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LRTAP INTERCOMPARISON STUDY L-8: MAJOR IONS, NUTRIENTS AND PHYSICAL PROPERTIES IN WATER

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LRTAP INTERCOMPARISON STUDY L-8:

MAJOR IONS, NUTRIENTS AND PHYSICAL PROPERTIES IN WATER

by

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LRTAP Intercomparison Study L-8:

Major Ions, Nutrients and Physical Properties in Water.

K. Aspila, S. Todd

EXECUTIVE SUMMARY

The Canadian LRTAP program (long range transport of atmospheric pollutants) involves many different laboratories who individually produce data for regional or national objectives. If these data are to be merged or if they are to be used to establish long-term trends it is imperative that the data be verified as comparable between laboratories and that laboratories have produced data in a controlled and unbiased manner. This report describes the eighth interlaboratory study that addresses these issues.

This study consisted of 10 water samples and was distributed to 48 laboratories who were requested to analyze for 16 different constituents. Data provided were analyzed for bias by the rank order method of Youden. Results which deviated significantly from interlaboratory sample medians were flagged.

This report is a compilation of all results received and evaluated. The individual laboratory appraisals provided to participants in May 1985 are included. The evidence on study to study performance provided in this report indicates several laboratories are improving. Approximately ten laboratories have major problems and about 15 are satisfactory. The remaining 15 laboratories have moderate or average performance in their peer group.

ABSTRACT

This report is a compilation of results received and evaluated for LRTAP interlaboratory study L-8. The report includes all laboratory specific appraisals that had been provided earlier (May 1985) to laboratory heads and project managers. The study consisted of 10 samples of which seven were natural waters derived from LRTAP watershed programs or precipitation networks. Three samples were distilled water synthetic references. Laboratory data sets were appraised for bias by the rank order method of Youden. Individual sample results were flagged if deviating significantly from interlaboratory median values. The parameters included Ca, Mg, Na, K, Cl, SO_4, acidity, gran acidity, total alkalinity, gran alkalinity, pH, specific conductance, colour, reactive silica and nitrate plus nitrite. Included in this report is a brief comparison of bias and flag frequency for each participant in the six similar studies completed to date. A brief statement on laboratory performance as being either satisfactory, moderate or poor is given for 51 different LRTAP laboratories.

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INTRODUCTION

The long range transport of atmospheric pollutants (LRTAP) program involves many different laboratories that contribute data for various project objectives. If the data are to be merged or used for year to year trend or impact studies, then it is necessary that laboratories be defined as in control and comparable. This interlaboratory study addresses these issues. The merits and impact of interlaboratory studies are described elsewhere (1,2,3). Seven other interlaboratory studies provided for the LRTAP program are listed at the end of this report.

Background of Study

This study was organized during the summer and fall of 1984. It was distributed to client laboratories in November 1985 and had a January 1985 deadline assigned. Not all participants reported on schedule. The appraisals in this report were provided to each participant in May 1985 and reflect laboratory performance during that time frame: December 1984 to April 1985. All laboratories who exhibited bias or eratic results have hopefully taken internal action to review and correct their measurement process.

Release of Laboratory Codes

Laboratories that participated in this study are identified by their affiliations at the end of this report. The individual results in Appendix I and the appraisals compiled in Appendix II have laboratories coded by number. The key to these codes, although confidential, is available on a need to know basis. Users of data and program managers are encouraged to seek out the source of their data and openly discuss issues of quality with their client laboratories.

Design of the Study

The study comprized of 10 different water samples distributed to 48 laboratories. The samples are described in Table 1. Several were recycled from earlier studies. Their inclusion has merit as they assist in verifying stability and allow individual laboratories who exhibited poor results to update and verify performance.

Preparation of Samples

Test sample bottles for this study were 500 mL linear polyethylene. These were either new bottles or bottles recycled from earlier studies. All bottles were washed with chromerge, tap water

TABLE 1. Test Samples Used in Study L-8

Sample Number	Internal Code	Description	Previous Use (Study-Sample No.)
1	CM-ION-91	Lake Superior	L1-11;L3-5;L4-10; L5-9
2	RM-ANI-01	Synthetic Reference	L3-8;L4-6
3	CM-ION-94	Mixture of Coloured Surface Waters	-
4	LR-PRC-02	1982 Burlington Rainwater	-
5	LR-SSW-08	ELA (Lake 239) 1982	L6-5;L1-6;IJC41-6
6	LR-SSW-13	Lac Isidore (Quebec)	-
7	LR-PRS-04	New Brunswick Rainwater (high sea salt popn) See L9-4	-
8	RM-CAT-01	Synthetic Reference	L4-7;L5-8;L6-3
9	LR-SSW-06	MacFarlane and Clearwater Lakes (near Sudbury, Ont.)	-
10	CM-ION-92	Tank C (Synthetic Reference)	IJC41-9;L1-15;L3-10 L4-11;L5-10;L6-10

rinsed and then thoroughly rinsed with distilled water. They were then filled with distilled deionized water and stored 1 week to 50 weeks before use.

