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The Laboratory Methods and Data Exchange Programme

Interim Report on the Exchange Round 85-2

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INTERNATIONAL SOIL REFERENCE AND INFORMATION CENTRE

THE LABORATORY METHODS AND DATA EXCHANGE PROGRAMME

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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 85-1 the participating laboratories analysed 15 soil samples, sent to them by ISRIC, for texture, pH, exchangeable cations, CEC and organic C, using their own routine analytical procedures. In the exchange round 85-2 the same set of soil samples was analysed, but the participants were asked to follow the analytical procedures as provided by ISRIC. These procedures are given in paragraph 2 of this report. 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 85-2 received at ISRIC at the beginning of February 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. It is up to the participants to see what their figures look like. In the Labex programme the number of participating laboratories is 85. All are listed in the annex. For various reasons, but probably mainly because of the workload, only 44 of them were able to participate in round 85-2.
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 Methods

2.1 Particle Size Analysis

Apparatus

Water bath
Hot plate
Reciprocating shaking machine
50 micron sieve
Glass sedimentation cylinders, marked at 1 litre (1 l measuring cylinders can be used)
Drying oven
Moisture tins

Reagents

H_2O_2 30%
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.
Sodium pyrophosphate solution 5% (dispersion agent)
Dissolve 50.0 g $Na_4P_2O_7.10\ H_2O$ in water in
1 l volumetric flask and make up to volume.

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

Ad 1. Calcareous soils (removal of carbonate)
1. Weigh out approx. 20 g fine earth into a 1 l beaker (at carbonate contents exceeding 10%, weigh out proportionally more soil)
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 efervescence 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.
3. Centrifuge and decant or let stand overnight and siphon off the supernatant solution.
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.
5. Proceed with oxidation of organic matter.

Ad 2. Non-calcareous soils
1. Weigh out approx. 20 g of soil into a 1 l beaker
2. Add 15 ml water
3. Proceed with oxidation of organic matter.

Oxidation of organic matter

1. Add 15 ml H_2O_2 30%
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.
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).

4. Add H_2O to a volume of approx 300 ml.
5. Place on hot plate and boil for 1 hour to remove any remaining H_2O_2.
6. Remove beaker from hot plate and allow to cool.
7. Centrifuge and decant or allow material to settle in the beaker

and siphon off.
8. Add approx. 300 ml water and redisperse sediment.
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.

Dispersion

1. Transfer suspension quantitatively to a 1 l polythene bottle.
2. Add 25.00 ml dispersing agent, make up the volume to approx. 400 ml water and cap the bottle.
3. shake overnight (16 hours) on a reciprocating shaker at 125 str./min.

Separation of fractions

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.
2. make up to the 1 l mark with H_2O.
3. Wash the sand fraction remaining on the sieve into a tared porcelain dish, evaporate on waterbath and dry at 105 °C.
4. Weigh with 0.01 g accuracy (wt. A sand fraction)

Determination of silt and clay

1. Close the sedimentation cylinder with a rubber stopper and shake well.
2. Place the cylinder on the table, remove stopper and immediately pipette 20 ml from the centre of the cylinder (see note).
3. Transfer the aliquot to a tared moisture tin, dry overnight at 105 °C.
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).
5. Again stopper the cylinder and shake well.
6. Place the cylinder on a vibration-free table under the pipette-assembly.
7. After 5 minutes pipette 20 ml at depth indicated in table 1.
8. Transfer aliquot to tared moisture tin, dry overnight at 105 °C.
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).
10. Repeat 5 and 6.
11. After 5.5 hours pipette 20 ml at a depth indicated in table 1.
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).

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

2.2 pH

pH-H_2O and pH-KCl

Apparatus
pH meter with appropriate electrode(s), calibrated with buffer solutions
Reciprocating shaking machine
Polythene bottles, 100 ml wide mouth (or equivalent)

Reagents

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

Procedure
1. Weigh 20.0 g fine earth into 100 ml polythene bottle.
2. Add 50 ml liquid and cap the bottle.
3. Shake for 2 hours.
4. Before opening the bottle for measurement, shake by hand.
5. Immerse electrode(s) in upper part of suspension.
6. 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).

2.3 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.

Apparatus

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

Reagents

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

Procedure

1. Preparation
   -'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).
   -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.
-Transfer quantitatively to the percolation tube. Include a blank (sand or celite without sample).

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. Saturation with Ammonium
-Percolate with 100 ml NH_4Ac 1 M, pH 7, collect percolate in 100 ml volumetric flask.
-Make to volume with NH_4Ac 1 M and measure exchangeable K, Na, Ca and Mg.
4. Removal of excess Ammonium
-Percolate with 100 ml ethanol 96%, discard percolate.

5. Exchange of Ammonium
-Percolate with 100 ml acidified KCl 1 M solution, collect percolate in 100 ml volumetric flask.
-Make to volume of percolate with water to 100 ml in volumetric flask.

6. Distillation of Ammonium
-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.
-Add 5 ml 35% NaOH solution to the distillation flask and distill for about 7 mins. boiling time into the boric acid (outlet submerged).
-Titrate distillate with 0.010 M HCl until the colour changes from green to pink.

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:-The percolation assembly is schematically represented at the accompanying diagram. 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.
-For those who do not possess a steam distillation or other distillation unit, a simple distillation assembly is drawn as well.

2.4 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.

Apparatus

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

Reagents

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

Procedure

1. Preparation
   - '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).
   - 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.
   - Transfer quantitatively to the extraction tube. Include a blank (sand or celite without sample).

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%

3. Saturation with Ammonium
   - Extract with 65 ml NH_4Ac 1 M, pH 7.
   - Transfer extract quantitatively to 100 ml volumetric flask.
   - Make up to the volume with NH_4Ac 1 M and measure exchangeable K, Na, Ca and Mg.
4. Removal of excess Ammonium
   - Extract with 65 ml ethanol 96%, discard extract.

5. Exchange of Ammonium
   -Extract with 65 ml acidified KCl 1 M solution, transfer extract in 100 ml volumetric flask.
   -Make to volume of with water to 100 ml in volumetric flask.

6. Distillation of Ammonium
   -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.
   -Add 5 ml 35% NaOH solution to the distillation flask and distill for about 7 mins. boiling time into the boric acid (outlet submerged).
   -Titrate distillate with 0.010 M HCl until the colour changes from green to pink.

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.

Remark:-For those who do not possess a steam distillation or other destillation unit, a simple distillation assembly is drawn in the accompanying diagram (when using the extractor, the percolation unit in this diagram does not apply).

3 *Samples*

sample no.	country of origin	soiltype	horizon	depth	soilname or location
11	Syria	saline/ calcareous/ gypsiferous soil	B	40-50	-
12	Canada	podzol	B_2	?	-
14	Malaysia	ferric acrisol	B_{21t}	43-92	Serdang
15	Hungary	sodic solonchak	B	16-29	-
16	Hungary	sodic solonchak	C	55-90	-
17	Kenya	pellic vertisol	A	0-20	Sultan Hamud
18	Kenya	pellic vertisol	C	110-150	Sultan Hamud

19	USA	typic argiustoll	A_1	0-19	Holdrege
20	USA	typic argiustoll	B_{2t}	44-67	Holdrege
23	France	mediterranean red soil	A	0-21	-
24	France	mediterranean red soil	B	21+	-
25	Brazil	xanthic ferralsol	A_1	0-15	Bra 11
26	Brazil	xanthic ferralsol	B_{2t}	80-150	Bra 11
27	Netherlands	orthic luvisol	B_1	27-58	-
28	Netherlands	orthic luvisol	B_2	58-102	-

4 *Data Treatment*

4.1 Modifications in the data

Contrary to the report on exchange-round 85-1 the data in this report have not been modified but are presented in the tables as received. The only correction that was made (if necessary) was for moisture as data were requested on an oven-dry basis.
Some participants send a complete breakdown of the texture data. Where possible these were combined to make the 2 texture classifications used in this report:

USDA	FAO
clay (<2 micron)	clay (<2 micron)
silt1(2-20 micron)	silt2(2-50 micron)
sand1(20-2000 micron)	sand2(50-2000 micron)

As some participants did not have a 50 micron-sieve they used a 64 micron-sieve or a 40 micron-sieve. These data have been discarded as the comparison with data obtained with a 50 micron-sieve is not justified.

4.2 Internal inconsistencies

The data received at Isric have been subjected to an error checking routine. The participants concerned will find enclosed with this report a computer output with the details of the 'errors' in their data.
The control points are:

- sand+silt+clay = 100% (1% margin)
- silt1 <= silt2
- sand1 >= sand2

$pH\text{-}H_2O$ > pH-KCl and $pH\text{-}CaCl_2$
4 < $pH\text{-}H_2O$ < 9
4 < pH-KCl < 8
4 < $pH\text{-}CaCl_2$ <8
sum of exch. cations <= CEC (10% margin)
at pH > 7 sum of exch. cations = CEC (10% margin)
at pH > 7 exch. Ca > sum of other exch. cations (10% margin)

It has to be stressed that detected inconsistencies do not always point to errors in the data. They only indicate which data are not in agreement with the mentioned control-points. For some soils however these control-points are too rigid. As they show a certain overlap, a single inconsistency is usually detected by more than one control-point. Therefore the above mentioned computer output might look unnecessary extensive.

4.3 Results and outlying individual data

An overview of the results is given in table 2. This table has been divided in subtables for each soil parameter. In each subtable 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 parameter. 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 + 2*MAD1) or lower than (MED1 - 2*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 2* MAD2 from MED2 are marked with a single asterix '*'. Discussions are going on about the appropriateness of the factor 2 in this calculation. To facilitate comparison with the data in the report on the exchange round 85-1, where this factor 2 is used, the factor 2 is also applied in this report.

4.4 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-lowerlimit interval are marked with '**'. This is an indication that the laboratories concerned produce figures consistently higher or lower than others. Table 3 is given for clay%, pH-H_2O and CEC.

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 (%)

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	45	6	35	25	5*	86	87	25	32	36	40	13	26	23	19
3	50	12	75**	37**	8	87	82*	29*	21**	40*	43	33**	31**	28*	21
4	46	4	36	27	7	84	86	25	38**	29*	42	13	29	27*	23
6	37	4	30**	27	5	85	86	26	31	36	40	11	25	23	18
7	48	5	34	26	6	84	86	26	31	35	40	12	26	23	19
9	56**	1**	45**	25	11*	90	87	23	26*	34	41	17**	32**	23	19
11	26**	1*	34	31*	9	74**	77**	22*	28*	29*	38*	11	26	22	18*
14	35	11	35	31*	9*	82	84	23	29	33	40	12	28	23	19
19	42	8	37*	25	6	90*	88	27	32	37	42	13	29	25	20
22	39	5	35	26	7	17**	24**	21**	31	29*	39	11	18**	17**	24*
24	47	4	35	25	5	83	86	24	31	33	40	12	27	24	20
25	9**	11	38*	37**	13**	81*	83*	29*	31	30	41	15**	30*	25	21
26	47	4	36	26	7	81*	82*	26	32	34	40	13	28	25	27**
27	45	11	38*	27	8	77**	77**	27	32	36	43*	13	30*	26*	21
28	45	7	35	26	6	87	89	28*	30	35	42	13	28	23	20
29	35*	4	32*	23*	5	74**	77**	25	29	31	37*	6**	25	24	16**
30	39	0**	27**	20**	0**	88	88	19**	25**	30	35**	2**	18**	17**	10**
34	35*	4	35	25	6	89	89	26	34*	38	44*	12	27	28*	25**
35	22**	6	35	21*	7	58**	74**	24	29	33	40	14	25*	23	22
37	39	8	43**	35**	11**	93**	94**	34**	40**	38	48**	20**	31**	37**	30**
39	41	19**	56**	36**	20**	93**	94**	32**	35*	44**	55**	26**	48**	29**	22
43	25**	4	29**	22*	8	71**	75**	19**	27*	20**	31**	10*	27	21*	17**
46	27**	18**	35	37**	12**	80*	60**	27	43**	32	22**	-	13**	58**	27**
47	35*	10	33*	32*	10*	52**	74**	24	25**	30	34**	17**	27	21*	18
48	42	4	35	23*	4*	84	85	25	33	35	41	11	28	24	19
50	44	4	31**	24	6	81*	85	23	31	30	39	10*	27	22	19
53	60**	18**	44**	34**	15**	89	93**	36**	39**	39*	47**	20**	33**	38**	26**
54	39	7	35	26	5	88	88	27	30	35	41	12	26	23	19
55	45	7	38*	29*	8	87	89	29*	32	38	44*	15**	30*	26*	21
56	43	8	35	25	7	86	89*	26	32	33	41	12	25	23	21
62	38	8	23**	30*	11**	85	89	30**	24**	6**	41	14*	21**	26*	25**
64	50	10	28**	26	7	88	87	27	21**	36	33**	9**	22**	28**	21
73	45	7	37*	0**	12**	90	86	24	34*	38	44*	14*	28	24	22
74	28**	9	30**	31*	9	82*	81*	24	28*	30	38*	12	23**	23	18*
76	43	13*	35	33**	8	87	85	36**	53**	45**	51**	12	26	48**	39**
83	39	4	34	29*	2**	86	87	25	27*	33	42	12	28	27*	21
88	43	4	36	35**	9	81*	80*	25	35*	35	49**	12	26	22	22
MED1	42.2	7.0	35.0	26.4	7.1	85.0	86.0	25.8	31.0	34.2	40.9	12.1	27.0	24.0	20.9
MAD1	4.2	3.0	1.7	3.0	1.9	3.6	3.0	2.0	2.8	3.1	1.9	1.1	1.8	2.0	1.9
MED2	43.0	6.7	35.0	26.2	6.9	86.0	86.4	25.3	31.0	34.2	40.9	12.0	27.0	23.4	20.4
MAD2	4.0	2.7	0.6	1.3	1.1	2.0	1.4	1.4	1.4	2.2	1.1	0.8	1.0	1.2	1.3

