59	83*	82	27**	47	36	29**	90**
83	35**	43**	45*	68*	77*	26**	37**	36*	16**	89*
88	32	33**	26**	29**	61**	25**	40**	36	20	76**
92	30	66	58	75	86	28*	43*	34**	22*	77**
93	33	64	61*	55**	83	31	45	35	20	81**
MED1	32.0	58.0	53.5	70.8	83.0	29.7	46.0	35.3	19.9	87.5
MAD1	1.1	7.7	5.9	7.8	4.2	1.5	2.0	0.7	1.5	1.5
MED2	32.0	59.5	56.3	75.3	83.9	29.8	46.4	35.3	19.7	87.6
MAD2	1.0	5.5	2.8	3.8	2.2	0.9	0.9	0.3	0.7	0.6

WITH 39 LABS THE FACTOR F = 1.65

CLAY (%)

Other analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
2	32	65	65	72	85	27	45	35	19	63
23	30	65	53	70	86	28	34	35*	19	85
39	32	46**	45	55	74**	30*	46	35	20	44
41	31	69	68	79	87	27	42	33**	21	90
94	37**	59	52	51	52**	39**	31	41**	24**	64
MED1	31.5	64.6	52.7	69.6	84.5	27.6	41.5	34.9	19.8	64.0
MAD1	0.6	4.5	7.3	8.9	2.8	1.1	4.0	0.3	0.7	19.7
MED2	31.2	64.7	52.7	69.6	85.8	27.4	41.5	34.9	19.5	64.0
MAD2	0.5	2.3	7.3	8.9	1.3	0.5	4.0	0.0	0.5	19.7

WITH 5 LABS THE FACTOR F = 3.03

CLAY (%)

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	31.9	59.0	53.1	70.2	83.0	29.6	45.5	35.3	19.8	87.3
MAD1	1.1	6.9	6.2	8.3	4.3	1.8	1.7	0.7	1.4	2.1
MED2	31.9	60.8	54.0	75.0	84.5	29.6	46.1	35.3	19.7	87.7
MAD2	0.9	5.0	4.5	3.6	2.1	1.2	0.9	0.4	0.7	0.8

WITH 44 LABS THE FACTOR F = 1.63

SILT (%) (2-20 μ)

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
3	1	24	15	9*	3**	10	12	2*	18**	4*
4	2*	21	19	27**	25**	13**	9**	2*	21	8**
5	1	23	28**	24**	8	12**	12	1	22	6
6	1	33**	24*	22**	20**	9	13	0**	22	6
7	1	19	22	13*	6*	11	11	1	19	6
9	16**	44**	15	21**	23**	20**	55**	15**	40**	0**
13	1	17	18	11	7	9	12	1	20	5
15	9**	27*	29**	14*	15**	13**	13	7**	37**	8**
18	1	23	20	11	9	10	12	1	20	5
19	1	15	16	12	8	10	11	1	21	6
22	2*	21	16	14*	10*	11	14**	1	22	6
26	6**	23	28**	11	7	11	12	2	21	5
27	1	15	18	11	8	9	13	2	22	3**
28	2*	16	22	11	7	11	12	1	21	6
29	3**	23	23	23**	15**	3**	7**	3**	5**	12**
33	0**	19	31**	12	8	12*	10**	3**	22	8**

SILT (%) (2-20 µ)

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
34	2*	14*	7**	12	9	9	21**	1	11**	5*
35	5**	9**	6**	13	14**	8**	13	0**	16**	5
38	3**	19	12*	25**	13**	10	14**	1	22	0**
42	2*	30**	28**	15*	9	9	11	1	16**	4*
43	1	16	13	12	7	10	12	2	22	7*
44	10**	20	23	29**	12*	9	14**	3**	20	9**
45	1	16	25*	13	9	10	12	1	19*	6
46	2*	45**	56**	39**	48**	13**	46**	16**	24**	59**
47	0**	31**	30**	29**	33**	7**	18**	2**	18**	5
48	1	22	19	38**	35**	11	13	1	21	3**
53	3**	23	17	23**	8	11	13	2	21	6
54	2*	17	27**	13*	10	11	12	1	21	6
59	1	23	18	26**	15**	10	11	0**	20	6
62	2*	23	15	10	7	7**	8**	1	8**	4*
63	0**	-	24	11	9	14**	17**	0**	20	0**
65	1	16	19	11	4**	9	10*	1	24**	4*
68	1	25	26*	29**	11*	11	13	2*	23**	6
76	1	14*	16	8**	14**	9	11	1	12**	4*
83	2*	26*	15	11	10*	10	11	2*	18**	3**
88	3**	30**	15	31**	17**	15**	16**	2	22	9**
92	3**	4**	1**	3**	3**	3**	2**	1*	2**	3**
93	1	16	20	31**	7	9	8**	3**	31**	5
MED1	1.4	21.0	18.8	13.2	9.2	10.0	12.0	1.4	20.8	5.5
MAD1	0.6	4.7	4.2	2.9	2.4	1.0	1.2	0.6	1.3	1.2
MED2	1.0	20.0	18.3	11.5	7.9	10.0	12.0	1.3	21.0	5.5
MAD2	0.3	3.3	3.3	1.0	1.1	0.9	0.9	0.3	1.0	0.6

WITH 38 LABS THE FACTOR F = 1.65

SILT (%) (2-20 µ)

Other analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
2	2	17	17	14	8	11	12	2	19	20
23	2	17	20	17	7	10	22	3	19	7
39	0	28	14	26	16	12	14	1	24	46
41	1	18	20	11	6	10	14	3	20	4
MED1	1.5	17.4	18.2	15.3	7.4	10.8	13.9	2.3	19.7	13.7
MAD1	0.5	0.6	1.4	3.0	0.6	0.6	0.9	0.3	0.6	7.9
MED2	1.5	17.4	18.2	15.3	7.4	10.8	13.9	2.3	19.7	13.7
MAD2	0.5	0.6	1.4	3.0	0.6	0.6	0.9	0.3	0.6	7.9

WITH 4 LABS THE FACTOR F = 27.28

SILT (%) (2-20 µ)

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	1.4	21.0	18.8	13.6	9.0	10.1	12.1	1.4	20.7	5.8
MAD1	0.6	4.3	4.2	3.2	2.2	1.1	1.2	0.6	1.4	1.4
MED2	1.2	19.7	18.4	11.5	7.7	10.0	12.0	1.3	20.9	5.8
MAD2	0.3	3.3	2.8	1.0	1.0	0.9	0.9	0.4	0.9	0.8

WITH 42 LABS THE FACTOR F = 1.63

SILT (%) (20-50 µ)

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
3	3	9*	11*	6	5*	2	1	1	22	4*
4	7**	11**	14**	12**	9**	7**	5**	6**	31**	5**
5	2	7	8	5	2	2	2	1	26**	2
6	2	7	11*	7	7**	3*	0*	2**	21	3
7	3*	7	11*	6	6**	3*	4*	2**	22	2
9	4**	12**	0**	12**	10**	9**	7**	4**	20	31**
13	2	4	8	4	2	1*	0*	0**	22	1
15	5**	4	4**	10**	2	1*	10**	1*	3**	2
18	2	5	7	4	2	2	2	1	15*	2
19	3	6	9	3	2	2	3*	1	21	1
22	2	4	10	3	2	2	2	1	16	2
26	0**	0**	5*	3	2	1*	0	0**	19	3
27	3	3*	5*	3	4*	2	1	1	24**	4**
28	2	4	8	4	2	1	1	1	21	1
29	1**	6	8	5	2	3	7**	1	5**	0**
33	1**	5	11*	2**	0**	1*	1	1	18	3*
34	2	6	7	7	4*	2	15**	2**	2**	0**
35	3*	3**	7	7	10**	5**	5**	2**	19	8**
38	4**	9*	9	5	4*	3*	1	1	22	0**
42	8**	9*	15**	25**	5*	2	4*	6**	37**	4**
43	3	6	8	3	1*	2	2	1	14**	2
44	16**	8*	14**	5	4*	5**	7**	15**	16	4*
45	0**	5	3**	3	3	0**	2	0**	17	2
46	3	5	6*	8*	23**	2	5**	14**	11**	0**
47	2	11**	8	19**	15**	2	2	0*	18	3
48	1*	5	8	6	12**	1**	1	1	19	5**
53	2	7	5*	9**	3	2	2	1	22	3
54	2	5	8	3	3	1**	2	1	16	3
59	7**	13**	10	9**	2	2	4*	2*	19	3*
62	2	6	8	4	1*	5**	4*	1	29**	4*
63	2	-	5*	0**	11**	2	0*	0**	20	0**
65	1**	3**	3**	1**	1*	2	1	1*	11**	2
68	4**	7	10	6	3	2	2	3**	24*	3
76	3	9*	1**	2*	0**	1*	1	0*	0**	2
83	4**	9*	9	7	5*	2	3*	1	19	3

SILT (%) (20-50 µ)
ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
88	3	6	9	8*	2	1**	1	2*	16	2
92	3	21**	28**	17**	9**	11**	12**	2*	40**	17**
93	1**	2**	1**	0**	0**	0**	0*	0**	2**	0**
MED1	2.5	6.1	8.1	5.1	2.9	2.0	2.0	1.0	19.0	2.3
MAD1	0.8	1.8	2.2	2.0	1.5	0.7	1.5	0.6	3.0	1.1
MED2	2.2	5.9	8.2	4.8	2.4	2.0	1.5	1.0	19.2	2.0
MAD2	0.5	1.2	1.1	1.5	0.7	0.4	0.7	0.3	2.3	0.7

WITH 38 LABS THE FACTOR F = 1.65

SILT (%) (20-50 µ)
Other analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
2	29	10	12	9	6	8	7	26	58	5
23	2	4	13	6	3	3	5	62	27	4
39	3	7	10	11	5	0	0	2	18	4
41	4	3	3	5	3	2	3	2	29	2
MED1	3.5	5.4	11.0	7.7	3.8	2.2	4.0	14.0	28.2	4.0
MAD1	0.9	2.1	1.2	2.2	1.1	1.3	2.0	12.0	5.5	0.5
MED2	3.5	5.4	11.0	7.7	3.8	2.2	4.0	14.0	28.2	4.0
MAD2	0.9	2.1	1.2	2.2	1.1	1.3	2.0	12.0	5.5	0.5

WITH 4 LABS THE FACTOR F = 27.28

SILT (%) (20-50 µ)
All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	2.7	6.1	8.2	5.3	2.9	2.0	2.0	1.0	19.2	2.6
MAD1	0.8	1.9	2.5	2.2	1.5	0.7	1.6	0.7	3.2	1.0
MED2	2.7	5.6	8.3	4.8	2.5	2.0	1.5	1.0	19.2	2.2
MAD2	0.7	1.4	1.3	1.5	0.6	0.4	1.0	0.5	2.3	0.6

WITH 42 LABS THE FACTOR F = 1.63

SAND (%)