Forty litre aliquots of stock samples (see Table 1) were obtained by syphoning from stock waters (100 to 200 litres) maintained in permanent storage at 4°C. The 40 litre substocks were mixed vigorously and 400 mL units serially transferred to the clean bottles. Samples so prepared were all stored at 4°C until distributed to the participants.

Evaluation of Data

Interlaboratory data sets were evaluated for bias by the nonparametric rank order method of Youden (4,7) which had been modified by Clark (2,5) to allow for computerized evaluation. A set of data is said to be biased when it exhibits a tendency to be higher or lower than some standard. The standard for these studies is the performance of all participating laboratories. For these studies there is about a 1 chance in 20 of deeming a laboratory set biased when it is not.

In addition to bias, results on each individual sample were evaluated by flagging results that deviated significantly from the interlaboratory medians. This process is described elsewhere (study L-1, L-2, and References 2 and 5). The criteria for flagging results are found in Appendix I and are the same criteria as used for study L-6.

To assist in evaluating data, analysts were requested to report all their calculated results and to use the codes W and T where appropriate. This format is described in study L-1 and L-2 and found in a recent ASTM Standard Practice (6).

RESULTS AND DISCUSSION

General

Laboratory results, brief method statements, bias and assigned flags are provided in Appendix I. Laboratories that were assigned bias are in most situations in error due to calibration. Flags assigned on individual samples reflect, in most cases, a lack of precision in the method applications. Those laboratories assigned a high frequency of bias (based on whole data sets) as well as a high percentage of results flagged have hopefully taken appropriate internal corrective action (8). The appraisals had been provided shortly after the completion of the study. A compilation of all appraisals is given in Appendix II.

Flags and Bias

The procedures used for flagging an individual result and for discerning a set of data as biased is described elsewhere

(2, 4, 5, 7) A brief description is also given in Appendix III. The criteria to flag results were the same as in Study L-6. A summary of flag and bias statements is given in Table 2. This table was prepared from the detailed evaluations found in Appendix I. Those laboratories underlined in Table 3 were informed when appraisals were mailed that some review was perhaps necessary and that corrective action was in order.

Comparison of Results to Earlier Studies

A summary of median values between laboratories is given in Table 3. These values are abstracted from Appendix I. Several of these samples were recycled from earlier studies. A comparison of study to study interlaboratory median values is given in Tables 4A and 4B. Overall the agreement between studies is very good, and this helps verify the stability of test samples. The medians for acidity and alkalinity are overall not always very close. This is attributed to the small data sets, the low concentration and the differences between laboratory methods and the measurement procedures.

In the previous study (L-6), one of the samples had revealed a significant change in the nitrate plus nitrite value compared to the earlier interlaboratory median. This nitrate instability is not apparent in this current study, however, the higher value for nitrate plus nitrite in sample 1 suggests some ammonia/nitrate conversion may be taking place.

TABLE 2. A Comparison of Laboratory Performance (Study L-8)

Lab Code	Bias: No. of Parameters Analyzed	Bias: No. of Parameters Biased	Bias: Percentage of Parameters Biased (%)	Flags: No. of Results Ranked	Flags: No. of Flags Assigned	Flags: Percentage of Results Flagged (%)	Flags: Sum of % Bias and % Flags	Comment
L002	15	2	13.3	126	12	9.5	22.8	
L003	15	1	6.7	121	9	7.5	14.2	
L004	14	2	14.3	138	23	16.7	31.0	
L006	13	2	15.4	125	16	12.8	38.2	
L007	9	1	11.1	90	7	7.8	18.9	
L009	11	1	9.1	98	5	5.1	14.2	
L010	13	3	23.1	124	25	20.2	43.3	
L011	11	4	36.4	97	14	14.4	50.8	
L013	9	0	0	90	1	1.1	1.1	Well done
L014	11	2	18.2	105	8	7.6	25.8	
L016	10	2	20	96	12	12.5	32.5	
L019	9	0	0	89	8	9.0	9.0	Well done
L020	14	2	14.3	124	20	16.1	30.4	
L021	10	0	0	97	11	11.3	11.3	
L022	15	7	46.7	148	50	33.8	80.5	Poor
L023	15	1	6.7	121	21	17.4	24.1	
L024	13	1	15.4	120	3	2.5	17.9	
L025	10	1	10.0	98	3	3.1	13.1	
L027	14	3	21.4	134	17	12.7	34.1	
L028	2	1	50	20	3	15.0	65.0	Poor
L029	14	2	14.3	135	21	15.6	29.9	
L030	8	0	0	79	4	5.1	5.1	Well done
L031	14	4	28.6	127	12	9.4	38.0	
L032	16	5	31.3	160	28	17.5	48.8	
L040	7	4	57.1	70	29	41.4	98.5	Poor
L042	9	4	44.4	84	35	41.7	86.1	Poor
L043	12	2	16.7	119	35	29.4	46.1	