SILT1 (%)

SAMPLE:	11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
LAB:															
1	16	16	1	15	5	8	4*	18	18	16	11**	1	1	16	13
3	17	18	1	10**	10**	7	15**	23**	31**	18	18	5**	2*	19*	20**
4	17	20*	2	15	6	8	10**	19	17	29**	17	1	1	11**	13
6	23*	19	2	19**	6	8	9*	19	20	19	20	4**	5**	17	15
7	14	19	1	14	5	7	7	19	18	18	17	1	2*	18	15
9	19	25**	1	22**	3	6	5	21**	17	25**	29**	1	1	19	12
11	34**	12*	1	16	6	15**	12**	18	18	19	18	1	1	17	14
14	16	16	1	13	2**	17**	26**	20	29**	16	20	1*	1*	6**	16
19	15	15	1	13	5	2**	6	18	15**	16	16	1	1	16	11*
22	22	18	1	16	5	14**	18**	16**	20	21**	18	1	11**	14*	18
24	15	14	2	14	5	10*	8*	20*	21	19	20	2**	1	17	15
26	17	15	1	15	6	14**	7	18	20	17	18	1*	1	18	2**
27	20	17	2	14	6	11**	9**	19	20	16	19	1	1	18	15
28	19	15	1	14	5	6	6	18	20	18	17	1	1	16	13
29	33**	17	5**	3**	6	14**	17**	20**	21	18	19	1	1	18	18
30	23*	16	3**	13	4	7	6	19	23**	21**	20	1	2*	20*	18
34	18	6**	1	12*	4	5*	4*	17	10**	14**	14**	1	1	15	9**
39	31**	28**	3**	26**	7**	1**	2**	16**	17	23**	17	1	1	14*	16
43	11**	12**	7**	14	3**	10*	5	18	13**	21**	13**	0**	0**	16	15
47	35**	17	7**	18**	14**	42**	19**	18	21	16	20*	5**	6**	8**	16
48	23*	15	2*	17*	6	9*	6	15**	15*	18	16	1	0**	13**	10**
50	15	9**	2	13	6	8	7	20*	16	18	15	2**	1	17	10**
53	12*	16	0	13	5	6	3*	18	19	17	17	1	4**	20*	12
54	16	18	1	15	6	6	6	18	18	17	17	1	1	17	14
55	18	13	0	14	4	6	5	18	19	16	16	2**	2*	18	17
56	19	18	1	15	4	6	6	19	17	15	16	1	1	15*	13
62	20	42**	2	9**	3*	7	5	50**	64**	57**	29**	1	3**	25**	44**
64	13	2**	1	10**	4	8	6	3**	12**	13**	14**	0*	0*	2**	1**
73	22	11**	0	25**	3	0**	5	17	15**	14**	14**	2**	5**	13**	13
74	29**	13*	4**	19**	8**	7	3**	20*	19	19	18	1*	3**	16	17
76	18	19	2	6**	4	8	11**	28**	24**	14**	11**	3**	1	34**	14
83	24*	14	0	16	13**	5*	6	17	17	17	16	1	1	20*	15
MED1	18.4	16.0	1.1	14.2	5.0	7.4	6.0	18.3	18.4	17.6	17.2	1.0	1.2	16.8	14.6
MAD1	3.4	2.1	0.7	1.5	1.0	1.4	1.5	0.9	1.7	1.5	1.8	0.4	0.4	1.7	1.8
MED2	17.8	16.1	1.0	14.1	4.8	7.1	5.8	18.2	18.4	17.0	17.5	1.0	1.0	17.0	15.0
MAD2	2.4	1.7	0.5	1.1	0.8	0.9	0.8	0.8	1.4	1.0	1.3	0.2	0.2	0.9	1.5

SILT2 (%)

SAMPLE:	11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
LAB:															
1	23*	27**	2	17**	6	8	8	37**	30**	21**	17**	1**	3	32**	26**
3	25	48	4	18**	17**	10	15**	57	67**	32	30	6**	4*	63	69
4	30	57**	4	31*	14*	11	11	70**	58	45**	33	3	4*	69	73
6	32	42	4	25	10	10	10	50	53	32	31	4*	5**	58	55
7	28	56**	3	27	11	12	10	67**	63	35	34*	3	5**	71	76

SILT2 (%)

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
9	33	64**	6**	60**	42**	7	11	77**	74**	55**	50**	12**	15**	76**	80**
11	49**	49	4	30*	14*	20**	17**	69**	65*	36*	34*	4	5**	73**	76
14	32	46	4	27	10	24**	32**	62	69**	32	35*	3	3	53	71
19	29	44	2	26	11	5*	8	59	56	30	28	3	2*	65	67
22	27	41	3	24	8	36**	61**	32**	51	33	31	2	12**	36**	61
24	23	37	3	22	9	12	10	52	48	29	28	3	3	54	51
25	39**	42	1	24	9	13*	11	57	52	31	29	2	1**	64	66
26	23	34*	2	25	7	17**	11	59	57	31	30	3	4*	65	6**
27	30	50*	3	31**	14*	16*	16**	63	60	33	31	3	3	67	73
28	26	40	1**	21	7	8	7*	59	55	28	27	2	2*	67	71
29	39**	50*	10**	32**	14*	22**	19**	67**	64*	37*	38**	9**	7**	60	78*
34	33	32*	3	25	8	6	6*	44**	40*	26*	23**	2	3	48	48
35	33	40	4	34**	19**	35**	23**	55	43	34	29	5**	9**	56	55
37	27	47	1	22	6	3**	12	41**	41*	23**	22**	1**	3	47*	44*
39	45**	56**	4	36**	17**	5*	4**	63	59	38*	30	9**	4*	64	74
43	17**	27**	9**	19**	4**	14*	11	54	51	28	30	2	3	43**	56
46	52**	54**	17**	28	34**	13*	37**	51	37**	32	54**	-	19**	31**	57
47	38**	41	10**	21	19**	42**	21**	55	59	38**	33	6**	10**	49	61
48	29	43	2	25	8	10	8	54	45	28	25*	3	0**	54	56
50	28	46	7**	28	8	14*	11	65*	57	41**	31	9**	5**	67	67
53	17**	41	1**	23	8	7	3**	51	52	26*	26	1**	4*	51	59
54	23*	41	2	17**	7	8	8	42**	37**	30	27	2	2*	43**	38**
55	29	51*	2	27	11	9	8	53	48	29	27	2	3	60	70
56	27	40	1	24	8	8	6**	50	41*	27	24*	2	2	51	49
62	35*	43	3	21	6	10	7	50	64	57**	29	2	3	62	55
73	30	44	3	55**	9	5*	9	39**	45	23**	25*	2	5**	54	47
74	40**	32**	4	28	10	9	9	61	58	31	30	4*	3	63	67
76	29	33*	2	6**	4*	8	11	44**	24**	14**	11**	3	3	34**	39*
83	35*	37	3	26	18**	9	9	53	36**	29	26	3	4*	51	54
88	24	37	2	25	12	7	6**	59	46	28	23*	4	3	66	58
MED1	29.4	42.2	3.0	25.0	10.0	10.0	10.0	55.3	52.2	31.1	29.1	2.8	3.3	58.0	58.7
MAD1	4.0	5.2	1.0	3.0	3.0	2.9	2.0	5.4	6.9	3.3	3.1	0.8	0.8	7.0	10.3
MED2	28.8	42.0	2.9	24.8	8.6	9.0	9.6	55.4	53.0	30.8	29.5	2.7	3.0	60.0	61.0
MAD2	3.0	3.5	1.0	2.0	1.8	1.7	1.4	3.8	5.5	2.3	2.0	0.6	0.3	6.2	8.0

SAND1 (%)

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	39	77	64	60	90	6	9	58	51	48	49**	87	72	62	68
3	33*	70*	23**	53*	82**	6	3**	48**	48	42**	39*	62**	67**	53*	59**
4	37	76	62*	58	87	8	4*	56	45**	42**	41	86	70*	62	64
6	40*	77	68**	54*	89	7	5	55	49	45*	40	85*	70*	60	67
7	38	76	65	59	89	9*	7	56	51	47	43	87	72	59	66
9	25**	74	55**	53*	86	5	8	56	56**	41**	30**	82**	67**	58	69
11	40*	87**	65*	53*	85*	11**	11*	60**	54	53**	44	88*	73	62	69

SAND1 (%)

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
14	47**	74	67**	65*	94**	15**	13**	57	52	50	45*	90**	70*	55	65
19	43**	77	62*	62	89	8	7	56	53	47	43	86*	70	58	69
22	39	77	64	58	88	69**	58**	63**	49	50	43	88	71	69**	58**
24	39	83	63	61	90	7	7	56	49	48	40	87	72	58	65
26	36	81	63	59	88	5	11**	56	48	50	42	87	71	57	71*
27	35	72	61*	60	86*	12**	14**	54	48	48	38**	86	69*	56	64
28	36	78	64	60	90	7	5	54*	50	48	40	86	71	60	67
29	32**	79	63	73**	89	12**	6	55	50	51	44	92**	74**	58	66
30	38	84*	70**	67**	96**	5	7	62**	52	49	45*	97**	80**	63	72**
34	48**	90**	64	63*	90	7	7	57	56**	49	42	87	71	57	66
39	29**	53**	41**	38**	72**	6	4*	52**	47	33**	28**	73**	51**	56	63
43	36	61**	63	46**	76**	10*	11**	56	57**	40**	48**	85*	73	54	62*
47	31**	72	60**	51**	75**	6	7	58*	54	53**	46*	78**	67**	-	66
48	35	81	63	60	91	7	10	60**	52	47	44	87	72	63	70*
50	40*	87**	67**	63*	88	11**	8	57	53	52*	46*	88	72	61	71*
53	29**	66**	56**	53*	80**	5	4*	46**	43**	44*	36**	80**	63**	43**	62*
54	46**	75	64	59	89	6	6	56	52	48	42	88	72	60	67
55	37	80	62*	58	88	7	6	53*	49	46	39*	83**	68**	56	62*
56	38	74	64	60	88	8	5	55	51	52*	42	87	74*	62	66
64	37	88**	71**	64*	90	5	8	70**	67**	51	54**	91**	78**	70**	77**
73	33*	82	63	75**	85*	10*	8	59*	51	49	42	84**	68**	63	65
74	43**	79	66*	50**	84**	11**	16**	57	53	51	43	87	74**	61	66
76	38	68**	64	61	88	5	4*	36**	23**	41**	38**	85*	73	19**	47**
83	37	82	67**	55*	85*	9*	9	58*	56**	50	42	87	71	53*	63
MED1	37.0	77.2	63.7	59.4	88.0	7.0	7.1	56.0	51.1	48.1	42.2	86.6	71.1	58.6	65.8
MAD1	2.1	4.0	1.5	3.7	1.8	1.7	2.0	1.7	2.1	2.1	2.2	1.3	1.4	3.0	2.7
MED2	37.0	77.2	63.5	59.5	88.4	6.5	7.0	56.0	50.8	48.6	42.4	87.0	71.6	58.6	65.8
MAD2	1.4	2.9	0.6	1.5	1.1	1.1	1.3	0.9	1.8	1.4	1.2	0.6	0.8	2.6	1.8