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
3	59**	14	20*	7	4	53**	40	58**	37	4
4	60**	14	19*	10**	4	45**	51**	58**	30**	4
5	66	15	15	8*	5**	63**	42**	62	35	5**
6	64	16*	17*	8*	6**	59*	41*	61	38	5**
7	63	11	10	7	4	55*	38*	62	39	4*
9	60**	25**	45**	7	4	71**	39	62	37	4
13	64	11	10	7	4	58	40	62	38	4
15	61**	14	27**	8*	5*	57	37**	61*	42	6**
18	65	15	19*	8*	5**	59*	40	63	46**	4
19	64	14	17	7	4	57	39	62	39	4
22	66	17**	35**	10**	5**	60*	41*	62	43*	5**
26	61**	10*	10	7	3**	56*	38*	58**	38	4
27	64	11	11	7	4	60**	40	62	35	3**
28	65	10*	10	7	4	57	39	62	37	4
29	58**	12	23*	8*	4	56*	35**	62	61**	4*
33	66	12	15	8*	5*	58	48**	61*	42	5**
34	66	61**	78**	39**	23**	59*	46**	63	39	5*
35	68**	52**	71**	9**	14**	60*	39	64**	49**	4*
37	65	11	12	8*	5**	48**	30**	60**	44*	3**
38	62*	41**	47**	22**	7**	58	39	62	36	5*
42	59**	11	11	2**	4	57	39	58**	30**	4*
43	64	17**	42**	7	4	58	38*	63	48**	4*
44	32**	10**	11	7	5**	53**	32**	42**	35	7**
45	67**	13	13	9**	4*	58	40	63	45**	5*
46	41**	4**	3**	3**	2**	40**	4**	30**	28**	1**
47	67**	8**	13	7	3**	65**	42**	63*	45**	4*
48	65	14	16	8*	4	61**	40	63	41	5*
53	65	15	18*	8*	4*	58	39	62	37	4*
54	65	13	12	7	4	59*	41*	62	45**	4
59	64	15	16	16**	4	59*	40	64*	44*	5**
62	65	15*	26**	7	4	60*	40	63	41	4
63	61**	-	14	7	3**	54**	40	61	40	4
65	66	13	11	7	4	58	41	64**	43*	7**
68	63*	9**	8*	6**	4*	57	38*	61*	33*	3**
76	63	11	24**	8*	4*	63**	41*	63	59**	5**
83	64	18**	28**	7	4	60*	37**	62	36	4
88	63*	25**	43**	21**	5**	57	36**	61	30**	4*
92	66	12	13	6**	3*	59	43**	64**	35	3**
93	50**	13	12	10**	4	57	37**	63	35	4
MED1	64.0	13.2	15.6	7.3	4.1	57.7	39.6	62.0	38.5	4.1
MAD1	1.7	2.0	4.9	0.7	0.4	1.6	1.4	1.0	3.5	0.4
MED2	64.6	12.8	12.6	7.2	4.0	57.7	39.7	62.0	38.0	4.1
MAD2	1.0	1.4	2.5	0.2	0.2	0.7	0.7	0.6	2.7	0.1

WITH 39 LABS THE FACTOR F = 1.65

SAND (%)

Other analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
2	38**	8	6	5	2*	54	36	37**	4**	12*
23	65	15	15	8	4	60	39	0**	34	5
39	65	18	30	8	4	58	40	62	39	6
41	63	10	9	6	3	60	41	62	30	3
94	58*	24	28	30**	18**	54	36	58*	38	18**
MED1	62.7	14.7	15.0	7.5	4.3	57.7	39.0	58.0	34.0	5.6
MAD1	2.8	5.0	8.9	1.8	1.1	2.5	2.2	4.3	4.1	2.5
MED2	63.8	14.7	15.0	6.6	3.7	57.7	39.0	61.7	36.0	5.2
MAD2	1.4	5.0	8.9	1.0	0.6	2.5	2.2	0.6	2.3	1.3

WITH 5 LABS THE FACTOR F = 3.03

SAND (%)

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	63.8	13.5	15.4	7.4	4.1	57.7	39.4	61.9	38.2	4.2
MAD1	1.8	2.5	5.0	0.6	0.4	1.8	1.5	1.0	3.5	0.4
MED2	64.4	12.8	12.6	7.2	4.0	57.8	39.7	62.0	38.0	4.1
MAD2	1.0	1.8	2.5	0.2	0.2	0.8	0.7	0.5	2.5	0.3

WITH 44 LABS THE FACTOR F = 1.63

pH–H_2O

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
2	4.9	6.2**	4.8**	5.8**	5.8**	8.4*	8.0	4.9	8.4	8.5*
3	4.8	4.8	5.6	5.5	6.2	8.4*	8.1**	4.8	8.3	8.4
4	4.7	4.7	5.3*	5.5	6.0	8.2	7.8*	4.7**	8.3	8.4
5	4.8	4.8	5.6	5.6	6.3	8.3	8.0	4.9	8.4	8.4
6	4.7	4.6	5.4*	5.5	6.1	8.3	8.0	4.8	8.3	8.4
7	4.8	4.7	5.8	5.6	6.4*	8.2	7.8*	4.8	8.1*	8.4
9	4.6**	4.4**	5.5	5.3**	5.9*	8.1*	7.6**	4.7**	8.0**	8.2**
13	4.5**	4.5**	5.0**	5.3**	5.9*	7.9**	7.8*	4.8	7.9**	8.2**
15	4.8	4.8	5.6	5.6	6.2	8.5**	8.0	4.8	8.7**	8.6**
18	4.8	4.8	5.6	5.6	6.0	8.2	8.0	4.9	8.4	8.6**
19	4.7	4.7	6.0**	5.6	6.3	8.2	8.0	4.8	8.3	8.2**
22	4.8	4.8	5.3*	5.5	6.3	8.4*	8.1**	4.9	8.4	8.4
26	4.9*	4.9**	5.8	5.5	6.3	8.1*	7.6**	4.8	8.4*	8.2**
27	4.5**	4.6	5.3*	5.4*	5.9*	7.8**	7.6**	5.0	8.0**	8.1**
28	4.9	4.8	5.8	5.6	6.3	8.3	8.1**	4.8	8.5*	8.6**
29	4.6**	4.6	5.2**	5.3**	5.9*	8.0*	8.0	4.6**	8.0**	8.3*

pH–H_2O

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
30	4.7	4.7	5.8	5.5	6.2	8.3	8.0	4.9	8.2	8.4
31	4.7	4.6	5.4*	5.5	6.0	8.0*	7.7**	4.8	8.0**	8.2**
32	4.8	4.8	5.6	5.6	6.2	8.4*	8.0	4.9	8.4	8.5*
33	4.9	4.8	5.7	5.7	6.4*	8.3	8.1**	4.9	8.4	8.5*
35	4.4**	4.5**	5.2**	5.2**	5.5**	7.8**	7.7**	4.4**	7.6**	7.8**
36	4.7*	4.7	5.9*	5.6	6.0	8.1*	7.9	4.9	8.3	8.4
37	4.9*	4.9**	5.6	5.8**	6.4	8.3	8.0	5.0	8.4	8.5*
38	4.3**	4.3**	5.2**	5.0**	5.6**	7.8**	7.4**	4.7**	7.4**	7.7**
39	4.3**	4.4**	5.0**	5.4*	5.8**	7.9*	8.1**	4.6**	8.2*	8.3*
42	4.8	4.8	5.8	5.7	6.4*	8.5**	8.2**	5.0	8.6**	8.7**
43	5.0**	4.9**	5.8	5.7	6.4*	8.2	7.9*	5.1**	8.2	8.3*
44	4.5**	4.5**	5.5	5.0**	5.5**	7.5**	7.5**	5.0	7.5**	7.5**
45	4.9	4.8	6.0**	5.7	6.2	8.2	7.9*	4.9	8.3	8.4
46	5.4**	5.0**	5.8	5.4*	5.7**	7.2**	7.0**	7.2**	7.7**	7.8**
47	5.5**	5.6**	6.1**	5.9**	6.7**	7.3**	7.2**	5.9**	7.7**	7.8**
48	4.4**	4.6	5.8	5.1**	5.9*	7.7**	7.5**	5.0	7.8**	8.0**
49	4.5**	4.7	5.4*	5.4*	5.9*	7.9**	7.9*	4.8	8.1*	8.3*
53	4.8	4.7	5.5	5.5	6.1	8.0*	7.7**	4.8	8.1*	8.1**
54	4.8	4.8	5.5	5.6	6.2	8.4*	8.0*	4.8	8.3	8.5*
59	4.9*	4.8	5.8	5.5	6.3	7.9**	7.6**	5.3**	7.9**	8.2**
60	4.8	4.9**	5.8	5.8**	6.3	8.1*	8.0*	4.9	8.0**	8.3*
62	4.8	4.7	5.7	5.6	6.3	8.3	7.9*	4.9	8.4	8.4
63	4.7	4.6	5.4	5.5	6.1	8.3	7.9*	4.8	8.3	8.4
65	4.9	4.9*	5.6	5.7	6.1	8.2	8.0	5.1**	8.4	8.4
68	4.9	4.9**	5.7	5.6	6.1	8.1*	7.8*	5.0	8.2	8.3*
76	4.8	4.8	5.7	5.6	6.2	8.2	7.9*	4.8	8.3	8.3*
78	4.8	4.6	5.7	5.3**	5.9*	7.9**	7.7**	4.9	7.9**	8.2**
83	4.4**	4.3**	5.3*	5.3**	5.7**	8.3	8.0	4.6**	8.1*	8.4
88	4.8	4.8	5.5	5.6	6.1	8.4*	8.1**	4.8	8.5*	8.6**
92	4.7	4.4**	5.3**	5.1**	5.4**	7.3**	7.1**	5.3**	7.2**	7.6**
93	4.6**	4.6	5.6	5.5	6.3	8.3	8.0	4.9	8.4*	8.4
MED1	4.80	4.71	5.60	5.54	6.15	8.20	7.90	4.90	8.30	8.39
MAD1	0.10	0.11	0.20	0.11	0.16	0.16	0.10	0.10	0.15	0.11
MED2	4.80	4.71	5.62	5.60	6.18	8.25	7.97	4.90	8.32	8.40
MAD2	0.06	0.09	0.13	0.09	0.13	0.05	0.03	0.10	0.08	0.02

WITH 47 LABS THE FACTOR F = 1.62

pH–H_2O

Other analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
23	5.1	4.9	5.7	5.9	5.8	8.1	8.1	5.2	7.9	8.6
41	4.9	4.8	5.6	5.6	6.2	8.2	7.9	4.9	8.2	8.4
MED1	5.00	4.87	5.63	5.73	5.98	8.15	8.02	5.03	8.03	8.51
MAD1	0.10	0.03	0.06	0.16	0.19	0.06	0.08	0.17	0.14	0.08
MED2	5.00	4.87	5.63	5.73	5.98	8.15	8.02	5.03	8.03	8.51
MAD2	0.10	0.03	0.06	0.16	0.19	0.06	0.08	0.17	0.14	0.08

WITH 2 LABS THE FACTOR F = 75.76

pH–H_2O

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	4.80	4.75	5.60	5.55	6.15	8.20	7.94	4.90	8.20	8.40
MAD1	0.10	0.12	0.20	0.10	0.16	0.13	0.14	0.10	0.20	0.10
MED2	4.80	4.79	5.62	5.60	6.17	8.23	8.00	4.90	8.30	8.40
MAD2	0.07	0.09	0.12	0.08	0.13	0.07	0.07	0.10	0.12	0.02