SAND2 (%)

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	32	65**	64	58**	90*	6	5*	39**	38**	44**	34*	87	71*	46**	55**
3	25	40*	20**	45	75*	3**	3**	14	12	28**	27*	61**	65**	9	10
4	24	39*	60*	42	79	5	3**	5**	4**	26**	25**	84	67	4	4
6	31	54	66**	48	85	5	4	24	16	32	29	85	70	19	27
7	24	38**	62	47	83	4*	4	7*	6*	30*	27*	86	69	6	5
9	10**	36**	50**	15**	48**	3**	2**	0**	0**	11**	9**	72**	54**	1*	0*
11	25	50	62	39	77	5	6*	9	7	35	28	86	69	6	7
14	31	44	64	51	86	8**	7**	14	12	34	30	87	68	8	9
19	28	48	61	49	83	5	4	14	12	33	30	84	69	10	12
22	34*	54	62	50	85	47**	15**	47**	18	38	30	87*	70	47**	15
24	31	60**	62	53*	86	5	5*	24	22	38	32	86	70	21*	29
25	51**	47	61	39	78	5	6**	14	17	39	30	84	69	10	14
26	30	62**	62	49	86	2**	8**	15	11	36	29	84	68	10	67**

SAND2 (%)

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
27	26	40*	60*	42	78	7**	7**	10	8	31	26*	84	67	7	6
28	29	53	64*	53*	87	5	5	13	15	38	31	85	70	10	9
29	27	46	58**	45	81	4*	4	8*	7	32	25**	85	68	6	6
34	33	64**	62	50	85	5	5*	30*	26*	37	33*	86	70	24*	28
35	45**	54	61	45	74*	7**	4	21	28**	33	31	82*	67	21*	23
37	34*	45	56**	43	83	4*	4	25	19	39	30	79**	66*	16	26
39	15**	25**	40**	27**	63**	2**	2**	5**	6*	19**	15**	65**	48**	6	4
43	30	46	61	41	75*	6*	6**	21	20	33	31	84	69	27**	21
46	21**	28**	48**	35**	54**	7**	3**	22	20	36	24**	-	68	11	16
47	27	49	57**	47	71**	5	5*	21	16	31	33*	77**	63**	20	20
48	29	53	63	52*	89	6*	7**	20	22	37	34*	86	72**	22*	25
50	27	49	62	48	86	5	4	12	12	29**	29	81*	68	11	14
53	23	41	55**	43	77	4**	4	13	9	35	27*	79**	63**	11	15
54	33	52	63	56**	88	5	4	31**	33**	35	32	87	71**	34**	43**
55	26	42	61	44	82	4*	4	18	20	33	28	83	67	14	9
56	30	52	64*	51	85	6	5	24	27**	40	34**	86	72**	26**	30
62	27	49	74**	49	83	5	4	20	12	37	30	84	76**	12	20
73	24	49	60*	45	79	6	5*	37**	20	40	31	84	67	22*	32*
74	32	60**	66**	41	81	10**	9**	16	14	39	32	84	74**	15	15
76	28	55	64	61**	88	5	4	20	23	41**	38**	85	71*	19	22
83	26	58*	63	45	80	5	5*	23	37**	38	31	85	68	22*	25
88	26	41*	62	37*	77	4	4	10	16	32	25**	81*	68	8	17
MED1	28.0	49.0	62.0	45.3	82.0	5.0	4.4	18.0	16.0	35.1	30.0	84.0	68.4	12.0	16.0
MAD1	3.0	5.0	1.7	4.0	4.0	0.6	0.6	6.0	5.0	2.9	2.0	1.7	1.4	6.4	8.7
MED2	28.1	48.9	62.0	45.3	83.0	5.0	4.2	16.8	15.3	35.5	30.0	85.0	68.4	10.9	15.1
MAD2	2.8	4.1	0.9	3.4	3.2	0.4	0.3	4.1	4.4	2.5	1.0	1.0	1.1	4.7	7.4

pH–H_2O

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	7.5**	4.8*	4.6*	10.0**	10.0**	7.6**	8.1*	6.4	7.0**	7.9*	7.8*	6.0**	4.6**	6.3**	6.6*
3	8.1**	5.1	5.2**	10.0**	10.1	7.2**	7.8**	6.0	6.6**	7.6**	8.4**	5.6	5.4**	8.0**	7.8**
4	7.9	5.2	4.8	10.4	10.4	8.0	8.3	6.3	7.3*	7.9*	7.9	5.7	4.9	6.5	6.9
5	7.9	5.0	4.8	10.4	10.4	7.8	8.4	6.3	7.3*	8.1*	8.0	5.7	4.9	6.7	6.9
6	7.8	4.9	4.8	10.4	10.3	7.8	8.3	6.4	7.5	8.0	8.0	5.7	4.9	6.5	6.9
7	8.0**	5.1	4.7*	10.3	10.4	8.0	8.4	6.3	7.5	8.0	8.1	5.9	4.7	6.7	7.0
9	7.6*	4.9	4.6*	10.3	10.2	7.9	8.2*	6.1	7.0**	7.8**	7.8*	5.9	4.9	6.1**	6.3**
11	7.5**	5.2	5.0*	10.2	10.3	8.0	8.2	6.5**	7.5	8.0	8.1	5.9	5.0	6.8**	7.1*
14	7.7	4.7**	4.5**	10.4	10.3	7.1**	8.3	6.2	7.0**	7.8**	7.8*	6.3**	5.0	6.4*	6.7
19	8.0**	5.1	5.0**	10.5	10.4	8.0	8.4	6.2	7.5	8.1*	8.1	5.8	5.1*	6.9**	7.1
22	7.9	4.9	4.8	10.4	10.4	7.8	8.6*	6.0	7.5	8.0	7.9	5.7	4.7	6.7	6.7
24	7.8	4.9	4.8	10.3	10.3	7.9	8.3	6.2	7.4	8.0	8.0	5.6	4.8	6.7	7.0
25	7.7	5.0	4.5**	10.4	10.3	7.8	8.5	6.3	7.4	7.9*	7.6**	5.6	4.9	6.5	6.7
26	7.7	5.0	4.7*	10.5	10.4	8.3**	8.5	6.2	7.2*	7.9*	8.2*	5.9	4.9	6.0**	6.8
27	7.9	5.1	4.8	10.3	10.3	7.8	8.3	6.2	7.0**	8.0	7.9	5.8	5.0	6.6	6.8

pH-H_2O

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
28	8.0**	5.1	4.6*	10.6**	10.6**	7.8	8.4	6.2	7.5	8.2**	8.0	5.6	4.8	6.4**	7.0
29	7.9	5.0	5.0**	10.3	10.3	8.0	8.4	6.2	7.5	8.0	8.0	5.7	4.9	6.7	7.0
30	7.8	4.6**	4.8	10.4	10.3	7.8	8.3	6.0	7.4	8.0	8.0	5.6	4.8	6.6	7.1
32	7.7	5.0	4.8	10.4	10.5	8.1	8.4	6.1	7.3*	8.0	7.9	5.6	4.7	6.3**	6.6*
34	7.8	4.9	4.8	10.2*	10.2	7.9	8.3	6.3	7.5	8.0	8.0	5.8	4.9	6.7	7.0
35	7.8	4.9	4.8	10.3	10.2	7.8	8.4	6.2	7.3*	7.9	7.9	5.6	4.9	6.6	6.9
36	7.7	4.6**	4.6**	10.2	10.1	7.6**	8.2	5.9**	6.8**	7.7**	7.6**	5.4**	4.5**	6.2**	6.5**
37	8.0**	5.0	4.9*	10.5	10.5	8.0	8.5	6.3	7.6	8.2**	8.2*	5.7	4.9	6.9**	7.3**
39	7.5**	5.2	4.8	10.1*	9.7**	7.9	8.5	6.4	7.1**	8.0	7.9	5.7	5.0	6.3**	6.5*
43	7.8	5.0	4.8	10.2*	10.3	8.1	8.4	6.2	7.5	8.0	8.0	5.7	4.9	6.7	7.1
46	7.0**	5.9**	5.0**	10.0**	9.8**	7.8	8.1*	7.0**	7.0**	7.6**	7.7**	6.5**	5.6**	6.4*	6.7
47	7.4**	5.3**	5.3**	9.1**	9.4**	7.5**	7.8**	6.3	7.3	7.8**	7.4**	5.9**	5.3**	6.6	6.9
48	7.9	4.9	4.8*	10.4	10.1	7.9	8.8**	6.3	7.5	8.0	8.1	5.6	4.7	6.6	6.8
49	7.8	5.0	4.9*	10.7**	10.6**	7.8	8.5	6.1	7.5	8.1*	8.0	5.6	4.8	6.6	6.8
50	7.8	5.0	4.8	10.6**	10.5	8.2**	8.7**	6.5**	7.5	8.1*	8.1	5.8	4.9	6.7	6.9
51	7.6*	5.0	5.1**	9.5**	9.4**	7.2**	7.9**	6.8**	7.3*	7.6**	7.5**	5.4**	4.7	6.1**	6.5*
53	7.8	5.1	4.9*	10.6**	10.6**	8.1	8.5	6.6**	7.6	8.2**	8.1	5.9	5.0	6.6	7.0
54	8.2**	5.0	4.8	10.6**	10.6**	7.9	8.7**	6.2	7.7**	8.1*	8.0	5.7	4.8	6.7	7.1
55	7.5**	4.4**	4.2**	10.0**	9.8**	7.3**	8.0**	5.7**	6.8**	7.4**	7.2**	5.0**	4.1**	5.9**	6.2**
56	7.4**	4.1**	3.9**	10.2*	10.0**	7.3**	8.0**	5.6**	6.8**	7.4**	7.2**	4.9**	4.0**	5.8**	6.0**
62	8.0**	4.8*	4.7*	10.5	10.4	7.9	8.4	6.1	7.3*	8.0	8.0	5.5	4.6**	6.3**	6.7
63	7.9	4.8*	4.6*	10.5	10.3	7.9	8.4	6.1	7.4	7.9*	7.8*	5.5	4.6**	6.5	6.9
64	7.8	4.8**	5.0**	10.1*	9.9**	7.9	8.1*	6.0	6.8**	7.9*	8.0	5.5	4.8	6.4*	6.4**
73	7.8	5.0	5.0**	10.5	10.4	8.1	8.8**	6.5**	7.5	8.1*	8.0	6.2**	4.8	6.4	6.8
76	7.8	5.0	4.8	10.3	10.2	7.9	8.4	6.3	7.4	8.0	8.0	5.7	4.8	6.7	7.0
80	8.1**	4.1**	4.9*	9.8**	9.4**	6.5**	7.7**	5.5**	6.4**	6.9**	6.9**	5.3**	4.6**	5.2**	5.4**
83	7.3**	6.2**	6.0**	9.7**	9.8**	8.2**	8.2*	7.0**	7.6	7.9*	6.5**	6.4**	6.3**	7.4**	7.4**
88	8.2**	5.1	5.0**	10.3	10.4	7.8	8.3	6.3	7.3*	8.3**	7.9	5.8	5.0	6.7	6.9
MED1	7.80	5.00	4.80	10.31	10.30	7.90	8.36	6.20	7.40	8.00	8.00	5.70	4.90	6.60	6.90
MAD1	0.10	0.10	0.10	0.11	0.10	0.10	0.14	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.20
MED2	7.80	5.00	4.80	10.37	10.30	7.90	8.39	6.20	7.47	8.00	8.00	5.70	4.90	6.60	6.90
MAD2	0.08	0.10	0.01	0.07	0.10	0.10	0.09	0.10	0.08	0.05	0.10	0.10	0.10	0.10	0.10

pH-KCl

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	7.2	4.2	4.0	9.9**	9.6**	7.3**	7.9**	6.0**	6.4**	7.4	7.1**	5.8**	4.1*	5.4**	5.8**
3	6.6**	4.2	4.1	9.0**	9.0*	6.3**	6.6**	5.6**	6.4**	6.8**	6.2**	5.3**	4.4	5.4**	5.4
4	7.1	4.3	4.0	9.2*	9.2	6.5	6.9	5.0*	5.8	7.1	6.4**	4.8**	4.0**	4.9	4.8**
5	7.1	4.2	4.1	9.3	9.3	6.5	7.0	5.2	5.9	7.2	6.6	5.0	4.3	5.1	5.2
6	7.3	4.3	4.2	9.5	9.5	6.6	7.1	5.2	5.9	7.4	6.7	5.0	4.3	5.1	5.3
7	6.9**	4.1	4.0	9.3	9.3	6.3**	6.5**	5.1	5.8	7.1	6.3**	4.9*	4.1*	4.9	5.1
9	7.1	4.0**	4.0	9.2*	9.0*	6.5	6.8**	5.0*	5.7*	7.1	6.6	5.0	4.1*	4.8**	5.1
11	6.9**	4.3	4.4**	9.1*	9.1	6.6	6.7**	5.4*	5.9	7.1*	6.3**	5.2*	4.3	5.1	5.3
14	7.1	4.1	4.0	9.3	9.3	5.9**	7.0	5.0*	5.6**	6.9**	6.4**	5.0	4.2	4.8**	5.0

pH-KCl

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
19	7.3	4.1	4.0	9.5	9.4	6.6	7.0	5.2	6.0	7.3	6.6	5.0	4.1*	4.9	5.1
22	7.1	4.2	4.0	9.4	9.4	6.4*	6.8**	5.0*	5.7*	7.2	6.5	4.9*	4.2	4.9	5.0
24	7.2	4.1	4.0	9.3	9.3	6.5	6.9	5.0*	5.7*	7.2	6.5	4.8**	4.0**	4.8**	5.0
25	7.1	4.0**	3.9**	9.2*	9.1	6.6	7.0	5.1	5.8	7.1	6.6	4.9*	4.1*	4.7**	4.9**
26	6.6**	4.3	4.2	9.5	9.4	7.8**	7.5**	5.3	5.6**	6.5**	6.5	5.0	4.2	4.8**	5.1
27	7.4	4.3	4.3	9.4	9.2	6.7	7.2*	5.5**	6.5**	7.4	7.2**	5.6**	4.7**	5.3**	5.6**
28	7.5**	4.2	4.0	9.6*	9.6*	6.7	7.1*	5.2	6.0	7.5	6.8	5.0	4.2	5.0	5.2
29	7.1	4.2	4.2	9.3	9.3	6.4*	6.9	5.1	5.9	7.3	6.6	5.0	4.3	5.0	5.2
30	7.3	4.3	4.2	9.5	9.5	6.6	7.1	5.2	6.0	7.4	6.8	5.1*	4.4	5.1	5.4
32	7.0	4.2	4.0	9.3	9.3	6.4*	6.8**	5.2	5.6**	7.4	6.4**	4.9*	4.1*	5.0	5.0
34	7.1	4.2	4.2	9.2*	9.2	6.6	7.0	5.3	5.9	7.3	6.6	5.1*	4.3	5.1	5.3
35	7.3	4.3	4.1	9.3	9.1*	6.8*	7.0	5.3	5.9	7.3	6.6	5.0	4.3	5.0	5.2
36	7.3	4.2	4.0	9.4	9.4	6.7	7.0	5.2	5.9	7.3	6.8	5.0	4.2	5.0	5.3
37	7.3	4.2	4.2	9.4	9.4	5.6**	7.1	5.2	5.9	7.3	6.6	5.0	4.3	5.0	5.2
39	7.3	4.2	4.1	9.9**	9.0*	7.0**	7.1	5.5**	5.9	7.3	6.9**	5.2*	4.3	5.0	5.2
43	7.1	4.2	4.0	9.2*	9.3	6.6	6.9	5.2	5.9	7.1	6.5	4.9*	4.1*	4.9	5.1
46	6.7**	4.2	4.1	9.2*	9.0*	6.8**	7.0	5.9**	6.0	6.6**	6.6	5.4**	4.4	4.9	5.0
47	6.8**	4.6**	4.8**	8.5**	8.3**	6.2**	6.8**	5.4*	5.9	6.9**	6.5	5.4**	4.8**	5.3**	5.3
48	7.1	4.2	4.1	9.3	9.1	6.5	6.9	5.1	5.8	7.1	6.5	4.8**	4.0**	4.9	5.0**
49	7.3	4.3	4.2	9.6*	9.6**	6.6	6.8**	5.2	5.9	7.4	6.7	5.0	4.3	5.0	5.2
50	7.3	4.3	4.1	9.5	9.4	6.6	7.1	5.2	5.9	7.3	6.7	5.0	4.3	5.1	5.2
51	7.3	4.2	4.2	9.4	9.2	6.2**	7.0	5.2	5.8	7.3	6.4**	4.9*	4.2	4.9	5.3
53	7.2	4.1	4.0	9.4	9.4	6.5	7.0	5.2	5.8	7.3	6.7	5.1*	4.3	5.0	5.2
54	7.3	4.2	4.1	9.5	9.5	6.5	7.1	5.2	5.8	7.3	6.5	5.0	4.2	5.0	5.2
55	6.9**	4.2	4.1	9.3	9.1	6.5	6.8**	5.1	5.8	7.1	6.4**	5.0	4.3	5.0	5.0
56	7.0	4.1	4.0	9.2*	9.2	6.5	6.9	5.5**	5.9	7.1	6.6	5.1*	4.4	5.0	5.1
62	7.5**	4.3	4.4**	9.6*	9.6**	6.9**	7.2*	5.4*	6.0	7.4	6.8	5.2*	4.4	5.1	5.3
63	7.3	4.0**	4.0	9.4	9.2	6.7	7.0	5.1	5.9	7.3	6.7	4.8**	4.1*	4.9	5.1
64	7.2	4.3	4.0	9.4	9.1	6.5	7.0	5.2	5.9	7.3	6.6	5.0	4.1*	4.9	5.2
73	7.3	4.1	4.0	9.4	9.3	6.4*	6.9	5.3	5.9	7.3	6.7	5.0*	4.3	5.1	5.3
76	7.2	4.2	4.1	9.3	9.1	6.5	7.0	5.2	5.8	7.3	6.6	5.0	4.2	5.0	5.2
80	6.6**	4.3	4.1	9.0**	9.0*	6.3**	6.8**	5.5**	5.5**	6.5**	5.9**	5.3**	4.2	5.0	5.0
83	5.8**	3.6**	3.6**	7.7**	7.2**	5.6**	4.3**	4.3**	4.8**	5.7**	6.1**	5.2*	4.7**	5.2	5.4
88	7.5**	4.4**	4.4**	9.4	9.5	6.6	7.2*	5.3*	6.0	7.2	6.7	5.0	4.4	5.0	5.2
MED1	7.20	4.20	4.10	9.35	9.30	6.55	7.00	5.20	5.90	7.28	6.60	5.00	4.29	5.00	5.20
MAD1	0.10	0.09	0.10	0.15	0.15	0.11	0.10	0.10	0.10	0.12	0.10	0.10	0.11	0.10	0.10
MED2	7.20	4.20	4.10	9.39	9.30	6.57	7.00	5.20	5.90	7.30	6.60	5.00	4.29	5.00	5.20
MAD2	0.10	0.05	0.10	0.09	0.10	0.07	0.06	0.07	0.09	0.10	0.10	0.02	0.09	0.10	0.10

pH-$CaCl_2$

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
39	7.4	4.6**	4.7**	9.0	8.2**	7.2	7.4**	5.9**	6.5	7.2	7.0	5.5	4.7**	6.0**	6.2**
64	7.6	4.2	4.1	9.6	8.7	7.3	7.9	5.5	6.6**	7.6	7.1**	5.2	4.3	5.8	5.9
73	7.8	4.3	4.1	10.0	8.6	7.1	7.9	5.5	6.4	7.4	7.0	5.0	4.3	5.8	5.9
MED1	7.60	4.25	4.15	9.65	8.65	7.20	7.90	5.55	6.50	7.40	7.05	5.20	4.25	5.85	5.95
MAD1	0.20	0.05	0.00	0.35	0.05	0.10	0.05	0.05	0.05	0.20	0.05	0.20	0.00	0.05	0.05
MED2	7.60	4.22	4.15	9.65	8.67	7.20	7.92	5.52	6.47	7.40	7.02	5.20	4.25	5.82	5.92
MAD2	0.20	0.03	0.00	0.35	0.03	0.10	0.03	0.02	0.03	0.20	0.02	0.20	0.00	0.03	0.03