WITH 49 LABS THE FACTOR F = 1.61

pH–KCl

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
2	4.2	4.4	5.8	4.6	5.2	7.1	7.5	4.1	7.5	7.1
3	4.3**	4.5**	5.8	4.7**	5.3**	7.2	7.7*	4.2	7.6*	7.1
4	3.9**	4.1**	5.5**	4.5**	4.9**	6.6**	6.9**	4.1	7.1**	6.7*
5	4.2	4.4	5.8	4.6	5.2	7.2	7.6	4.2	7.5	7.0
6	4.1	4.3	5.7	4.6	5.1*	7.2	7.6	4.0	7.4	6.8*
7	4.0**	4.2**	5.3**	4.5**	5.1*	6.4**	6.7**	3.9**	6.6**	6.4**
9	3.9**	3.2**	5.6	3.5**	5.0**	6.7**	7.1**	4.0	7.1**	6.8*
13	4.1	4.3	4.7**	4.6	5.2	7.0	7.5	4.2	7.4	7.0
15	4.1	4.3	5.5**	4.6	5.2	7.1	7.3*	4.2	7.5	6.8*
18	4.1	4.3	5.7	4.6	5.1*	6.9*	7.2*	4.1	7.3*	6.9
19	4.4**	4.5**	5.7	4.7**	5.2	7.2	7.6	4.4**	7.5	7.0
22	4.2	4.4*	5.9*	4.6*	5.3**	7.2	7.6	4.2	7.6*	7.1
26	4.1	4.2**	5.4**	4.5**	5.0**	6.7**	7.0**	4.1	7.1**	6.5**
27	4.0**	4.2**	5.5**	4.5**	5.0**	6.7**	7.2*	4.0	7.3*	6.9
28	4.1	4.3	5.8	4.6	5.2	7.3	7.6	4.1	7.6*	7.1
29	4.1	4.3	5.7	4.6*	5.1*	7.0	7.5	4.1	7.4	7.4**
30	4.3**	4.4	5.8	4.6	5.2	7.2	7.6	4.2	7.6*	7.1
31	4.0**	4.2**	5.6	4.5**	5.0**	6.8*	7.3*	4.2	7.2*	6.8*
32	4.2	4.3	5.7	4.6*	5.1*	6.8*	7.6	4.1	7.5	6.8*
33	4.2	4.4	5.8	4.6	5.2	7.1	7.5	4.1	7.5	7.1
35	4.1	4.3	5.6	4.6*	4.9**	6.9	7.4	4.0	7.2*	6.7**
36	4.2	4.4	5.8*	4.6*	5.2	7.2	7.5	4.1	7.6*	7.2**
37	4.3**	4.4*	5.8	4.7*	5.2	7.2	7.6	4.3**	7.5	7.1
38	3.6**	3.9**	5.1**	4.1**	4.6**	6.3**	6.6**	3.7**	6.6**	6.3**
39	4.2	4.3	5.6	4.6*	5.1*	6.8*	7.4	4.0	7.3*	6.9
42	4.3**	4.4	5.8	4.6	5.2	7.3*	7.7*	4.2	7.7**	7.2**
43	4.1	4.3	5.6	4.5**	5.1*	6.9*	7.3*	4.0	7.4	6.8*
44	4.0**	4.5**	5.0**	4.5**	5.0**	6.5**	7.0**	4.5**	7.0**	6.5**
45	4.0**	4.3	5.7	4.6	5.1*	7.1	7.4	4.0	7.4	6.9
46	4.4**	4.6**	5.3**	4.8**	5.1*	6.4**	6.6**	4.4**	6.6**	6.5**
47	4.6**	4.8**	5.7	5.0**	5.5**	6.0**	6.0**	4.6**	6.3**	6.2**
48	3.9**	4.1**	5.5**	4.4**	4.9**	6.7**	6.9**	3.9**	6.5**	6.3**
49	4.2	4.5**	5.8	4.7**	5.2	7.2	7.5	4.2	7.5	7.0
53	4.0**	4.2**	5.6	4.5**	5.0**	6.9*	7.3*	4.1	7.2*	6.8*
54	4.1	4.3	5.8	4.6*	5.2	7.2	7.5	4.1	7.5	7.1

pH–KCl

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
59	4.0*	4.2*	5.1**	4.5*	5.0**	7.1	7.1**	4.2	7.0**	7.0
60	4.0*	4.3*	5.6	4.5*	5.0**	6.6**	7.1**	4.1	7.3*	6.8
63	4.2	4.4	5.8	4.6*	5.2	7.0	7.6	4.2	7.4	7.1
65	4.2	4.4	5.8	4.6*	5.2	7.2	7.5	4.1	7.5	7.0
68	4.2	4.4	5.7	4.6	5.2	6.8*	7.3*	4.2	7.2*	6.9
76	4.1	4.3	5.7	4.6	5.2	7.2	7.5	4.1	7.5	7.0
78	4.3**	4.4	5.7	4.7**	5.2	6.8*	7.2*	4.4**	7.2*	7.0
83	4.7**	4.6**	6.0**	4.8**	5.4**	7.7**	7.8**	4.3**	7.4	7.1
88	4.2	4.4	-	4.7*	5.2*	7.1	7.6	4.2	7.6*	7.1
92	3.8**	4.0**	4.8**	4.3**	4.8**	5.9**	6.1**	4.3**	6.1**	6.2**
93	4.1	4.3	5.7	4.6	5.1*	7.1	7.5	4.1	7.4	7.0
MED1	4.15	4.33	5.70	4.60	5.16	7.01	7.43	4.12	7.40	6.94
MAD1	0.07	0.07	0.10	0.05	0.06	0.19	0.17	0.08	0.15	0.15
MED2	4.15	4.34	5.70	4.60	5.20	7.10	7.50	4.10	7.45	7.00
MAD2	0.05	0.04	0.08	0.01	0.02	0.10	0.10	0.08	0.06	0.10

WITH 46 LABS THE FACTOR F = 1.62

pH–KCl

Other analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
23	4.4	4.6	5.8	4.8	5.4	6.9	7.4	4.3	7.4	7.1
41	4.2	4.3	5.6	4.6	5.1	6.8	7.6	4.1	7.5	6.7
MED1	4.28	4.47	5.71	4.69	5.25	6.87	7.48	4.21	7.43	6.92
MAD1	0.12	0.13	0.08	0.11	0.15	0.02	0.09	0.08	0.03	0.18
MED2	4.28	4.47	5.71	4.69	5.25	6.87	7.48	4.21	7.43	6.92
MAD2	0.12	0.13	0.08	0.11	0.15	0.02	0.09	0.08	0.03	0.18

WITH 2 LABS THE FACTOR F = 75.76

pH–KCl

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	4.15	4.33	5.70	4.60	5.16	6.98	7.43	4.13	7.40	6.94
MAD1	0.07	0.07	0.10	0.05	0.06	0.21	0.17	0.07	0.12	0.16
MED2	4.15	4.34	5.70	4.60	5.20	7.08	7.50	4.13	7.46	7.00
MAD2	0.05	0.04	0.08	0.01	0.02	0.12	0.10	0.04	0.07	0.10

WITH 48 LABS THE FACTOR F = 1.61

pH-CaCl$_2$

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
31	4.1	4.2	5.2	4.8	5.5	7.3	7.7	4.0	7.3	7.7
53	4.0	4.1	5.2	4.8	5.5	7.2	7.6	4.1	7.3	7.6
62	4.1	4.2	5.3**	4.9**	5.6**	7.5	7.9	4.1	7.7	7.9
83	3.9	4.1	5.2	4.8	5.5	7.5	7.9	4.0	7.5	7.9
92	3.3**	3.4**	4.1**	4.0**	4.8**	5.6**	5.5**	3.9	5.5**	6.6**
MED1	4.00	4.10	5.20	4.80	5.50	7.30	7.70	4.00	7.30	7.70
MAD1	0.10	0.10	0.00	0.00	0.00	0.20	0.20	0.10	0.20	0.20
MED2	4.05	4.15	5.20	4.80	5.50	7.40	7.80	4.00	7.40	7.80
MAD2	0.05	0.05	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10

WITH 5 LABS THE FACTOR F = 3.03

pH-CaCl$_2$

Other analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
40	4.1	4.2	5.3	4.9	5.6	7.0	7.3	4.2	7.1	7.7
MED1	4.10	4.20	5.30	4.90	5.60	7.00	7.30	4.20	7.10	7.70
MAD1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MED2	4.10	4.20	5.30	4.90	5.60	7.00	7.30	4.20	7.10	7.70
MAD2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

WITH 1 LABS THE FACTOR F = 100.00

pH-CaCl$_2$

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	4.05	4.15	5.20	4.80	5.50	7.25	7.65	4.05	7.30	7.70
MAD1	0.05	0.05	0.05	0.05	0.05	0.25	0.25	0.05	0.20	0.15
MED2	4.10	4.20	5.20	4.80	5.50	7.30	7.70	4.05	7.30	7.70
MAD2	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.05	0.20	0.10

WITH 6 LABS THE FACTOR F = 2.74

Exch.K

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
2	0.09	0.07	0.03**	2.49	0.37	1.06	0.89	0.04*	0.12*	1.21