Exch.K

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	0.39	0.05	0.04	0.42*	0.12*	1.19	1.51*	2.10	1.59	0.57	0.42*	0.06	0.02	0.26	0.19
3	0.59**	0.50**	0.60**	0.60**	0.04	2.34**	2.62**	4.55**	2.95**	0.97**	0.77**	0.10	0.05*	0.54**	0.35**
4	0.24	0.08*	0.04	0.23*	0.06	1.06	1.04	2.40	1.60	0.54	0.40	0.09	0.06*	0.30	0.58**
5	0.27	0.04	0.02	0.26	0.06	1.27	1.22	2.16	1.61	0.57	0.39	0.04	0.01	0.26	0.19
6	0.30	0.00**	0.00	0.30	0.10	1.30	1.20	2.30	1.80	0.60	0.40	0.10	0.00	0.30	0.20
7	0.20	0.00**	0.00	0.30	0.10	1.20	1.20	2.10	1.60	0.60	0.40	0.10	0.00	0.30	0.20
9	0.77**	0.61**	0.56**	0.87**	0.72**	1.64**	1.53*	2.81**	2.20**	1.13**	0.10**	3.12**	0.15**	0.92**	1.07**
11	0.20	0.00**	0.00	0.20*	0.00**	1.30	1.20	2.30	1.80	0.60	0.40	0.00**	0.00	0.30	0.20
14	0.30	0.10**	0.04	0.30	0.10	1.30	1.50*	2.60**	1.60	0.60	0.40	0.04	0.02	0.30	0.20
19	2.00**	0.04	0.03	2.11**	1.22**	2.50**	3.13**	2.37	2.01**	1.37**	0.72**	0.11	0.03	0.52**	0.41**
22	0.34	0.05	0.03	0.31	0.06	1.16	1.10	1.80*	1.41**	0.65	0.39	0.03	0.00	0.14**	0.21
24	0.39	0.04	0.03	0.45**	0.09	1.53**	1.53*	2.62**	2.17**	0.77**	0.41	0.08	0.04	0.33	0.25*
25	0.30	0.10**	0.10**	0.30	0.20**	1.20	1.20	2.20	1.80	0.60	0.40	0.10	0.10**	0.30	0.30**
26	0.04**	0.01*	0.01	0.05**	0.01*	0.24**	0.34**	0.30**	0.30**	0.16**	0.15**	0.06	0.04	0.11**	0.07**
27	0.41*	0.05	0.02	0.12**	0.12*	1.40	0.96*	1.69**	1.68	0.66	0.42*	0.07	0.03	0.28	0.23*
28	0.22	0.00**	0.00	0.26	0.00**	0.95*	1.04	1.12**	0.94**	0.26**	0.20**	0.01*	0.00	0.06**	0.07**
29	0.46**	0.06	0.03	0.55**	0.20**	1.39	1.69**	2.48*	1.94**	0.59	0.44*	0.10	0.05*	0.33	0.28**
30	0.22	0.05	0.03	0.27	0.06	1.17	1.03	2.24	1.79	0.55	0.38*	0.07	0.02	0.27	0.20
32	0.40	0.10**	0.01	0.40*	0.10	1.20	1.80**	2.00	1.50*	0.50*	0.40	0.10	0.01	0.30	0.20
35	0.64**	0.32**	0.41**	0.76**	0.38**	2.12**	17.94**	16.66**	1.92*	1.79**	1.15**	0.87**	0.13**	0.41**	0.32**
37	0.28	0.04	0.00	0.30	0.06	1.10	1.26	1.96	1.56	0.52	0.36*	0.06	0.04	0.24*	0.20
39	0.27	0.13**	0.17**	0.30	0.06	1.28	0.88*	2.16	1.78	0.54	0.40	0.08	0.06*	0.30	0.23*
43	0.08**	0.03	0.02	0.26	0.04	0.97*	0.70**	0.75**	0.73**	0.42**	0.39	0.15**	0.06*	0.48**	0.43**
46	0.20	0.06	0.01	0.24	0.09	1.14	1.00	2.31	1.68	0.47**	0.33**	0.09	0.03	0.24*	0.23*
47	0.31	0.03	0.24**	0.49**	0.17**	1.16	1.20	0.95**	0.85**	0.57	0.36*	0.09	0.08**	0.08**	0.08**
48	0.43*	0.07*	0.03	0.23*	0.07	1.09	1.10	1.98	1.50*	0.51*	0.32**	0.07	0.01	0.20**	0.16*
49	0.60**	0.20**	0.60**	1.70**	0.90**	1.40	3.00**	2.10	2.90**	1.00**	0.60**	0.30**	0.70**	0.00**	0.20
50	0.25	0.06	0.05*	0.28	0.06	1.33	1.27	2.17	1.76	0.66	0.43*	0.09	0.04	0.30	0.27**
51	0.28	0.06	0.02	0.32	-	0.84**	1.17	0.26**	1.41**	0.71*	0.48**	0.04	0.00	0.34	0.24*
53	0.25	0.05	0.03	0.26	0.07	1.44*	1.38	2.36	1.81	0.65	0.42*	0.07	0.03	0.27	0.21
54	0.24	0.04	0.02	0.24	0.04	1.38	1.24	2.27	1.73	0.60	0.40	0.06	0.02	0.28	0.21
56	0.30	0.10**	0.00	0.30	0.10	1.20	1.20	2.20	1.70	0.60	0.40	0.10	0.00	0.30	0.20
62	0.28	0.03	0.04	0.34	0.05	1.18	1.42	2.18	1.70	0.57	0.40	0.06	0.02	0.28	0.21
63	0.20	0.03	0.02	0.40*	0.06	1.10	1.80**	2.00	1.60	0.51*	0.36*	0.02*	0.02	0.18**	0.17*
64	0.38	0.09*	0.07**	0.50**	0.44**	1.34	1.08	1.98	1.60	0.70*	0.60**	0.17**	0.08**	0.32	0.30**
73	0.28	0.05	0.05*	0.25	0.02	1.08	0.91*	1.74*	1.28**	0.56	0.38*	0.05	0.10**	0.25*	0.20
74	-	0.04	0.03	-	-	-	-	1.84*	-	-	-	0.06	0.03	0.26	0.20
76	0.41*	0.04	0.01	0.63**	0.25**	1.75**	1.72**	2.06	1.75	0.77**	0.49**	0.06	0.02	0.30	0.39**
83	0.20	0.04	0.02	0.10**	0.03	0.50**	0.50**	0.80**	0.70**	0.30**	0.20**	0.03	0.03	0.10**	0.10**
88	0.15*	0.04	0.03	0.18*	0.04	0.71**	0.63**	1.67**	1.03**	0.42**	0.26**	0.06	0.02	0.18**	0.14**
MED1	0.28	0.05	0.03	0.30	0.07	1.20	1.20	2.13	1.68	0.60	0.40	0.07	0.03	0.29	0.20
MAD1	0.08	0.02	0.01	0.07	0.03	0.13	0.22	0.20	0.12	0.06	0.02	0.03	0.02	0.03	0.03
MED2	0.28	0.04	0.02	0.29	0.06	1.20	1.20	2.16	1.69	0.59	0.40	0.07	0.02	0.30	0.20
MAD2	0.06	0.01	0.01	0.03	0.02	0.10	0.12	0.14	0.09	0.04	0.01	0.02	0.01	0.02	0.01

Exch.Na

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	1.19	0.02	0.02	6.93**	1.28*	0.72	7.45	0.04	0.08	0.10	0.08	0.04	0.02	0.05	0.04
3	1.70	0.10*	0.00	20.40**	3.60**	2.00**	15.90**	0.50**	0.40**	0.30**	0.40**	0.10	0.10**	0.30**	0.20*
4	2.40*	0.16**	0.07*	9.60	2.40*	0.87	8.00	0.39**	0.33**	0.23*	0.23*	0.13	0.09**	0.16	0.19*
5	1.17	0.06	0.02	9.69	1.72	0.85	8.88	0.05	0.07	0.09	0.13	0.06	0.06*	0.07	0.05
6	0.80	0.10*	0.00	8.60	1.50	0.70	7.70	0.10	0.10	0.10	0.10	0.10	0.00	0.10	0.10
7	2.40*	0.00	0.00	11.00*	2.00	0.80	9.30	0.00*	0.20	0.10	0.10	0.10	0.00	0.10	0.10
9	1.91	0.47**	0.46**	9.78	1.30	1.39**	7.04*	0.47**	0.82**	0.44**	0.46**	0.56**	0.27**	0.47**	0.47**
11	3.05**	0.10*	0.10**	13.15**	2.95**	0.85	10.40**	0.15	0.20	0.15	0.20*	0.10	0.10**	0.10	0.15
14	1.40	0.60**	0.02	11.30*	1.90	2.30**	11.70**	0.90**	0.20	0.70**	0.40**	0.02	0.02	0.70**	0.20*
19	1.68	0.02	0.01	9.84	3.34**	1.25**	9.49*	0.13	0.20	0.41**	0.23*	0.06	0.02	0.16	0.14
22	1.16	0.24**	0.10**	9.50	2.00	0.71	7.20	0.14	0.13	0.12	0.14	0.00	0.00	0.04	0.13
24	2.84*	0.03	0.03	11.50*	3.07**	0.74	7.96	0.05	0.12	0.11	0.12	0.08	0.02	0.11	0.11
25	2.60*	0.30**	0.20**	8.30	2.60*	1.30**	8.20	0.30**	0.40**	0.30**	0.40**	0.30**	0.30**	0.30**	0.30**
26	0.52	0.04	0.03	3.00**	1.07*	0.25**	4.00**	0.04	0.05	0.05	0.09	0.06	0.03	0.06	0.06
27	0.66	0.01	0.01	1.10**	0.12**	0.59	2.80**	0.11	0.24*	0.13	0.01**	0.01	0.01	0.01	0.01
28	1.33	0.02	0.09*	9.26	1.65	10.08**	8.16	0.06	0.03	0.04	0.08	0.06	0.05*	0.04	0.04
29	0.58	0.08*	0.00	8.41	1.19*	0.82	7.85	0.19*	0.23*	0.19*	0.23*	0.12	0.08**	0.22**	0.21**
30	1.00	0.20**	0.05*	8.90	1.60	0.70	7.30	0.10	0.03	0.02*	0.05	0.10	0.00	0.10	0.04
32	1.50	0.00	0.01	10.10	2.50*	0.70	8.80	0.10	0.10	0.10	0.10	0.10	0.01	0.10	0.10
35	4.38**	0.64**	0.70**	18.80**	5.00**	2.12**	8.60	0.94**	1.54**	1.12**	0.82**	0.60**	0.26**	0.70**	0.86**
37	2.84*	0.02	0.00	10.30	1.70	0.72	9.04	0.04	0.08	0.10	0.14	0.06	0.02	0.04	0.06
39	3.36**	2.43**	3.52**	14.53**	2.63*	1.33**	13.13**	0.64**	1.39**	0.84**	0.57**	0.31**	0.52**	0.50**	0.50**
43	0.80	0.08*	0.09*	10.50	1.62	0.85	8.50	0.10	0.04	0.15	0.08	0.02	0.16**	0.04	0.04
46	3.39**	0.02	0.02	13.22**	2.78**	0.87	8.70	0.10	0.14	0.21*	0.16	0.07	0.02	0.10	0.09
47	2.60*	0.08*	0.28**	5.30**	1.52	0.60	2.30**	0.44**	0.32**	0.22*	0.23*	0.18**	0.16**	0.16	0.16
48	1.27	0.01	0.00	8.55	1.50	0.67	8.32	0.04	0.06	0.09	0.05	0.04	0.00	0.05	0.06
49	1.00	0.01	0.01	10.20	1.70	1.10**	8.10	0.00*	0.40**	0.00*	0.00**	0.00	0.00	0.00*	0.00*
50	0.74	0.13*	0.13**	9.03	1.78	0.83	9.24	0.09	0.18	0.21*	0.19*	0.14*	0.08**	0.17	0.18*
51	1.15	0.02	0.00	0.73**	-	0.90	0.75**	0.12	0.19	0.19*	0.21*	0.02	0.00	0.10	0.14
53	0.53	0.03	0.03	9.54	1.71	0.78	9.97*	0.05	0.10	0.10	0.10	0.05	0.03	0.05	0.05
54	0.58	0.01	0.01	9.49	1.65	0.79	8.19	0.01	0.04	0.08	0.09	0.04	0.01	0.06	0.05
56	1.40	0.10*	0.00	10.80	1.80	1.20**	10.60**	0.10	0.20	0.20*	0.30**	0.10	0.00	0.20*	0.10
62	0.51	0.02	0.01	8.53	1.59	0.70	7.94	0.05	0.06	0.07	0.08	0.04	0.01	0.06	0.06
63	2.40*	0.11*	0.11**	5.10**	2.01	0.60	10.00*	0.10	0.10	0.07	0.09	0.03	0.01	0.08	0.05
64	2.04	0.16**	0.14**	11.93*	5.31**	8.48**	15.08**	4.28**	4.26**	3.78**	3.34**	0.79**	0.13**	1.72**	3.78**
73	3.65**	0.04	0.04	14.52**	2.43*	1.26**	11.26**	0.17	0.17	0.22*	0.17	0.04	0.30**	0.13	-
74	-	0.05	0.03	-	-	-	-	0.11	-	-	-	0.03	0.02	0.11	0.13
76	0.71	0.02	-	8.78	1.00*	0.57*	7.17	0.03	-	-	0.03	0.04	-	0.05	0.05
83	0.20	0.04	0.03	3.30**	0.60**	0.30**	3.00**	0.03	0.08	0.06	0.07	0.05	0.03	0.04	0.06
88	2.69*	0.08*	0.04	13.20**	2.59*	0.85	0.85**	7.72**	0.10	0.12	0.14	0.14*	0.04	0.12	0.10
MED1	1.40	0.05	0.03	9.60	1.75	0.83	8.20	0.10	0.15	0.12	0.14	0.06	0.02	0.10	0.10
MAD1	0.74	0.04	0.03	1.20	0.46	0.13	1.03	0.06	0.07	0.07	0.06	0.04	0.02	0.05	0.05
MED2	1.23	0.03	0.02	9.60	1.70	0.74	8.19	0.09	0.10	0.10	0.10	0.06	0.01	0.09	0.09
MAD2	0.54	0.02	0.01	0.70	0.20	0.08	0.56	0.04	0.05	0.03	0.04	0.03	0.01	0.04	0.04