Exch.K

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
3	0.10	0.08	0.20**	2.40	0.38	1.07	0.91	0.03	0.10	1.22
4	0.06*	0.06	0.02*	2.20*	0.28**	0.72*	0.68**	0.02	0.08*	0.94*
5	0.09	0.08	0.01*	2.52	0.41	1.05	0.94	0.02	0.12*	1.28
6	0.10	0.10*	0.00	2.50	0.40	0.90	0.80*	0.00*	0.10	1.00*
7	0.10	0.20**	0.00	2.60	0.50**	1.00	0.90	0.10**	0.30**	1.40*
9	0.12*	0.11*	0.04**	2.71	0.39	0.43**	0.61**	0.06*	0.13*	0.77**
13	0.07*	0.08	0.00	2.55	0.44*	1.06	0.97	0.00*	0.10	1.31
15	0.10	0.10*	0.04**	2.29	0.39	1.46**	1.25**	0.06*	0.11	1.12
18	0.01**	0.01**	0.01*	2.00**	0.30*	0.80*	0.80*	0.01	0.10	1.00*
19	0.05**	0.05*	0.00	1.29**	0.28**	0.93	1.24**	0.00*	0.29**	1.47*
22	0.21**	0.18**	0.00	2.69	0.37	1.50**	1.46**	0.00*	0.13*	1.70**
26	0.06*	0.28**	0.02*	1.20**	0.28**	0.56**	0.52**	0.02	0.09	0.76**
27	0.18**	0.16**	0.00	13.25**	1.04**	3.17**	3.44**	0.14**	0.40**	4.22**
28	0.18**	0.20**	0.11**	5.30**	0.72**	2.18**	2.21**	0.05*	0.21**	3.17**
29	0.03**	0.03**	0.00	2.07**	0.31*	0.73*	0.86	0.14**	0.16**	1.24
30	0.08	0.07	0.00	2.71	0.38	1.09	1.00	0.02	0.10	1.30
32	0.08	0.06	0.00	2.42	0.36	1.30*	1.10*	0.01	0.10	1.42*
33	0.14**	0.12**	0.09**	2.66	0.41	1.03	0.93	0.07**	0.15**	1.18
35	0.18**	0.13**	0.13**	5.00**	0.68**	1.82**	1.60**	0.04*	0.18**	0.94*
37	0.09	0.08	0.03**	1.84**	0.19**	1.14	1.01	0.03	0.09	1.36
38	0.13**	0.12**	0.07**	2.51	0.41	1.05	0.96	0.05*	0.14*	1.30
39	0.08	0.08	0.00	2.56	0.40	0.75*	0.70*	0.09**	0.11	0.90*
42	0.03**	0.02**	0.00	1.58**	0.21**	0.03**	0.00**	0.00*	0.04**	0.09**
43	0.17**	0.13**	0.09**	2.17*	0.48**	1.28*	1.15*	0.02	0.75**	1.56**
44	0.20**	0.10*	0.10**	1.30**	0.50**	0.90	0.80*	0.10**	0.10	1.00*
45	0.06*	0.06	0.00	2.63	0.37	1.66**	4.28**	0.03	0.11	1.21
46	0.07*	0.06	0.01*	2.30	0.31*	0.78*	0.73*	0.03	0.09	0.85**
47	1.04**	0.17**	0.53**	3.16**	0.11**	1.68**	1.70**	0.11**	0.66**	1.78**
48	0.08	0.08	0.00	2.41	0.38	0.93	0.84	0.01	0.11	1.13
53	0.14**	0.12**	0.02*	5.44**	0.68**	2.03**	1.72**	0.03	0.16**	2.41**
54	0.09	0.07	0.01*	2.54	0.39	0.87	0.78*	0.02	0.10	1.13
59	0.10	0.06	0.00	2.10*	0.49**	1.08	0.87	0.06*	0.16**	1.20
60	0.08	0.07	0.01*	2.53	0.39	1.02	0.95	0.01	0.10	1.14
62	0.09	0.07	0.01*	2.26*	0.37	1.25*	1.15*	0.02	0.11	1.48*
63	0.10	0.17**	0.02*	2.78*	0.40	1.10	0.93	0.03	0.11	1.35
65	0.09	0.07	0.01*	2.26*	0.31*	0.92	0.85	0.02	0.09	1.13
68	0.08	0.06	0.00	2.36	0.38	0.96	0.92	0.02	0.10	1.22
76	0.07*	0.04**	0.00	1.98**	0.36	1.43**	1.47**	0.10**	0.11	1.80**
78	0.04**	0.04**	0.01*	1.19**	0.21**	0.66**	0.57**	0.01	0.06**	0.78**
83	0.13**	0.12**	0.03**	2.90**	0.48**	1.24*	0.99	0.06*	0.14*	1.26
88	0.20**	0.14**	0.09**	2.26*	0.44*	1.66**	1.43**	0.11**	0.33**	1.43*
92	0.10	0.08	0.03**	2.59	0.38	1.45**	1.01	0.17**	0.38**	1.24
93	0.10	0.08	0.00	2.30	0.33*	0.89	0.86	0.05*	0.10	1.02*
MED1	0.09	0.08	0.01	2.45	0.38	1.05	0.93	0.03	0.11	1.22
MAD1	0.02	0.02	0.01	0.22	0.05	0.21	0.14	0.02	0.02	0.20
MED2	0.09	0.07	0.00	2.50	0.38	1.02	0.91	0.02	0.10	1.21
MAD2	0.01	0.01	0.00	0.14	0.02	0.10	0.07	0.01	0.01	0.09

WITH 44 LABS THE FACTOR F = 1.63

Exch.K

Other analytical methods

SAMPLE:	13	29	30	31	32	33	34	35	36	37
LAB:										
23	0.07	0.06	0.01	2.53	0.41	1.10	1.10	0.03	0.11	1.37
41	0.06	0.04	0.00	2.13	0.22	0.74	0.58	0.00	0.12	0.64
49	0.01	0.01	0.00	9.00	0.10	0.20	0.20	0.00	0.01	0.40
94	0.31	0.27	0.14	4.76	0.99	2.15	1.95	0.16	0.31	2.05
MED1	0.06	0.05	0.00	3.64	0.31	0.92	0.84	0.01	0.11	1.00
MAD1	0.03	0.02	0.00	1.31	0.15	0.45	0.45	0.01	0.05	0.48
MED2	0.06	0.05	0.00	3.64	0.31	0.92	0.84	0.01	0.11	1.00
MAD2	0.03	0.02	0.00	1.31	0.15	0.45	0.45	0.01	0.05	0.48

WITH 4 LABS THE FACTOR F = 27.28

Exch.K

All methods

SAMPLE:	13	29	30	31	32	33	34	35	36	37
MED1	0.09	0.08	0.01	2.49	0.38	1.05	0.93	0.03	0.11	1.22
MAD1	0.02	0.02	0.01	0.24	0.06	0.24	0.16	0.02	0.02	0.20
MED2	0.09	0.07	0.00	2.50	0.38	1.02	0.91	0.02	0.10	1.22
MAD2	0.01	0.01	0.00	0.14	0.02	0.11	0.08	0.01	0.01	0.09

WITH 48 LABS THE FACTOR F = 1.61

Exch.Na

ISRIC"s prescribed analytical methods

SAMPLE:	13	29	30	31	32	33	34	35	36	37
LAB:										
2	0.01	0.00	0.03*	0.15**	0.07	4.20	9.60	0.07*	0.04**	7.53*
3	0.05	0.05	0.07**	0.19**	0.15*	3.96	9.08	0.18**	0.00**	6.30**
4	0.04	0.04	0.04*	0.18**	0.10	3.60*	13.00*	0.04	0.26	7.00*
5	0.01	0.02	0.02	0.03	0.06	4.01	10.37	0.00	0.19	8.69
6	0.00	0.00	0.00	0.00*	0.00*	4.20	10.40	0.00	0.20	8.90
7	0.10**	0.20**	0.10**	0.00*	0.10	6.90**	11.70	0.10*	0.30*	4.70**
9	0.14**	0.13**	0.14**	0.30**	0.18*	3.14**	4.98**	0.01	0.24	13.10**
13	0.05	0.03	0.00	0.03	0.07	4.69*	10.90	0.09*	0.18	9.20
15	0.08**	0.14**	0.13**	0.12*	0.20**	3.63	8.40*	0.08*	0.30*	8.78
18	0.01	0.01	0.01	0.01*	0.01*	3.40*	10.50	0.00	0.20	78.70**
19	0.02	0.02	0.00	0.06	0.07	4.89*	4.94**	0.02	0.21	4.07**
22	0.00	0.00	0.19**	0.04	0.00*	7.08**	10.70	0.00	0.04**	10.70*
26	0.06*	0.09*	0.07**	0.09*	0.16*	1.50**	4.07**	0.12**	0.31*	3.47**
27	0.25**	0.40**	0.30**	0.42**	0.45**	9.28**	10.80	0.52**	0.86**	26.00**
28	0.02	0.03	0.02	0.05	0.15*	8.73**	9.39	0.05	0.40**	18.41**
29	0.09**	0.15**	0.09**	0.30**	0.25**	4.50*	8.40*	0.32**	0.45**	8.65
30	0.02	0.01	0.01	0.04	0.07	4.53*	8.79*	0.00	0.17	8.92

Exch.Na

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
32	0.05	0.05	0.05*	0.07	0.08	4.56*	11.81	0.05	0.22	8.67
33	0.06*	0.14**	0.07**	0.09*	0.12*	4.13	26.20**	0.07*	0.28	6.08**
35	1.00**	1.20**	0.86**	0.72**	1.26**	4.00	17.40**	2.40**	3.20**	4.00**
37	0.02	0.06*	0.01	0.02	0.05	4.03	10.45	0.04	0.18	8.53
38	0.06*	0.07*	0.10**	0.12*	0.16*	5.77**	22.59**	0.10*	0.40**	8.78
39	0.00	0.00	0.00	0.05	0.02*	6.45**	4.56**	0.00	0.05**	0.70**
42	0.07*	0.06*	0.05*	0.04	0.06	1.47**	4.42**	0.01	0.15	3.24**
43	0.13**	0.01	0.05*	0.00*	0.12*	4.28	9.68	0.08*	0.01**	9.28
44	0.10**	1.50**	0.60**	1.00**	0.40**	4.70*	14.30**	0.10*	0.40**	8.40
45	0.00	0.00	0.00	0.05	0.09	2.03**	7.71*	0.00	0.20	8.50
46	0.02	0.02	0.01	0.05	0.07	6.18**	8.26*	0.02	0.21	9.40*
47	0.05	0.05	0.05*	0.13*	0.21**	3.77	6.38**	0.05	0.26	11.10**
48	0.05	0.04	0.00	0.03	0.07	3.67	9.43	0.03	0.27	10.04*
53	0.01	0.05	0.01	0.05	0.11	8.30**	23.60**	0.01	0.36*	18.50**
54	0.01	0.01	0.00	0.03	0.06	3.79	8.25*	0.02	0.18	8.44
59	0.00	0.10*	0.00	0.10*	0.55**	4.38	10.37	0.20**	0.61**	10.00*
60	0.00	0.01	0.00	0.11*	0.07	3.83	9.66	0.01	0.28	8.47
62	0.00	0.01	0.00	0.01*	0.03	4.51*	10.70	0.00	0.16	8.76
63	0.02	0.42**	0.02	0.03	0.06	3.87	11.05	0.02	0.22	8.85
65	0.01	0.01	0.02	0.00*	0.00*	3.96	15.48**	0.03	0.16	10.43*
68	0.01	0.01	0.00	0.02	0.04	4.04	11.20	0.01	0.19	9.04
76	0.01	0.01	0.01	0.23**	0.16*	0.61**	3.85**	0.03	1.57**	2.18**
78	0.01	0.01	0.00	0.06	0.03	1.73**	4.67**	0.00	0.29*	3.75**
83	0.06*	0.06*	0.06*	0.06	0.09	4.64*	12.98*	0.06*	0.27	9.86*
88	0.11**	0.12**	0.13**	0.21**	0.18*	5.74**	16.26**	0.13**	3.31**	11.22**
92	0.41**	0.48**	0.37**	1.88**	0.61**	6.33**	13.35*	0.42**	0.61**	8.61
93	1.17**	1.39**	1.39**	1.39**	1.48**	7.83**	11.48	1.39**	1.48**	9.91*
MED1	0.03	0.04	0.02	0.06	0.09	4.20	10.38	0.04	0.25	8.77
MAD1	0.03	0.03	0.02	0.04	0.06	0.51	1.99	0.04	0.07	1.24
MED2	0.02	0.02	0.01	0.04	0.07	4.04	10.40	0.02	0.21	8.78
MAD2	0.02	0.02	0.01	0.02	0.03	0.27	0.97	0.02	0.04	0.31

WITH 44 LABS THE FACTOR F = 1.63

Exch.Na

Other analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
23	0.00	0.00	0.01	0.03	0.06	3.68	11.99	0.03	0.21	9.67
41	0.02	0.02	0.00	0.02	0.05	6.03	23.19	0.00	0.18	9.33
49	0.01	0.00	0.00	0.00	0.00	68.00**	99.00	0.10	0.20	98.00**
94	0.87**	0.04-	0.04	0.04	0.39	4.79	12.18	0.04	0.39	11.31
MED1	0.01	0.01	0.00	0.02	0.05	5.41	17.68	0.03	0.20	10.49
MAD1	0.01	0.01	0.00	0.01	0.03	1.18	5.60	0.02	0.01	0.99
MED2	0.01	0.01	0.00	0.02	0.05	4.79	17.68	0.03	0.20	9.67
MAD2	0.01	0.01	0.00	0.01	0.03	1.11	5.60	0.02	0.01	0.34