Exch.Ca

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	48.3	0.5	0.2	37.7*	31.0*	51.8	44.6	11.9	15.6	23.4	14.2	2.3	0.1	9.4	8.1
3	188.4**	4.0**	4.0**	59.4**	43.9**	108.4**	90.4**	23.4**	27.6**	50.0**	25.8**	6.8**	5.4**	22.4**	15.8**
4	64.0	1.1**	0.5**	26.5	21.0	55.0	40.0	11.5	13.6*	20.9	12.8*	2.5	0.4**	11.2	9.8**
5	93.1	0.4	0.0	37.5*	31.5*	58.6*	49.4	12.6	15.5	28.8	14.4	2.2	0.0	10.4	8.4
6	50.0	0.9*	0.1	26.9	21.2	50.0	44.6	12.1	14.9	27.9	14.0	2.2	0.1	10.1	8.3
7	115.3	0.5	0.0	34.5*	28.5	58.7*	52.1*	13.5*	16.0	32.5	14.7	2.0	0.0	10.8	8.8
9	111.3	0.2	0.4**	28.1	22.9	41.4**	36.0*	14.3**	18.5**	14.1**	13.7	2.3	0.1	13.9**	8.0
11	-	0.8	0.1	-	-	62.5**	57.3**	13.6*	17.0*	-	16.3**	2.4	0.1	11.3	9.1*
14	63.6	0.4	0.4**	23.7	25.0	48.7	47.5	13.2	17.4*	27.2	14.0	4.6**	0.4**	12.1*	11.2**
19	106.2	0.2	0.2	49.5**	42.4**	52.9	51.9*	12.7	15.9	38.9**	14.4	2.2	0.1	10.3	8.5
22	22.0**	0.5	0.0	30.4	26.9	51.4	44.4	11.9	14.4*	28.4	12.4*	1.5**	0.0	8.4*	10.4**
24	69.4	0.7	0.0	23.4	20.4	49.4	40.9	13.1	15.2	23.4	14.0	1.9	0.1	9.6	8.1
25	9.5**	1.3**	0.5**	1.5**	2.4**	44.4*	38.4	12.4	15.5	16.4*	14.5	2.3	0.3**	10.1	8.4
26	1.4**	0.3	0.2	10.2**	4.3**	14.9**	15.6**	3.6**	6.2**	6.8**	5.3**	1.0**	0.1	4.5**	2.9**
27	68.0	0.5	0.0	22.3	23.5	35.2**	38.0*	8.8**	11.4**	22.8	10.9**	2.0	1.1**	8.2*	4.3**
28	62.2	0.1**	0.1	20.6	18.1	49.7	43.2	6.7**	9.8**	10.3**	9.6**	2.0	0.0	4.5**	5.3**
29	141.1**	0.5	0.0	44.8**	22.9	67.0**	64.3**	13.1	15.8	36.0**	15.1*	3.0**	0.5**	11.7*	10.1**
30	124.5	0.1**	0.1	40.7**	37.0**	65.6**	58.3**	14.5**	19.0**	27.2	14.0	2.6	0.1	13.0**	10.3**
32	64.5	0.5	0.0	23.6	21.9	53.1	44.7	12.0	15.4	27.7	13.8	2.1	0.0	10.7	8.7
35	10.1**	0.1*	0.1	2.9**	2.3**	5.5**	4.5**	1.4**	1.1**	2.8**	1.3**	0.2**	0.0	1.1**	1.0**
37	96.9	0.8	0.0	24.8	18.4	61.4*	51.2	11.6	16.1	26.0	15.5**	2.3	0.4**	13.2**	10.5**
39	104.0	1.3**	1.3**	32.5	37.1**	51.6	46.2	11.6	15.6	31.3	13.5	2.5	0.5**	10.0	7.9
43	112.0	0.2	0.1	31.5	22.3	58.4*	46.7	13.3	17.1*	29.1	14.1	1.9	0.1	10.4	8.6
46	91.3	0.3	0.1	40.7**	40.4**	36.2**	30.7**	8.7**	10.7**	25.2	10.5**	1.4**	0.1	6.8**	5.7**
47	15.6**	1.6**	4.8**	12.0**	2.5**	34.5**	38.5	50.2**	10.2**	6.9**	6.5**	2.5	3.1**	2.7**	2.5**
48	73.8	0.2	0.2	23.5	25.3	54.4	48.0	12.3	15.9	26.0	14.1	2.8**	0.1	9.7	8.2
49	114.0	5.6**	0.0	25.4	16.3	54.9	44.8	10.9*	12.7**	25.6	12.0**	0.5**	0.0	8.1*	6.3**
50	99.9	0.7	0.2	42.0**	35.1**	52.9	45.8	12.2	15.4	34.6*	14.3	2.3	0.2	10.0	8.3
53	52.7	0.2	0.1	13.4**	12.5*	53.7	48.7	10.6*	11.9**	13.8**	11.4**	2.0	0.6**	9.7	9.0*
54	112.0	0.5	0.0	23.3	13.7*	59.2*	51.1	13.0	15.9	34.1*	14.9*	2.3	0.0	10.6	8.4
56	71.3	0.5	0.1	23.3	22.5	46.6*	40.0	10.4*	12.6**	23.4	11.7**	1.8	0.1	8.5*	7.2*
62	102.0	0.3	0.1	35.0*	27.3	55.5	46.2	12.5	15.4	29.7	14.0	2.4	0.5**	10.7	8.7
63	66.7	0.4	1.5**	20.3	15.6	53.8	44.5	10.4*	12.8*	21.2	12.5*	1.7*	0.1	7.1**	7.5*
64	77.8	1.4**	1.4**	17.2*	16.2	49.8	46.9	12.1	15.1	28.3	13.4	2.2	1.8**	9.1	7.9
73	88.8	14.8**	0.1	27.8	18.0	40.8**	38.4	11.2	12.3**	18.8*	12.6*	1.8	0.6**	13.6**	7.0*
74	-	0.5	0.1	-	-	-	-	12.3	-	-	-	2.6	0.0	10.1	8.1
76	80.9	0.3	0.0	22.0	16.8	54.0	45.1	11.4	10.8**	20.9	14.3	1.7*	0.0	8.7*	7.1*
83	119.6	0.3	0.0	30.4	22.6	52.7	47.2	12.0	15.3	31.7	13.7	2.1	0.0	9.9	8.4
88	92.0	0.7	0.2*	30.0	24.6	41.6**	36.0*	10.4*	14.6*	26.6	13.2*	2.6	0.4**	11.2	8.4
MED1	80.94	0.50	0.10	26.50	22.50	52.80	44.95	12.10	15.35	26.05	13.90	2.20	0.10	10.10	8.30
MAD1	23.07	0.21	0.09	5.85	5.71	4.84	4.70	1.00	1.30	4.87	0.75	0.30	0.09	1.10	0.67
MED2	90.07	0.47	0.08	25.95	22.30	53.00	44.80	12.12	15.50	26.90	14.00	2.21	0.10	10.10	8.30
MAD2	21.58	0.17	0.07	3.80	3.90	2.25	3.25	0.60	0.40	3.15	0.36	0.21	0.05	0.60	0.30

Exch.Mg

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	3.84	0.06	0.03	5.00	5.93	22.95	25.55*	3.15**	5.62*	2.43	2.07*	0.51**	0.03	0.68**	0.77*
3	14.30**	0.20**	0.00	12.00**	9.80**	99.99**	99.99**	11.70**	21.10**	5.00**	7.90**	1.20**	0.60**	5.00**	3.60**
4	3.60**	0.20**	0.20**	4.30	3.20	27.50	30.80	3.60	7.20*	2.80	2.50	0.50**	0.20**	0.70*	0.70**
5	4.80	0.06	0.02	5.48	5.93	30.00	32.70	3.67	6.66	3.21	2.45	0.41	0.02	0.85	0.91
6	4.30	0.10	0.00	3.90	2.90	28.10	30.80	3.70	6.50	3.20	2.50	0.40	0.00	0.90	0.90
7	4.60	0.00**	0.00	4.10	4.80	10.20**	11.50**	3.70	6.50	3.30	2.40	0.40	0.00	0.80	0.90
9	4.14	0.07	0.07*	6.83**	7.61	21.00**	47.70**	12.34**	3.95**	16.53**	3.73**	3.06**	0.25**	1.60**	1.60**
11	5.00*	0.10	0.00	7.45**	9.80**	30.30	34.65	3.80	6.85	4.60**	2.80*	0.45*	0.00	0.90	1.00*
14	5.90**	0.40**	0.40**	4.90	4.80	29.50	34.70	5.80**	9.20**	5.80**	4.90**	0.60**	0.40**	1.80**	1.40**
19	4.80	0.10	0.60**	6.54**	8.51*	28.30	33.40	3.86*	6.74	3.88	2.57	0.40	0.04	0.91	0.92
22	4.70	0.08	0.04	3.70	3.20	27.00	32.00	3.60	6.30*	3.20	2.00*	0.30**	0.00	0.50**	0.70**
24	4.70	0.10	0.01	3.50	5.40	24.70	27.70*	4.20**	6.40	2.30*	2.30	0.40	0.10*	0.90	1.00*
25	4.50	0.30**	0.20**	2.90	3.00	30.00	33.20	3.60	6.70	3.30	2.60	0.50**	0.10*	1.00*	1.00*
26	0.95**	0.10	0.05	0.85**	0.60**	7.60**	9.20**	1.10**	2.65**	1.05**	0.85**	0.25**	0.10*	0.40**	0.35**
27	3.44**	0.01*	0.01	4.80	5.04	21.20**	21.40**	2.00**	5.28**	1.44**	1.68**	0.43	0.01	0.47**	0.90
28	4.09	0.02*	0.05	2.76	8.59*	27.12	31.23	2.39**	4.50**	1.56**	1.81**	0.43	0.03	0.38**	0.61**
29	4.95	0.00**	0.00	4.95	2.79	24.27	25.38*	4.21**	7.11*	3.84	2.97*	0.79**	0.00	1.29**	1.61**
30	3.92	0.13*	0.03	4.06	5.33	30.48	34.94	3.60	5.80*	3.02	2.61	0.46*	0.03	0.50**	0.53**
32	4.30	0.10	0.00	4.80	5.00	34.00**	37.50*	4.20**	3.90**	3.60	2.50	0.40	0.00	0.90	1.00*
35	0.32**	0.16*	0.08*	0.36**	0.40**	3.08**	3.13**	0.60**	1.36**	0.52**	0.40**	0.16**	0.04	0.18**	0.20**
37	4.13	0.03*	0.00	2.48	4.25	29.90	30.72	3.09**	6.60	2.65	1.07**	0.20**	0.00	0.79	0.79*
39	6.07**	0.52**	1.84**	7.34**	7.95	31.33	35.06	4.44**	7.92**	5.54**	2.95*	0.70**	0.56**	1.27**	1.73**
43	4.42	0.13*	0.12*	4.00	3.75	29.02	32.82	3.50*	6.43	2.58	2.88*	0.38*	0.08	0.89	0.91
46	5.10*	0.10	0.06	7.40**	16.13**	25.01	26.33*	3.82	6.55	3.95	2.62	0.47*	0.06	0.87	0.99*
47	14.50**	1.13**	4.82**	5.36	2.83	24.55	29.92	9.45**	14.35**	15.08**	14.69**	2.06**	6.87**	8.40**	8.40**
48	4.19	0.15*	0.01	4.28	4.79	27.72	31.93	3.78	7.01*	3.39	2.50	0.42	0.02	0.85	0.89
49	99.99**	37.90**	3.30**	3.20	1.60	31.30	31.70	3.00**	5.30**	1.90**	1.00**	0.00**	0.00	0.00**	0.00**
50	4.79	0.09	0.06	8.23**	8.16*	30.60	33.80	3.75	6.70	3.63	2.56	0.46*	0.06	0.93	1.01*
53	3.05**	0.05	0.01	3.22	2.75	28.52	32.47	3.82	6.47	2.77	2.23*	0.39	0.01	0.88	0.96
54	4.59	0.05	0.01	2.74	2.56	30.60	33.60	3.73	6.70	3.53	2.53	0.42	0.02	0.85	0.90
56	4.00	0.00**	0.00	5.80*	6.40	33.60**	37.00*	3.60	6.60	3.10	2.20*	0.40	0.00	0.80	0.90
62	4.40	0.08	0.00	5.02	4.97	32.30	32.40	3.70	6.68	3.41	2.37	0.46*	0.07	0.90	0.93
63	3.40**	0.05	0.30**	1.50**	2.20	25.10	28.00	2.80**	5.10**	1.80**	1.80**	0.20**	0.01	0.30**	0.61**
64	6.40**	0.08	0.06	3.92	5.81	23.31	29.19	3.71	6.56	3.61	2.52	0.44	0.04	0.82	0.91
73	4.30	0.06	0.06	3.93	2.04	24.26	27.13*	3.19**	5.99*	2.86	2.04*	0.31**	0.25**	0.69*	1.05*
74	-	0.06	0.03	-	-	-	-	3.54	-	-	-	0.49*	0.03	0.86	0.89
76	4.48	0.08	0.04	2.86	2.29	25.58	26.53*	3.40*	5.28**	2.59	1.77**	0.40	0.06	0.78	0.93
83	4.30	0.04	0.02	6.60**	10.30**	26.60	29.90	3.50*	6.00*	3.20	2.20*	0.40	0.04	0.80	1.00*
88	3.66*	0.10	0.08*	4.33	5.19	24.66	25.33*	3.46*	7.16*	3.60	2.46	0.50**	0.08	1.13**	1.00*
MED1	4.41	0.09	0.04	4.29	4.88	27.61	31.46	3.67	6.52	3.20	2.48	0.42	0.04	0.85	0.91
MAD1	0.40	0.04	0.04	1.08	2.02	2.93	3.21	0.19	0.53	0.59	0.30	0.04	0.04	0.08	0.09
MED2	4.41	0.08	0.02	4.06	4.80	27.91	31.81	3.68	6.60	3.20	2.50	0.41	0.03	0.86	0.92
MAD2	0.28	0.02	0.02	0.84	1.60	2.48	1.95	0.08	0.14	0.40	0.11	0.02	0.03	0.04	0.03

C E C

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28
1	14.5	19.8*	2.7	8.5	2.3	71.8*	71.5	18.4*	22.3	15.7**	15.3	3.7	1.9	12.3	9.3
3	42.4**	80.2**	7.0**	23.4**	3.8**	271.8**	246.1**	59.8**	89.3**	68.2**	45.9**	13.1**	4.2**	35.8**	27.5**
4	13.7	20.0*	5.1**	6.7**	1.9	69.7**	71.0	14.8**	17.3**	18.0	16.7	5.2*	2.6	15.9**	9.6
5	14.1	25.2	2.5	9.1	1.7	90.0**	88.4*	20.7	24.0	17.3	16.2	3.6	1.4	12.0	9.3-
6	12.9	25.3	2.5	8.8	1.4	79.1	78.7	19.7	22.5	16.9	15.7	3.4	1.4	11.6	9.0
7	13.6	27.2*	2.6	9.0	2.1	87.5**	86.9*	19.8	23.8	17.4	16.2	4.0	1.7	11.6	9.1
9	19.6**	18.4**	3.2	10.7*	0.3**	77.0	72.6	19.4	24.2	17.8	15.8	4.9*	2.7	13.0*	10.8*
11	12.6	24.0	2.3	8.2	1.8	88.3**	88.7**	21.8**	24.7*	17.3	16.6	3.4	1.2	13.1*	10.5*
14	15.8	25.3	3.0	12.2**	3.0*	79.4	83.0	17.5**	24.5	17.5	16.0	4.0	2.0	11.1	9.2
19	13.0	22.6	2.2*	8.5	1.8	81.8	80.6	19.1	22.5	15.3**	14.6	3.1	1.2	10.6	8.7
22	12.2	23.6	3.0	7.8*	3.2*	73.4*	75.0	18.4*	23.6	15.0**	14.0*	5.0*	2.4	10.4*	15.8**
24	16.6*	30.0**	3.2	8.3	3.1*	73.6*	74.0	20.6	23.9	17.9	17.5*	5.0*	3.7**	14.5**	11.8**
25	16.9*	30.4**	5.3**	13.0**	8.2**	76.9	81.0	24.2**	27.1**	20.6**	18.1*	6.1**	4.5**	15.7**	12.0**
26	15.9	24.6	2.8	10.9*	2.4	72.6*	73.5	20.7	22.5	18.3	20.2**	5.1*	2.7	9.7**	10.5*
27	13.7	22.8	2.9	8.4	2.9*	73.9	71.1	19.2	22.9	15.8**	14.8	3.8	1.7	11.2	9.0
28	19.3**	26.8*	4.8**	12.6**	4.3**	82.4	82.6	17.7**	23.8	17.1	15.4	4.3	4.1**	14.4**	19.4**
29	14.3	17.6**	2.6	8.5	1.4	76.0	74.9	19.6	22.6	16.2*	13.0**	3.5	1.5	12.0	9.3
30	13.8	27.4*	2.7	9.1	1.5	84.0*	83.3	19.5	23.4	17.2	15.9	3.8	1.5	12.0	9.3
32	16.5*	20.6*	5.9**	8.1	3.3**	76.6	76.5	19.5	22.7	16.8	14.4*	6.4**	3.0*	11.3	8.6
35	16.3*	21.0*	2.1*	10.5*	4.3**	90.5**	67.0**	18.1**	20.1**	35.6**	16.3	3.0	2.3	9.6**	12.9**
37	15.5	27.4*	2.4	10.6*	1.9	87.9**	86.6	20.4	24.1	18.7	16.6	3.8	1.2	11.4	9.0
39	7.9**	21.3	2.3	5.7**	1.1*	77.3	74.7	19.1	22.9	17.2	15.7	3.7	1.8	11.6	8.7
43	13.8	24.2	3.4	9.6	2.8*	80.4	80.0	21.0	26.0**	18.2	18.0*	5.0*	2.2	12.0	11.6**
46	14.3	29.5**	3.1	8.5	1.8	78.2	79.0	19.9	21.2**	16.9	15.5	3.7	2.0	10.1*	7.8*
47	18.2**	23.2	14.5**	17.8**	6.7**	63.3**	72.3	21.0	25.5**	23.2**	22.3**	5.7*	10.5**	11.9	11.4**
48	15.6	23.3	4.2**	9.3	1.6	80.4	81.0	20.2	22.2	18.3	19.1**	4.1	2.2	11.8	9.7
49	16.6*	28.2*	3.5*	9.9	3.0*	90.9**	90.3**	22.4**	25.8**	19.2**	18.1*	5.5*	2.4	12.5	9.3
50	12.1	30.0**	2.8	7.9	1.5	74.7	75.0	17.7**	20.5**	15.4**	14.4*	2.7*	1.2	11.1	7.9*
51	1.1**	1.9**	0.3**	0.0**	-	6.2**	7.3**	1.8**	2.1**	1.5**	1.4**	0.3**	0.1**	1.0**	0.8**
53	16.1	26.4*	5.5**	12.3**	5.3**	83.9*	87.3*	20.5	25.0*	20.1**	18.6**	6.8**	1.9	16.0**	12.3**
54	12.4	22.7	1.8**	9.3	1.7	86.9*	85.8	19.2	23.0	15.2**	14.5	3.1	0.9*	10.4*	7.7**
56	13.9	36.0**	3.3	9.6	1.6	88.5**	93.8**	21.6*	25.0*	18.2	15.8	4.0	1.9	13.0*	9.6
62	13.0	23.0	2.5	9.0	1.6	81.7	80.7	20.0	22.9	17.0	15.8	3.5	1.5	11.5	8.9
63	14.9	23.2	3.0	9.1	1.8	82.6*	-	-	-	13.7**	15.9	3.1	1.3	10.3*	9.6
64	13.4	23.2	1.0**	10.7*	6.7**	76.3	74.8	21.2	22.0	18.3	14.9	5.0*	2.8	10.9	10.7*
73	51.1**	9.3**	1.7**	31.5**	1.8	76.6	74.3	23.5**	22.4	20.7**	11.6**	3.9	1.4	9.0**	21.1**
74	15.8	24.1	3.2	9.2	2.0	79.1	80.9	20.0	22.8	17.9	16.2	4.1	1.6	12.4	10.3*
76	14.1	24.5	3.5*	10.4*	3.2*	80.4	80.4	20.8	24.2	18.0	17.2	5.0*	2.4	12.6	10.4*
83	13.9	25.4	4.1**	9.3	3.2*	79.1	76.9	20.8	27.1**	18.5	17.1	5.2*	3.4**	13.2*	10.5*
88	13.5	22.9	2.7	9.3	1.7	78.1	71.7	20.5	24.5	17.7	17.6*	3.7	2.0	19.2**	10.2*
MED1	14.19	24.05	2.95	9.25	2.00	79.10	79.05	20.00	23.40	17.61	15.95	4.00	1.94	11.88	9.60
MAD1	1.53	2.53	0.50	1.00	0.60	3.95	4.77	0.84	1.00	0.73	1.15	0.88	0.54	1.05	0.90
MED2	14.10	23.80	2.80	9.10	1.80	78.21	78.70	20.00	23.20	17.72	15.90	3.87	1.88	11.62	9.30
MAD2	1.10	1.30	0.30	0.62	0.30	2.19	4.04	0.65	0.72	0.51	0.72	0.47	0.48	0.52	0.42

TABLE 3.

CLAY (%)

RANKINGS OF DATA PER SAMPLE

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28	SUM
1	25.5	18	18	8	4	21	25	15	23	25	14	21	14	9	9.5	250
3	33.5	33	36	36	22	24.5	11	29.5	1	34	27	36	32.5	31	21.5	408.5**
4	29	11.5	26	21.5	17.5	15.5	18	16.5	33	4.5	24.5	23	28	28.5	29	326
6	10	11.5	5	21.5	5.5	18.5	18	21.5	18.5	27	12	7	7	13	6	202
7	32	16	12	17.5	12	15.5	20.5	20	21	22.5	10	10.5	14	16	12	251.5
9	35	2	34	11.5	30	32	22	6	6	18	17.5	31	34	15	14	308
11	4	3	11	27	25	6	7	4	9	3	6	7	10.5	5	4	131.5**
14	9	32	14	26	28	13	13	7	13	15	15	19	26	14	8	252
19	19	25	27	9	11	34	26	25	27	28	23	25	27	24	17	347
22	14.5	15	19.5	15	17.5	1	1	3	18.5	4.5	8.5	7	1.5	1.5	30	158
24	30	11.5	19.5	11.5	5.5	14	18	11.5	18.5	13.5	12	13.5	18.5	19	16	232.5
25	1	31	30	35	34	11	12	31	16	6	22	29	31	22.5	18.5	330
26	31	5	24	16	14	9	10	21.5	26	17	16	23	23	22.5	34	292
27	24	30	29	20	24	7	5	26	24.5	26	28	23	29	27	18.5	341
28	27	22	21.5	14	9	26	30	28	15	19	26	20	25	17	15	314.5
29	7	6	8	6	8	5	6	13	11	11	5	2	8	18	2	116 **
30	14.5	1	2	2	1	29	28	2	4	8	4	1	1.5	1.5	1	100.5**
34	6	8	23	13	13	30	29	23	29	29.5	29	17.5	20	30	31	331
35	2	17	15	3	15	3	2	11.5	12	16	12	26	6	9	25.5	175
37	14.5	23.5	32	33	31.5	35	35	34	35	31.5	33	34	32.5	34	35	473.5**
39	17	36	35	34	36	36	36	33	32	35	36	35	36	33	27	497 **
43	3	7	4	4	20	4	4	1	7	2	1	5	17	3	3	85 **
47	8	29	9	29	29	2	3	10	5	10	3	32	16	4	7	196
48	18	11.5	16.5	5	3	17	14.5	18	28	20	17.5	9	22	21	12	233
50	23	11.5	7	7	10	9	14.5	5	18.5	8	8.5	4	18.5	6	9.5	160
53	36	35	33	31	35	31	34	35	34	33	32	33	35	35	33	505 **
54	12	20.5	21.5	17.5	7	28	27	24	14	22.5	20	10.5	12	12	12	260.5
55	25.5	19	31	23.5	22	24.5	31.5	29.5	24.5	31.5	30	30	30	25.5	21.5	399.5
56	21	26	13	10	19	22	33	19	22	12	21	16	9	11	21.5	275.5
62	11	23.5	1	25	31.5	18.5	31.5	32	3	1	19	27	3	25.5	32	284.5
64	33.5	28	3	19	16	27	23	27	2	24	2	3	4	32	24	267.5
73	28	20.5	28	1	33	33	20.5	9	30	29.5	31	28	21	20	28	360.5
74	5	27	6	28	26	12	9	8	10	8	7	17.5	5	9	5	182.5
76	22	34	16.5	30	22	23	16	36	36	36	35	13.5	14	36	36	406
83	14.5	11.5	10	23.5	2	20	24	16.5	8	13.5	24.5	13.5	24	28.5	21.5	255.5
88	20	4	25	32	27	9	8	14	31	21	34	13.5	10.5	7	25.5	281.5