WITH 4 LABS THE FACTOR F = 27.28

Exch.Na

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	0.02	0.04	0.02	0.05	0.08	4.24	10.47	0.04	0.23	8.81
MAD1	0.02	0.03	0.02	0.04	0.05	0.57	2.07	0.04	0.07	1.21
MED2	0.01	0.01	0.01	0.04	0.07	4.04	10.45	0.03	0.21	8.85
MAD2	0.01	0.01	0.01	0.02	0.03	0.34	1.03	0.03	0.03	0.38

WITH 48 LABS THE FACTOR F = 1.61

Exch.Ca

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
2	0.2	0.5*	0.2**	7.6	6.0	13.9	79.9	0.3**	35.7	44.1
3	0.0**	1.0**	0.0	6.7*	5.3**	54.0**	75.8	0.0	31.9	41.8*
4	0.2	0.3	0.1	7.2	5.8*	10.0**	53.1**	0.1	34.2	40.4*
5	0.1	0.3	0.1	8.1*	6.5	14.4	84.9	0.1	43.4**	51.2*
6	0.1	0.2	0.0	7.8	6.1	13.3	52.3**	0.3**	35.7	43.9
7	0.6**	0.4	0.0	9.0**	7.0**	15.4*	90.1*	0.2*	40.1*	50.7
9	0.4**	0.5*	0.3**	4.7**	3.3**	1.4**	9.6**	0.0	13.6**	12.8**
13	0.0**	0.0**	0.0	7.4	6.0	13.3	78.5	0.1	34.0	54.0**
15	0.2	0.3	0.1	7.0	6.6	14.0	67.3	0.2	34.1	48.7
18	0.1	0.3	0.0	7.5	6.2	13.7	82.5	0.0	38.7*	49.8
19	0.0**	0.0**	0.0	7.2	6.6*	14.9*	84.0	0.0	34.5	71.7**
22	0.2	0.4	0.1	7.9	6.3	16.3**	-	0.0	-	46.3
26	0.5**	0.7**	0.4**	7.4	6.9**	17.3**	59.3*	0.8**	31.6	44.6
27	0.2	0.7**	0.0	19.1**	14.2**	33.4**	220.9**	0.2*	96.5**	119.0**
28	0.2	0.5*	0.1	15.5**	13.3**	27.8**	146.6**	0.1	54.2**	99.3**
29	0.2	0.4	0.1*	1.8**	6.3	6.3**	73.3	0.3**	43.3**	50.9
30	0.1	0.3	0.1	13.0**	10.0**	20.0**	162.8**	0.0	71.0**	79.4**
32	0.0**	0.2	0.0	7.1	5.7*	13.2	57.6*	0.0	32.7	43.0
33	0.2	0.3	0.1	6.4*	5.5**	14.2	68.5	0.1	27.0**	48.4
35	1.6**	1.5**	1.2**	7.6	6.4	15.6*	72.0	0.8**	34.4	28.4**
37	0.3**	0.7**	0.9**	7.7	5.7*	10.5**	65.2	0.4**	31.2	40.8*
38	0.0**	0.8**	0.0	9.1**	8.2**	15.2*	61.6*	0.0	32.6	48.8
39	0.2	0.8**	0.1	8.4*	6.7*	13.4	87.2*	0.2*	37.1	47.1
42	0.1	0.2	0.1	5.8**	4.5**	6.2**	34.2**	0.0	23.6**	22.4**
43	0.1	0.2	0.1	8.2*	6.5	14.6	86.2*	0.0	37.0	63.4**
44	1.9**	1.5**	1.4**	9.0**	11.4**	16.3**	37.5**	4.5**	21.2**	45.0
45	0.1	0.3	0.1*	6.7*	4.9**	11.0*	62.0*	0.1	32.0	36.1**
46	0.1	0.2*	0.0	4.0**	3.3**	8.2**	35.4**	0.1	23.4**	25.8**
47	0.8**	0.8**	1.1**	4.2**	9.5**	2.7**	9.0**	0.5**	7.7**	31.9**
48	0.1	0.1*	0.0	7.8	6.6*	12.7	76.1	0.1	36.7	55.5**
53	0.2	0.4	0.0	16.7**	6.6*	28.6**	172.0**	0.1	66.2**	89.6**
54	0.1	0.3	0.1	7.5	6.0	12.6	75.7	0.1	35.7	45.7
59	0.0**	0.2	0.0	4.0**	3.4**	10.7**	31.4**	0.2*	25.2**	31.5**
60	0.0**	0.3	0.0	7.1	6.2	16.7**	72.0	0.2	45.6**	42.1*
62	0.0**	0.3	0.0	7.2	5.7*	14.0	86.1*	0.0	35.9	47.9

Exch.Ca

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
63	0.3*	0.6**	0.2*	7.5	6.4	13.4	72.6	0.2*	29.6*	50.9
65	0.2	0.3	0.1	8.0*	6.0	12.6	74.0	0.2	36.4	46.8
68	0.1	0.3	0.1	7.6	6.2	12.5	91.7*	0.0	34.7	48.9
76	0.1	0.2*	0.0	5.9**	4.1**	12.2	74.3	0.0	30.7	44.0
78	0.3**	0.5*	0.2**	8.5*	6.6*	15.1*	113.2**	0.4**	109.9**	50.1
83	0.0**	0.0**	0.0	7.8	6.0	12.7	81.5	0.0	41.1**	47.1
88	0.4**	0.7**	0.6**	9.6**	6.4	12.5	47.5**	0.5**	19.5**	28.0**
92	0.0**	0.0**	0.0	5.3**	6.0	11.9*	64.4	0.0	30.4*	31.3**
93	0.2	0.2	0.4**	7.3	5.4**	14.9*	71.7	0.0	31.0	45.1
MED1	0.15	0.32	0.07	7.49	6.21	13.54	73.28	0.11	34.40	46.52
MAD1	0.07	0.15	0.07	0.65	0.42	1.57	11.65	0.09	3.68	4.40
MED2	0.16	0.30	0.05	7.49	6.22	13.39	74.32	0.06	34.31	46.80
MAD2	0.05	0.08	0.05	0.31	0.22	0.81	7.14	0.06	2.21	2.70

WITH 44 LABS THE FACTOR F = 1.63

Exch.Ca

Other analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
23	0.0*	0.4	0.2**	7.6	6.1	11.5	11.7	0.3*	11.1	44.0
41	0.0	0.3	0.0	8.2	6.5	12.3	22.3	0.0	14.4	45.0
49	1.0**	3.0	0.0	85.0**	67.0**	118.0**	174.0	10.0**	85.0**	329.0
94	0.0	0.0	0.0	6.0	5.8	12.9	25.2	0.0	13.3	19.9
MED1	0.02	0.35	0.00	7.90	6.30	12.62	23.73	0.15	13.84	44.50
MAD1	0.02	0.20	0.00	1.08	0.33	0.69	6.74	0.15	1.65	12.53
MED2	0.00	0.35	0.00	7.60	6.10	12.35	23.73	0.00	13.29	44.50
MAD2	0.00	0.20	0.00	0.60	0.26	0.54	6.74	0.00	1.11	12.53

WITH 4 LABS THE FACTOR F = 27.28

Exch.Ca

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	0.14	0.32	0.06	7.55	6.21	13.37	72.60	0.11	34.23	45.97
MAD1	0.09	0.15	0.06	0.65	0.40	1.65	13.50	0.11	4.47	4.80
MED2	0.10	0.30	0.04	7.60	6.21	13.30	74.00	0.05	34.40	46.25
MAD2	0.09	0.08	0.04	0.35	0.21	0.80	8.50	0.05	2.26	2.35

WITH 48 LABS THE FACTOR F = 1.61

Exch. Mg

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
2	0.07	0.14*	0.05*	1.42	2.35	5.54	10.62	0.06	0.98	30.34*
3	0.00**	0.00*	0.00	1.22*	1.00**	5.46	11.30	0.08*	0.83	9.08**
4	0.05	0.06	0.01	1.53	2.37	3.83**	7.89**	0.03	0.97	21.05**
5	0.07	0.08	0.02	1.64	2.69	6.08	12.46	0.02	1.18	33.24
6	0.00**	0.00*	0.00	1.50	2.60	5.80	10.60	0.00	0.90	30.70*
7	0.10	0.10	0.00	1.50	2.70	7.20**	14.50**	0.00	1.20*	40.70**
9	0.13**	0.13	0.06**	2.07**	2.78	1.25**	3.49**	0.03	1.17	14.56**
13	0.03*	0.03	0.00	1.42	2.49	5.74	11.40	0.03	0.87	33.50
15	0.09	0.04	0.05*	2.06*	2.72	3.58**	8.54**	0.09*	1.80**	24.61**
18	0.01**	0.01	0.01	1.60	3.00*	6.00	11.40	0.01	1.10	33.60
19	0.00**	0.00*	0.00	4.59**	4.66**	9.44**	11.21	0.00	2.99**	15.15**
22	0.08	0.12	0.02	1.53	2.56	6.24	11.58	0.04	1.04	31.49
26	0.23**	0.23**	0.23**	1.61	2.98*	5.39	10.19	0.38**	1.18	25.07**
27	0.65**	0.64**	0.52**	38.43**	38.17**	24.16**	27.79**	0.60**	10.43**	81.58**
28	0.13**	0.14*	0.06**	3.15**	5.44**	11.71**	21.77**	0.07*	1.79**	70.89**
29	0.10	0.14*	0.04*	2.11**	3.88**	7.89**	6.18**	0.21**	1.81**	48.03**
30	0.06	0.07	0.02	1.73*	2.93*	6.66*	14.08**	0.02	1.11	38.47**
32	0.02*	0.04	0.00	1.51	2.59	5.97	10.40	0.00	0.96	31.67
33	0.07	0.09	0.04*	1.46	2.45	5.68	12.00	0.04	0.88	30.60*
35	0.40**	0.56**	0.40**	3.60**	15.40**	6.00	19.60**	0.40**	5.20**	59.20**
37	0.24**	0.38**	0.30**	2.24**	2.24*	5.30	9.22*	0.24**	0.50**	30.22*
38	1.39**	0.77**	1.15**	2.31**	2.04**	5.32	13.96**	0.00	0.07**	33.74
39	0.31**	0.61**	0.28**	1.96*	2.98*	5.77	11.65	0.30**	1.20*	30.85*
42	0.04	0.03	0.01	1.00**	1.66**	1.03**	1.90**	0.00	0.60**	6.46**
43	0.12*	0.11	0.02	1.79*	2.93*	13.71**	12.88*	0.03	1.18	33.29
44	0.60**	0.60**	0.40**	2.50**	5.10**	7.00**	10.00*	0.30**	0.90	11.30**
45	0.06	0.06	0.06**	1.58	2.52	4.89*	12.03	0.06	1.02	31.73
46	0.06	0.07	0.03*	1.33*	2.22*	5.35	9.42*	0.03	0.84	29.62*
47	1.04**	1.05**	2.12**	16.83**	8.70**	18.35**	23.51**	0.53**	5.11**	45.73**
48	0.07	0.07	0.02	1.57	2.81	5.52	11.73	0.03	1.02	33.86
53	0.15**	0.21**	0.01	3.39**	5.21**	14.60**	28.40**	0.10**	2.34**	67.20**
54	0.05	0.07	0.02	1.48	0.28**	5.49	11.40	0.03	0.99	32.60
59	0.04	0.07	0.01	1.68	2.75	6.22	12.28	0.07*	1.22*	32.92
60	0.08	0.12	0.08**	1.87*	3.12*	6.64*	12.80*	0.15**	1.25*	34.50
62	0.00**	0.00*	0.00	1.65	2.47	6.17	12.30	0.00	1.23*	33.30
63	0.10	0.13	0.08**	1.31*	2.41	4.82*	9.83*	0.04	0.84	64.49**
65	0.07	0.05	0.03*	1.25*	2.26*	4.74**	10.69	0.04	0.95	32.84
68	0.05	0.06	0.02	1.50	2.61	5.53	11.63	0.02	0.98	33.33
76	0.05	0.02	0.00	1.19*	1.88**	5.04*	10.61	0.03	0.74*	30.02*
78	0.10	0.10	0.00	1.46	2.47	6.18	13.36*	0.00	2.19**	34.05
83	0.06	0.07	0.01	1.24*	2.10*	4.30**	9.60*	0.01	0.84	23.90**
88	0.17**	0.33**	0.17**	1.67	2.66	6.66*	10.83	0.33**	1.00	23.33**
92	0.00**	0.00*	0.00	3.40**	2.16*	10.69**	15.85**	0.00	0.42**	21.19**
93	0.20**	3.22**	0.20**	3.62**	4.03**	6.04	3.22**	0.40**	0.81	33.02
MED1	0.07	0.08	0.02	1.62	2.63	5.88	11.40	0.03	1.02	32.72
MAD1	0.03	0.05	0.02	0.27	0.35	0.67	1.40	0.03	0.18	2.60
MED2	0.07	0.07	0.01	1.52	2.59	5.75	11.40	0.03	0.99	32.88
MAD2	0.02	0.04	0.01	0.11	0.18	0.34	0.79	0.02	0.12	1.07

WITH 44 LABS THE FACTOR F = 1.63

Exch.Mg

Other analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
23	0.09	0.10	0.04**	1.50	2.60	5.47	9.29	0.07	0.76	31.88
41	0.03	0.03	0.00	1.41	2.38	5.65	10.58	0.02	0.82	30.30
49	1.00	1.00	0.00	18.00**	27.00**	40.00**	45.00**	2.00**	1.00	99.00
94	0.00	0.00	0.00	2.01	2.22	5.44	8.66	0.00	0.60	13.49
MED1	0.06	0.06	0.00	1.75	2.49	5.56	9.93	0.04	0.79	31.09
MAD1	0.04	0.05	0.00	0.30	0.19	0.10	0.96	0.03	0.11	9.19
MED2	0.06	0.06	0.00	1.50	2.38	5.47	9.29	0.02	0.79	31.09
MAD2	0.04	0.05	0.00	0.09	0.16	0.03	0.63	0.02	0.11	9.19

WITH 4 LABS THE FACTOR F = 27.28

Exch.Mg

All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	0.07	0.08	0.02	1.62	2.60	5.78	11.40	0.03	1.00	32.24
MAD1	0.04	0.05	0.02	0.27	0.35	0.47	1.44	0.03	0.18	2.24
MED2	0.07	0.07	0.01	1.51	2.57	5.66	11.30	0.03	0.98	32.72
MAD2	0.02	0.04	0.01	0.10	0.20	0.29	0.72	0.02	0.14	1.04

WITH 48 LABS THE FACTOR F = 1.61

C E C

ISRIC"s prescribed analytical methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
LAB:										
2	4.5*	11.6*	6.9**	27.0*	23.6**	24.7	34.0	3.7*	9.1	89.8*
3	5.5**	10.5	8.9**	20.0	19.8	19.2**	22.1**	3.5*	14.0**	53.2**
4	6.1**	11.1	5.3*	23.2	19.2	19.2**	32.2	5.8**	8.5	62.9**
5	3.3	8.6	3.9	23.8	17.8	23.2	34.9	2.3	8.0	88.9*
6	2.4*	6.6*	2.8*	20.6	14.2	21.0	30.8	1.6**	7.4*	77.6
7	3.3	8.7	3.8	22.8	16.8	21.2	33.7	2.6	7.8	67.7**
9	3.6	10.6	4.2	23.3	36.3**	15.4**	37.2	3.9*	9.8*	63.9**
13	2.6	9.5	4.2	25.9	21.0	26.0*	38.2	2.7	8.8	96.1**
15	2.8	6.7	3.7	21.4	15.3	22.3	33.7	2.4	8.7	81.9
18	2.9	7.5	3.6	20.3	15.2	20.3*	32.3	2.7	7.8	79.2
19	2.4*	9.1	4.6	26.1	21.4*	24.3	39.0	2.2	7.7	98.6**
22	6.4**	13.3**	8.9**	33.6**	29.0**	33.6**	36.3	6.6**	9.1	93.9**
26	4.6*	9.3	6.3*	23.3	16.9	21.2	31.7	3.9*	9.5*	77.5
27	9.0**	20.2**	11.1**	52.4**	38.3**	53.9**	85.2**	8.0**	20.0**	198.3**
28	4.9*	10.9	7.4**	20.3	23.9**	25.1	37.5	1.9	9.3	93.8**
29	6.7**	15.6**	7.2**	29.8**	29.8**	27.3**	39.4*	3.7*	10.3**	113.7**
30	3.9	10.1	5.9*	26.5	22.2*	24.3	39.2*	3.2	7.8	95.1**

C E C

ISRIC"s prescribed analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
32	4.6*	11.9*	6.8**	27.2*	22.6*	24.2	35.8	3.5	8.2	83.6
33	3.0	8.9	3.5	24.0	17.3	25.3	39.5*	2.5	9.4*	97.0**
35	16.2**	12.1**	17.2**	20.7	17.3	27.2**	288.6**	6.0**	38.9**	79.0
37	2.8	7.5	3.1	19.0*	14.2	21.5	31.8	2.2	7.9	75.9*
38	3.5	5.2**	4.2	23.5	15.9	23.4	33.1	2.1	8.6	84.2
39	2.8	7.1	3.3	19.6	13.8	19.7*	30.0**	2.1	7.1**	78.0
42	1.6**	10.0	9.5**	19.8	12.5*	19.0**	42.6**	1.4**	5.7**	67.0**
43	7.0**	15.4**	11.7**	31.6**	26.0**	27.0**	39.0	5.8**	13.0**	94.0**
44	2.0**	4.5**	1.5**	6.5**	12.5*	14.0**	16.0**	2.0	9.5*	54.0**
45	3.7	9.9	5.7*	25.8	22.7*	24.2	36.2	3.0	8.1	81.3
46	3.5	9.9	5.9*	26.0	20.0	23.0	31.4	3.1	8.5	87.0*
47	11.2**	14.7**	12.9**	21.3	21.1	25.8*	38.6	11.3**	12.2**	83.7
48	3.1	8.4	4.0	23.4	12.3*	20.4*	32.3	1.9	8.3	82.9
53	2.6	7.1	3.0	21.1	15.3	20.7	32.3	2.2	7.4*	85.9
54	2.0**	5.5**	2.3*	15.3**	10.4**	19.2**	31.4	1.7*	5.5**	80.4
59	3.7	7.8	3.6	21.9	14.8	22.8	34.1	1.9	9.2	75.1*
60	3.2	8.7	4.7	22.7	17.3	21.5	34.3	3.2	8.5	81.6
62	2.8	6.9	3.1	20.7	15.9	24.3	35.2	3.8*	9.5*	82.5
63	3.5	8.9	4.3	24.3	20.8	22.1	36.7	3.0	8.3	87.8*
65	2.8	7.0	2.8*	19.8	14.4	19.4**	31.3	2.1	7.7	79.6
68	3.8	8.9	4.8	23.2	18.6	24.6	36.6	3.0	9.3	90.2*
76	3.6	8.8	4.0	20.8	15.6	21.4	32.0	3.6*	8.3	75.8*
78	2.8	6.4*	2.7*	19.6	13.7	23.2	35.6	2.2	8.1	87.4*
83	2.3*	7.2	4.2	20.3	14.1	18.2**	33.6	2.2	7.4*	69.3**
88	4.8*	11.6*	3.8	25.2	20.9	24.0	38.0	3.6*	10.4**	63.2**
92	5.8**	11.6*	6.8**	27.2*	25.2**	30.1**	40.7**	9.7**	11.6**	81.5
93	6.3**	13.2**	9.5**	26.5	24.9**	25.9*	35.2	5.5**	10.2**	81.8
MED1	3.52	8.99	4.27	23.18	17.55	23.12	35.03	3.00	8.55	81.85
MAD1	0.90	1.89	1.35	2.75	3.41	2.15	2.92	0.80	0.78	6.00
MED2	3.30	8.89	3.95	22.98	16.87	23.20	34.90	2.63	8.39	81.80
MAD2	0.49	1.39	0.65	2.34	2.67	1.60	2.60	0.55	0.60	2.80

WITH 44 LABS THE FACTOR F = 1.63

C E C

Other analytical methods

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37
23	2.6	7.4	2.8	19.1	11.8	21.3	34.3	2.1	11.3	80.8
41	5.6	13.6	7.4	25.2	17.4	21.0	-	4.2	12.0	73.0
49	51.0	50.0	46.0	175.0	165.0	179.0	235.0**	30.0	87.0**	625.0**
94	12.0	25.4	15.2	42.4	40.2	40.2	32.6	9.6	16.1	76.1
MED1	8.80	19.52	11.31	33.80	28.82	30.77	34.30	6.88	14.05	78.46
MAD1	4.71	9.02	6.22	11.65	14.22	9.62	1.68	3.73	2.40	3.88
MED2	8.80	19.52	11.31	33.80	28.82	30.77	33.46	6.88	12.00	76.12
MAD2	4.71	9.02	6.22	11.65	14.22	9.62	0.84	3.73	0.70	3.07

WITH 4 LABS THE FACTOR F = 27.28

C E C
All methods

	SAMPLE: 13	29	30	31	32	33	34	35	36	37
MED1	3.57	9.21	4.47	23.24	17.60	23.12	34.90	3.00	8.76	81.70
MAD1	0.97	2.06	1.45	2.79	3.45	2.15	2.74	0.85	0.96	6.00
MED2	3.20	8.89	4.00	22.98	16.94	23.12	34.30	2.63	8.48	81.54
MAD2	0.45	1.44	0.68	2.34	2.74	1.62	2.04	0.55	0.68	3.08

WITH 48 LABS THE FACTOR F = 1.61

Table 3

CLAY (%)

RANKINGS OF DATA PER SAMPLE (ALL METHODS)