WITH 36 LABS AND 15 SAMPLES THE APPROXIMATE 5% TWO TAIL LIMITS OF THE RANK SUMS ARE 406 AND 149. RANK SUMS EXCEEDING THESE VALUES ARE MARKED WITH **.

pH-H_2O

RANKINGS OF DATA PER SAMPLE

LAB:	SAMPLE: 11	12	14	15	16	17	18	19	20	23	24	25	26	27	28	SUM
1	6	9	7	6.5	9.5	9	8	35	9	14	11.5	39	5.5	9.5	9.5	188
3	40.5	34.5	41	6.5	12	3.5	2.5	6.5	2	5	43	12	41	43	43	336
4	30.5	39	20.5	28	32	34.5	17	28.5	17	14	16.5	22	25.5	18.5	24.5	368
5	30.5	24	20.5	28	32	15.5	27.5	28.5	17	36.5	26.5	22	25.5	32.5	24.5	391

pH-H_2O

RANKINGS OF DATA PER SAMPLE

SAMPLE:

LAB:	11	12	14	15	16	17	18	19	20	23	24	25	26	27	28	SUM	
6	20.5	14	20.5	28	22.5	15.5	17	35	33	25	26.5	22	25.5	18.5	24.5	348	
7	36.5	34.5	11	18.5	32	34.5	27.5	28.5	33	25	36.5	35.5	10	32.5	33	428.5	
9	9.5	14	7	18.5	15	25.5	10.5	11	9	9	11.5	35.5	25.5	5.5	4	211	
11	8	39	33	14	27	31	13	37	27	33	39	33	38	39	40	451	
14	12.5	6	3.5	28	22.5	2	17	18.5	9	9	11.5	41	35	14	13	242.5	
19	36.5	34.5	35.5	35.5	32	34.5	27.5	18.5	33	36.5	36.5	30	39	40.5	37.5	507.5	**
22	30.5	14	20.5	28	32	15.5	39	6.5	33	25	16.5	22	10	32.5	13	338	
24	20.5	14	20.5	18.5	22.5	25.5	17	18.5	24	25	26.5	12	16	32.5	33	326	
25	12.5	24	3.5	28	22.5	15.5	35.5	28.5	24	14	8	12	25.5	18.5	13	285	
26	12.5	24	11	35.5	32	43	35.5	18.5	13	14	41.5	35.5	25.5	4	18	363.5	
27	30.5	34.5	20.5	18.5	22.5	15.5	17	18.5	9	25	16.5	30	35	24	18	335	
28	39	31	9	39	41.5	20	32	23	39	42	33	17	19	12	29	425.5	
29	34	18	38	22	18	32	23	14	28	32	34	27	32	38	30	420	
30	20.5	4	20.5	28	22.5	15.5	17	6.5	24	25	26.5	12	16	24	37.5	299.5	
32	12.5	24	20.5	28	38	38.5	27.5	11	17	25	16.5	12	10	9.5	9.5	299.5	
34	20.5	14	20.5	12	15	25.5	17	28.5	33	25	26.5	30	25.5	32.5	33	358.5	
35	26	17	13	23	17	11	22	18.5	20	18	16.5	16	31	24	21	294	
36	15	5	5	15	12	8	12	4	4	7	7	5	3	7	6	115	**
37	36.5	24	30.5	35.5	38	34.5	35.5	28.5	41	40.5	41.5	22	25.5	40.5	41	515	**
39	6	39	20.5	9.5	4	25.5	35.5	35	12	25	16.5	22	35	9.5	7.5	302.5	
43	20.5	24	20.5	12	22.5	38.5	27.5	18.5	33	25	26.5	22	25.5	32.5	37.5	386	
46	1	42	35.5	6.5	6	15.5	8	42.5	9	5	9	43	42	14	13	292	
47	4	41	42	1	2	7	2.5	33	21	9	5	38	40	24	24.5	294	
48	30.5	11	28	28	12	25.5	42.5	24	38	25	40	12	10	24	18	368.5	
49	20.5	24	30.5	43	41.5	15.5	35.5	11	33	36.5	26.5	12	16	24	18	387.5	
50	20.5	24	20.5	41	38	41.5	40.5	38.5	33	36.5	36.5	30	25.5	32.5	24.5	483	
51	9.5	24	40	2	2	3.5	4	41	17	5	6	4	10	5.5	7.5	181	
53	20.5	34.5	30.5	41	41.5	38.5	35.5	40	41	40.5	36.5	35.5	35	24	33	527.5	**
54	42.5	24	20.5	41	41.5	25.5	40.5	18.5	43	36.5	26.5	22	16	32.5	37.5	468	
55	6	3	2	6.5	6	5.5	5.5	3	5.5	2.5	3.5	2	2	3	3	59	**
56	3	1.5	1	12	9.5	5.5	5.5	2	3	2.5	3.5	1	1	2	2	55	**
62	36.5	9	11	35.5	32	25.5	27.5	11	17	25	26.5	6.5	5.5	9.5	13	291	
63	30.5	9	7	35.5	22.5	25.5	27.5	11	24	14	11.5	6.5	5.5	18.5	24.5	273	
64	20.5	7	35.5	9.5	8	25.5	8	6.5	5.5	14	26.5	8	13	14	5	206.5	
73	27	30	35.5	35.5	32	38.5	42.5	38.5	33	36.5	26.5	40	20	16	18	469.5	
76	20.5	24	20.5	18.5	15	25.5	27.5	28.5	24	25	26.5	22	16	32.5	33	359	
80	40.5	1.5	30.5	4	2	1	1	1	1	1	2	3	5.5	1	1	96	**
83	2	43	43	3	6	41.5	10.5	42.5	41	14	1	42	43	42	42	416.5	
88	42.5	34.5	39	18.5	32	10	21	28.5	14	43	20	30	35	32.5	28	428.5	

WITH 43 LABS AND 15 SAMPLES THE APPROXIMATE 5% TWO TAIL LIMITS OF THE RANK SUMS ARE 486 AND 174. RANK SUMS EXCEEDING THESE VALUES ARE MARKED WITH **.

C E C

RANKINGS OF DATA PER SAMPLE

SAMPLE:

LAB:	11	12	14	15	16	17	18	19	20	23	24	25	26	27	28	SUM
1	22	4	14	10	21	3	4	6	7	5	10	12.5	16	24	14	172.5

C E C

RANKINGS OF DATA PER SAMPLE

LAB:	11	12	14	15	16	17	18	19	20	23	24	25	26	27	28	SUM
3	37	38	37	37	32	38	38	38	38	38	38	38	36	38	38	559 **
4	12.5	5	33	2	17.5	2	2	1	1	23.5	26	31.5	28	35	18.5	238.5
5	18.5	23	10	16.5	10.5	35	34	26	24	15	21	9	7.5	21.5	16	287.5
6	6	24.5	10	13	3.5	19	18	16	10.5	10	13	5.5	7.5	15.5	9	181
7	11	29	12	14.5	20	31	32	17	21.5	17	21	19	13.5	15.5	11	285
9	36	3	25	30	1	14	7	12	27	20	15	24	30	29	28	301
11	5	18	7	6	15.5	33	35	34	30	16	25	5.5	3.5	30	25	288.5
14	25.5	24.5	20.5	32	25.5	21	28	2	28	18	19	19	20	9.5	12	304.5
19	7.5	9	5	12	15.5	26	22	8	10.5	3	7	3.5	3.5	7	6	145.5**
22	3	17	20.5	3	29	5	14.5	7	20	1	3	26.5	26	5.5	35	216
24	31.5	34.5	23.5	7	27	6	9	25	23	21.5	29	26.5	34	33	31	361.5
25	33	36	34	35	38	13	26	37	36.5	34	32.5	35	37	34	32	493 **
26	27	22	17.5	31	22	4	8	27	9	27	36	30	29	3	25	317.5
27	12.5	11	19	8	24	7	3	10.5	15.5	6	8	15	13.5	11	9	173
28	35	28	32	34	34	27	27	4	21.5	12	11	23	35	32	36	391.5
29	21	2	13	11	3.5	9	13	15	12	7	2	8	9	21.5	13	160
30	14.5	30.5	16	16.5	5.5	29	29	13.5	19	13	18	15	10.5	21.5	16	267.5
32	30	6	36	5	31	11	16	13.5	13	8	4.5	36	32	12	4	258
35	29	7	4	27	33	36	1	5	2	37	23	2	24	2	34	266
37	23	30.5	8	28	17.5	32	31	22	25	31	24	15	3.5	13	9	312.5
39	1	8	6	1	2	15	11	9	17	14	14	11	15	17	5	146 **
43	14.5	20	27	23.5	23	23.5	20	30	35	25.5	31	26.5	23	21.5	30	374
46	20	33	22	9	14	17	19	18	4	9	12	10	19	4	2	212
47	34	14.5	38	36	36	1	6	31	33	36	37	34	38	19	29	422.5
48	24	16	31	20	9	22	25	21	6	28	35	22	22	18	20	319
49	31.5	32	28	25	25.5	37	36	35	34	32	32.5	33	26	26	16	449.5**
50	2	34.5	17.5	4	5.5	8	14.5	3	3	4	4.5	1	3.5	9.5	3	117.5**
53	28	27	35	33	35	28	33	23.5	31	33	34	37	18	36	33	464.5**
54	4	10	3	20	10.5	30	30	10.5	18	2	6	3.5	1	5.5	1	155 **
56	16.5	37	26	23.5	7.5	34	37	33	32	25.5	16.5	19	17	28	18.5	371
62	7.5	13	10	14.5	7.5	25	23	19.5	15.5	11	16.5	7	10.5	14	7	201.5
64	9	14.5	1	29	37	10	12	32	5	29	9	26.5	31	8	27	280
73	38	1	2	38	13	12	10	36	8	35	1	17	6	1	37	255
74	25.5	19	23.5	18	19	19	24	19.5	14	21.5	21	21	12	25	22	304
76	18.5	21	29	26	29	23.5	21	29	26	23.5	28	29	26	27	23	379.5
83	16.5	26	30	20	29	19	17	28	36.5	30	27	31.5	33	31	25	399.5
88	10	12	15	22	12	16	5	23.5	29	19	30	12.5	21	37	21	285

WITH 38 LABS AND 15 SAMPLES THE APPROXIMATE 5% TWO TAIL LIMITS OF THE RANK SUMS ARE 429 AND 156. RANK SUMS EXCEEDING THESE VALUES ARE MARKED WITH **.

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