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37	SUM	
2	21.5	30	39	24	27	6	18	15	12.5	3	196	
3	39.5	13	24.5	32.5	41	38.5	34	40	36	29.5	328.5	
4	14.5	14	15.5	8.5	7	38.5	5	6.5	8	11	128.5	
5	14.5	16	17	17.5	29.5	2	15.5	33	5	19.5	169.5	
6	32.5	7	15.5	17.5	10	17.5	23.5	38	15	17	193.5	
7	25.5	27	29	26	25	30.5	32	9.5	20	28	252.5	
9	1	1	8	15	8	1	1	1	1	5	42	**
13	32.5	38	38	32.5	35	35	37.5	38	26.5	39.5	352.5	**
15	2	15	9	20	15	15	8	2	11	14	111	
18	23.5	19	24.5	31	26	17.5	23.5	18.5	15	35.5	234	
19	29	33	33	34	34	28	34	26	26.5	35.5	313	
22	5	20	7	25	21.5	7.5	12	33	15	19.5	165.5	
23	9	31	22	22	33	12	4	21	17	15	186	
26	36	37	28	40	37	37	41	41	32	32	361	**
27	30	42	40	41	28	14	27.5	31	20	35.5	309	
28	18	40	35	37	36	32	36	24	29	33	320	
29	41	21	12	19	16	41	42	18.5	40	13	263.5	
33	35	29	10	36	40	22	10	30	7	12	231	
34	6	2	1	2	9	26	2	8	43	41	140	
35	4	5	2	23	6	7.5	14	6.5	3	10	81	**
37	32.5	43	41	28	29.5	42	43	18.5	37.5	42	357	**
38	11	3	4	4	12	23	25.5	36	31	43	192.5	
39	17	8	13	11	11	27	22	14	22	2	147	
41	13	41	43	38.5	38	9.5	11	4	30	38	266	
42	16	12	14	14	19.5	30.5	25.5	11	6	26	174.5	
43	19	26	6	35	42	29	39	16	4	22	238	
44	42	25	19	12	13.5	24.5	15.5	38	39	8	236.5	
45	27	36	34	29	23	34	30	35	18	21	287	
46	43	9	5	7	1	43	21	42	42	1	214	
47	12	10.5	18	3	2	5	7	3	10	23	93.5	
48	28	23	31	5	3	11	31	26	20	27	205	
53	7	17	37	16	31	21	29	22.5	23.5	24.5	228.5	
54	10	32	23	30	24	19.5	20	22.5	12.5	18	211.5	
59	3	10.5	27	6	17	16	17	9.5	9	16	131	
62	21.5	18	20	38.5	39	19.5	40	26	33.5	31	287	
65	20	39	42	42	43	36	37.5	13	33.5	24.5	330.5	
68	25.5	24	26	13	19.5	24.5	27.5	12	23.5	29.5	225	
76	37	35	32	43	18	9.5	34	28.5	41	39.5	317.5	
83	38	6	11	21	13.5	4	6	33	2	35.5	170	
88	23.5	4	3	1	5	3	9	28.5	26.5	6	109.5	
92	8	34	30	27	32	13	13	5	35	7	204	
93	32.5	28	36	10	21.5	33	19	18.5	26.5	9	234	
94	39.5	22	21	8.5	4	40	3	43	37.5	4	222.5	

WITH 43 LABS AND 10 SAMPLES THE APPROXIMATE 5% TWO TAIL LIMITS OF THE RANK SUMS ARE 347 AND 93. RANK SUMS EXCEEDING THESE VALUES ARE MARKED WITH **.

pH–H_2O

RANKINGS OF DATA PER SAMPLE (ALL METHODS)

LAB:	SAMPLE: 13	29	30	31	32	33	34	35	36	37	SUM	
2	39.5	49	1	47	8.5	45	35	29.5	39	40.5	334	
3	27.5	32.5	24	18	32	45	45.5	16.5	28.5	29.5	299	
4	16.5	20	9.5	18	18	26	16.5	6	28.5	29.5	188.5	
5	27.5	32.5	24	30.5	38.5	37	35	29.5	39	29.5	323	
6	16.5	12	13	18	22.5	37	35	16.5	28.5	29.5	228.5	
7	27.5	20	42	30.5	46.5	26	16.5	16.5	18.5	29.5	273.5	
9	11.5	3	18	8.5	12.5	18.5	8.5	6	14	13.5	114	
13	7.5	6.5	2	8.5	12.5	10.5	16.5	16.5	9	13.5	103	**
15	27.5	32.5	24	30.5	32	48.5	35	16.5	49	46	341.5	
18	27.5	32.5	24	30.5	18	26	35	29.5	39	46	308	
19	16.5	20	47.5	30.5	38.5	26	35	16.5	28.5	13.5	272.5	
22	33	27.5	9.5	23.5	35.5	42	42	35.5	36	35	319.5	
23	47	42.5	32.5	48.5	8.5	18.5	45.5	45	9	46	343	
26	44.5	42.5	36.5	18	43	21.5	10	16.5	44.5	13.5	290.5	
27	7.5	12	9.5	12	12.5	6.5	8.5	39.5	14	8.5	130.5	
28	36	27.5	38	36.5	42	41	43	9	47	44	364	
29	10	12	4	6	16	14	27	3.5	12	19	123.5	
30	16.5	20	42	18	32	37	35	29.5	24	29.5	283.5	
31	16.5	12	13	18	18	15.5	12	16.5	14	13.5	149	
32	34	37.5	27.5	36.5	27.5	47	28.5	35.5	42	42.5	358.5	
33	39.5	32.5	32.5	41.5	46.5	37	45.5	29.5	39	40.5	384	
35	5	8	5	5	3	8	14	1	4	6	59	**
36	13	24	46	35	20	21.5	26	23	34	36.5	279	
37	44.5	45	27.5	45.5	44	32.5	30	39.5	43	39	390.5	
38	1.5	1.5	6	1.5	4	6.5	4	6	2	3	36	**
39	1.5	4.5	3	14	7	13	45.5	3.5	21	22.5	135.5	
41	39.5	37.5	21	26	29	30	25	24	22	38	292	
42	27.5	32.5	42	41.5	46.5	48.5	49	39.5	48	49	424	**
43	46	42.5	42	41.5	46.5	26	22	43	24	19	352.5	
44	7.5	6.5	18	1.5	2	4	5.5	39.5	3	1	88.5	**
45	39.5	32.5	47.5	41.5	32	26	22	29.5	28.5	29.5	328.5	
46	48	47	42	12	5.5	1	1	49	5.5	4.5	215.5	
47	49	48	49	48.5	49	2.5	3	48	5.5	4.5	307	
48	3.5	12	42	3.5	12.5	5	5.5	39.5	7	7	137.5	
49	7.5	20	13	12	12.5	10.5	22	16.5	18.5	19	151.5	
53	27.5	20	18	18	22.5	15.5	12	16.5	18.5	8.5	177	
54	22	26	18	38.5	27.5	45	40.5	8	32	42.5	300	
59	43	25	36.5	23.5	41	10.5	7	47	11	10	254.5	
60	21	46	42	45.5	35.5	18.5	40.5	29.5	16	22.5	317	
62	27.5	20	32.5	30.5	38.5	37	22	29.5	39	29.5	306	
63	20	16	15	22	25.5	32.5	19	10	33	24	217	
65	39.5	40	29	44	22.5	31	28.5	44	35	36.5	350	
68	39.5	42.5	32.5	30.5	22.5	18.5	16.5	39.5	24	19	285	
76	27.5	32.5	32.5	30.5	32	26	22	16.5	28.5	19	267	
78	27.5	12	32.5	8.5	12.5	10.5	12	29.5	9	13.5	167.5	
83	3.5	1.5	9.5	8.5	5.5	37	35	2	18.5	29.5	150.5	
88	35	39	18	38.5	25.5	43	48	16.5	46	48	357.5	
92	16.5	4.5	7	3.5	1	2.5	2	46	1	2	86	**
93	11.5	12	24	25	38.5	37	35	29.5	44.5	29.5	286.5	

WITH 49 LABS AND 10 SAMPLES THE APPROXIMATE 5% TWO TAIL LIMITS OF THE RANK SUMS ARE 396 AND 104. RANK SUMS EXCEEDING THESE VALUES ARE MARKED WITH **.

C E C

RANKINGS OF DATA PER SAMPLE (ALL METHODS)

SAMPLE:

LAB:	13	29	30	31	32	33	34	35	36	37	SUM	
2	31	35.5	35	39	37	34	20	34	26	36	327.5	
3	36	31	39	9	27	5	2	30	43	1	223	
4	38	34	28	24	26	6.5	11	39	22	3	231.5	
5	20.5	17	17	29	24	24.5	24	17	13	35	221	
6	5	5	5.5	13	9.5	13	4	2	5	14	76	**
7	20.5	18	15	22	19	14	19	20	10	7	164.5	
9	26	32	20	25	44	2	33	36.5	35	5	258.5	
13	9	26	22.5	34	31	39	36	21	25	42	285.5	
15	15	6	14	19	15	21	18	18	24	25	175	
18	16	13.5	12	10.5	13	10	12.5	22	10	17	136.5	
19	6	24	25	36	33	32	38	16	7.5	44	261.5	
22	40	41	38	44	42	44	30	42	27	39	387	**
23	7.5	12	5.5	4	2	16	22.5	9.5	39	20	138	
26	32	25	32	26	20	15	8	36.5	34	13	241.5	
27	43	45	42	46	45	46	45	43	45	46	446	**
28	35	33	37	12	38	35	34	5	29.5	38	296.5	
29	41	44	36	42	43	42	41	33	37	45	404	**
30	30	30	31	38	34	30.5	40	27.5	10	41	312	
32	33	38	33	41	35	28	28	29	16	28	309	
33	17	22.5	11	30	22	36	42	19	31	43	273.5	
35	46	39	46	14.5	22	41	47	41	46	16	358.5	
37	12.5	13.5	9	3	9.5	18.5	9	13.5	12	11	111.5	
38	22.5	2	22.5	28	17	26	16	11	23	30	198	
39	14	10	10	5	7	9	3	8	3	15	84	**
42	1	29	40.5	7	4.5	4	44	1	2	6	139	
43	42	43	43	43	41	40	39	40	42	40	413	**
44	2	1	1	1	4.5	1	1	7	33	2	53.5	**
45	28	27	29	33	36	29	29	24	14.5	21	270.5	
46	24	28	30	35	28	23	7	26	21	32	254	
47	44	42	44	18	32	37	37	46	41	29	370	
48	18	16	19	27	3	11	14	6	19	27	160	
49	47	47	47	47	47	47	46	47	47	47	469	**
53	7.5	9	7	17	14	12	12.5	13.5	5	31	128.5	
54	3	3	2	2	1	6.5	6	3	1	19	46.5	**
59	27	15	13	20	12	22	21	4	28	9	171	
60	19	19	26	21	22	18.5	22.5	27.5	20	23	218.5	
62	10	7	8	14.5	18	30.5	26	35	32	26	207	
63	22.5	22.5	24	31	29	20	32	24	17.5	34	256.5	
65	11	8	4	8	11	8	5	9.5	7.5	18	90	**
68	29	21	27	23	25	33	31	24	29.5	37	279.5	
76	25	20	18	16	16	17	10	31.5	17.5	10	181	
78	12.5	4	3	6	6	24.5	27	13.5	14.5	33	144	
83	4	11	21	10.5	8	3	17	13.5	5	8	101	
88	34	35.5	16	32	30	27	35	31.5	38	4	283	
92	37	37	34	40	40	43	43	45	40	22	381	**
93	39	40	40.5	37	39	38	25	38	36	24	356.5	
94	45	46	45	45	46	45	15	44	44	12	387	**

WITH 47 LABS AND 10 SAMPLES THE APPROXIMATE 5% TWO TAIL LIMITS OF THE RANK SUMS ARE 380 AND 100. RANK SUMS EXCEEDING THESE VALUES ARE MARKED WITH **.

ANNEX

Participating laboratories

Secretaria de Agricultura INTA
Mr. H.J.M. Morras
Departamento de Suelos
1712 Castelar F.C.S.
ARGENTINA

Dept. of Primary Industries
Dr. R.C. Bruce
Meiers Road
Indooroopilly QLD 4068
AUSTRALIA

CSIRO Division of Soils
Mr. T.A. Beech
Private Bag no. 2
Glen Osmond SA 5064
AUSTRALIA

CSIRO Davies Laboratory
Dr. G.P. Gillman
Private Bag
Aitkenvale, QLD 4814
AUSTRALIA

Institut fuer Bodenforschung
Prof. Dr. W.E.H. Blum
Gregor Mendelstrasse 33
A 1180 Wien
AUSTRIA

Geologisch Instituut
Prof. Dr. C. Sys
Krijgslaan 281
S8 B 9000 Gent
BELGIUM

Centre Nat. d'Agro Pedologie
Mr. A. Kogblevi
B.P. 988
Cotonou
BENIN

CIAT Bolivia
Ing. Rufo Angulo
Casilla 247
Santa Cruz
BOLIVIA

Soil Mapping and Advisory Unit
Dr. R. Breitbart c/o UNDP Office
P.O.B. 54
Gaborone
BOTSWANA

Bureau National des Sols
Mr. Noumbie Sourabie
B.P. 7028
Ouagadougou
BOURKINA FASSO

SNLCS-EMBRAPA
Dr. W. de Oliveira Barreto
Rua Jardim Botanico 1024 Gavea
22460 Rio de Janeiro RJ
BRAZIL

IRA/CNS Ekona
Mr. A. Moukam
PMB 25
Buea
CAMEROUN

Land Resource Research Inst.
Dr. C. Wang
Neatby Bldg. Centr. Exp. Farm
Ottawa Ontario K1A 0C6
CANADA

Analytical Services Laboratory
Dr. Y.P. Kalra
5320 122 Street
Edmonton Alberta T6H 3S5
CANADA

INIA
Dr. Ing. E. Besoain M.
San Rosa 11610 Casil. 5427
Santiago
CHILE

Institute of Soil Science
Dr. Gong Zi-Tong
P.O. Box 821
Nanjing
CHINA

Instituto 'Agustin Codazzi'
Mrs. Beatriz M. de Munoz
Apartado Aereo 6721
Bogota
COLOMBIA

C.I.A.T.
Dr.R.H.Howeler Dr.O.Mosquera
Apartado Aereo 6713
Cali
COLOMBIA

Universidad de Costa Rica
Centro de Inv. Agronomicas
Prof. Elemer Bornemisza S.
Ciudad Univ. 'Rodrigo Facio'
COSTA RICA

CATIE
Mr. Roberto Diaz-Romeu
Turrialba
COSTA RICA

Instituto de Suelos
Ing. A. Cardenas Garcia
Apartado 8022
Ciudad Habana 8
CUBA

Nat. Soil Dept. PRONAREG
Ing. Guillermo del Posso M.
Sancho de la Carrera # 285 ccI
no. 11 Quito
ECUADOR

Faculty of Agriculture
Prof. Dr. Shafic I. Abdel-Aal
University of Cairo
Giza
EGYPT

Soil Science Department
Prof. Dr. M.A. Khisk
El Minia University
El Minia
EGYPT

Koronivia Research Station
Dr. R.N. Duve
P.O. Box 77
Nausori
FIJI

ORSTOM
Dr. P. Pelloux
70-74, Route d'Aulnay
93140 Bondy
FRANCE

Bundesanst. Geowissenschaften
Dr. H. Lueken
Postfach 51 01 53
3000 Hannover 51
GERMANY Fed. Rep.

Universitaet Hamburg
Dr. D. Goetz
Allende-Platz 2
2000 Hamburg 13
GERMANY Fed. Rep.

Soil Research Institute
Mr. R.D. Asiamah
Academy Post Office
Kwadaso Kumasi
GHANA

Agricultural Research Service
Mr. N. Theodorou
Land Reclamation Institute
574 00 Sindos
GREECE

Research Inst.for Soil Science
Mrs. Dr. M. Redly
Herman Otto u. 15
1022 Budapest
HUNGARY

Plant Protec. and Agric. Centre
Mrs. Nina Vajna
Pf.127
1502 Budapest
HUNGARY

Nat. Bureau of Soil Survey
Dr. V.A.K. Sarma
Regional Centre, Hebbal
Bangalore 560 024
INDIA

Centre for Soil Research
Dr. M. Sudjadi
Jalan Juanda 98
Bogor
INDONESIA

Prawijaya Univ. Dept. Soil Sc.
Dr. Ir. Slamet Setiyono M.Sc.
Jalan Mayjen Haryono 169
Malang
INDONESIA

Soil Institute of Iran
Dr. M.H. Roozitalab
Kargar Shomali Avenue
Teheran
IRAN

National Soil Survey
Mr. Thomas Shanley
Johnstown Castle
Wexford
IRELAND

Jamaica Soil Survey Project
att: Teamleader
Hope Gardens
Kingston 6
JAMAICA

Hokkaido Univ. Fac. Agriculture
Dr. Hiroki Imai
Kita 9, Nishi 9, Kita ku
Sapporo 060
JAPAN

Lab. of Soils Kyoto Univ.
Dr. K. Kyuma
Kitashirakawa, Sakyo ku
Kyoto 606
JAPAN

Tropical Agric. Research Centre
Dr. Yutaka Arita
1-2 O-Washi,Yatabe,Tsukaba
Ibaraki
JAPAN

Soils Division JVA
Mr. K.F. Hamdoukh
P.O.B. 2769
Amman
JORDAN

Kenya Soil Survey
Mr. F.N. Muchena
P.O. Box 14733
Nairobi
KENYA

Chitedze Research Station
Dr. A.R. Saka
P.O.Box 158
Lilongwe
MALAWI

Soil Management Branch
Mr. Lim Han Kuo
Jalan Mahameru
Kuala Lumpur 10-02
MALAYSIA

SRCVO Laboratoire des Sols
M. Mamadou Karounga Keita
Sotuba B.P. 438
Bamako
MALI

Centro de Edafologia
Dr. J.D. Etchevers
Colegio de Postgraduados
56230 Chapingo
MEXICO

Inst. Agron. & Veter. Hassan II
D.S.S. Said Jait
B.P. 6202
Rabat Instituts
MOROCCO

Soil Survey and Land Eval.Proj.
Mevr. M. Bovee
Caixa Postal 3658
Maputo
MOZAMBIQUE

Soil Bureau DSIR
Mr. L.C. Blakemore
Private bag
Lower Hutt
NEW ZEALAND

Forest Research Institute
Mrs. G. Nicholson
Private bag
Rotorua
NEW ZEALAND

I.I.T.A.-NIGERIA
Dr. J.L. Pleysier
PMB 5320
Ibadan
NIGERIA

Ahmadu Bello Univ. Dept.Soil Sc.
Dr. I.J. Ibanga
P.M.B. 1044
Samaru Zaria
NIGERIA

Soil Survey of Pakistan
Dr. Gulam Saeed Khan
P.O. Shahnoor Multan Road
Lahore
PAKISTAN

INIPA - CIPA VII
Mrs. Justa Sanz Carpio
Tristan 305
Arequipa
PERU

IRRI
Mrs. Ruby U. Castro
P.O. Box 933
Manila
PHILIPPINES

Soil Research Division
Dr. Modesto R. Recel
P.O. Box 1848
Ermita Manila
PHILIPPINES

Centro de Estudos Pedologia
Prof. Dr. Rui Pinto Ricardo
Tapada de Ajuda
1399 Lisboa, Codex
PORTUGAL

ISAR Rubona
Mr. V. Rutunga, Head Soil Div.
B.P. 138
Butare
RWANDA

ISRA-CNRA
A.N'Diaye & O.N'Doye
B.P. 51
Bambey
SENEGAL

Land and Water Develop. Div.
Mr. Noel Wills
P.M.Bag 187
Freetown
SIERRA LEONE

Soil Survey Administration
Mr. Abdel Monien M.A. Kafil
P.O.Box 388
Wad Medani
SUDAN

A.C.S.A.D.
Dr. Touhama Mouheich
P.O. Box 2440
Damascus
SYRIA

Dir. des Etudes Pedologiques
Mr. K.L. Allaglo
B.P. 1026
Lome
TOGO

Dept. Soil Science and Geology
Mr. L. Th. Begheyn
Postbus 37
6700 AA Wageningen
The NETHERLANDS

Royal Tropical Institute
Dr. F. van der Pol
Mauritskade 63
1092 AD Amsterdam
The NETHERLANDS

The Macaulay Inst. Soil Research
Dr. M.J. Wilson
Craigiebuckler
Aberdeen AB9 2 QJ
UNITED KINGDOM

ICI Jealott's Hill Research St.
Dr. D. Riley
Bracknell
Berkshire RG12 6 EY
UNITED KINGDOM

IBSNAT/Trop. Soils Projects
Mr. G.Y. Tsuji
2500 Dole Street Krauss Hall 22
Honolulu Hawaii 96822
USA

Chem. and Soil Research Inst.
Mr. J.G. Bennett
P.O.Box 8100
Causeway, Harare
ZIMBABWE

Departamento de Edafologia
M. Tejedor o' J. Hernandez
La Laguna Tenerife
Islas Canarias
SPAIN

Dienst Bodemkartering
Ir. J.L.H.J. Domen
Coppenamestr./Comm.Weytingweg
District Wanica
SURINAME

National Soil Service
The Director
P.O. BOX 5088
Tanga
TANZANIA

Direction des Sols
Mme. W. Naanaa
Route de la Soukra
Ariana
TUNISIA

ISRIC
Dr. L.P. van Reeuwijk
P.O. Box 353
6700 AJ Wageningen
The NETHERLANDS

Soil Conservation Service
Dr. J.M. Kimble
100 Centennial Mall North
Lincoln NE 68508-3866
U.S.A.

Trop. Soils Analysis Unit LRDC
Mr. R. Baker
Coley Park
Reading RG1 6 DT
UNITED KINGDOM

Caleb Brett Laboratories Ltd.
Mr. D.R. Ward
Lancots Lane
St. Helens Merseyside WA9 3ES
UNITED KINGDOM

CENIAP, MAC Seccion Suelos
Ing. Julia G. de Brito
Apdo. 4653
Maracay 2101
VENEZUELA

Land Use Division
Dr. W.D. Joshua
P.O.B. 1138
Colombo 7
SRI LANKA

Swedish University Agric. Sci.
Dept. of Soil Sciences
Dr. Arne Andersson
Box 7014 S-750 07 Uppsala
SWEDEN

Soil Analysis Division
Mrs. Somnuk Buachanda
Phahonyothin Road, Bangkhen
Bangkok 10900
THAILAND

Bedrijfslab. voor Grondonderz.
Dr. F. Kadijk
Postbus 115
6860 AC Oosterbeek
The NETHERLANDS

Lab. Soil Science Plant Nutrit.
Dr. V.J.G. Houba
De Dreyen 3
6703 BC Wageningen
The NETHERLANDS

Dokuchaev Soil Institute
Dr. V.A. Bolshakov
Pyzhevsky Lane 7
109017 Moscow
U.S.S.R.

Rothamsted Experimental Station
Dr. P. Loveland
Harpenden
Herts AL5 2 JQ
UNITED KINGDOM

Direccion de Suelos
Ing. Agr. Juan C.Sganga
Av. E. Garzon 456
Montevideo
URUGUAY

Mt. Makulu Central Research St.
Mr. R.J. Cheatle
P.O. Box 7
Chilanga
ZAMBIA