TABLE 2. A Comparison of Laboratory Performance (Study L-8) cont'd.

Lab Code	Bias: No. of Parameters Analyzed	Bias: No. of Parameters Biased	Bias: Percentage of Parameters Biased (%)	Flags: No. of Results Ranked	Flags: No. of Flags Assigned	Flags: Percentage of Results Flagged (%)	Flags: Sum of % Bias and % Flags	Comment
L045	14	1	7.1	130	1	0.8	7.9	Well done
L046	14	5	35.7	134	40	29.9	65.6	Poor
L048	13	2	15.4	126	10	7.9	23.3	
L049	14	3	21.4	114	37	32.5	53.9	
L050	4	1	25.0	33	11	33.3	58.3	
L051	10	0	0	90	12	13.1	13.1	
L053	10	0	0	100	4	4.0	4.0	Well done
L054	10	7	70.0	86	53	61.6	131.6	Poor
L057	8	4	50.0	76	16	21.1	71.1	
L058	13	0	0	117	14	12.0	12.0	
L059	7	6	85.7	67	30	44.8	130.5	Poor
L060	12	1	8.3	112	12	10.0	18.3	Very improved
L061	11	0	0	44	0	0	0.0	Well done
L062	16	2	12.5	158	17	10.8	23.3	
L063	19	9	47.4	186	40	21.5	68.9	Poor
L064	9	3	33.3	90	11	12.2	45.5	
L066	11	1	9.1	106	10	9.4	18.5	

Note: A satisfactory performance (well done) is recognized when bias and flag frequencies are very low (i.e 0 to 15%).
A poor overall performance (in this peer group of laboratories) is assigned when bias and flags are numerous (over 30 to 40%).

Laboratories L011, L022, L028, L040, L042, L046, L054, L057, L059 and L063 are urged to review their laboratory measurement systems and discuss their performance with their users of data.

TABLE 3. Summary of Interlab Median Values (Study L-8)

Parameter	Sample Number									
	1	2	3	4	5	6	7	8	9	10
Calcium (mg Ca/L)	13.000	.075	1.800	3.000	4.00	2.055	1.220	.300	11.470	42.10
Magnesium (mg Mg/L)	2.750	.720	.680	.900	1.000	.420	.340	.070	3.255	9.39
Sodium (mg Na/L)	1.200	.700	4.020	.160	1.250	.730	.320	.501	13.78	18.90
Potassium (mg K/L)	.500	1.075	.290	.082	.850	.760	.700	.330	1.110	.890
Chloride-IC (mg/Cl/L)	1.220	.840	5.100	.780	.500	.510	3.200	1.530	25.85	102.4
Chloride-NonIC (mg Cl/L)	1.300	.900	5.565	.800	.630	.950	3.250	1.500	25.80	103.5
Sulfate-IC (mg SO_4/L)	3.150	3.045	2.750	5.570	5.260	4.900	3.360	.360	22.20	37.25
Sulfate-NonIC (mg SO_4/L)	3.250	3.000	4.150	5.565	5.650	5.755	3.400	.410	22.00	37.15
Gran Acidity (mg $CaCO_3$/L)	.230	2.015	3.340	1.615	1.001	3.110	3.070	1.150	.712	1.075
Acidity to pH 8.3 (mg $CACO_3$/L)	1.415	2.400	3.830	1.860	1.435	3.285	3.470	1.330	1.220	1.670
Total Alkalinity (mg $CaCO_3$/L)	40.6	1.52	3.375	2.00	10.85	2.02	.493	1.43	14.10	1.00
Gran Alkalinity (mg $CaCO_3$/L)	41.0	-.280	3.30	1.40	9.71	.787	-1.35	.190	14.0	-.130
pH	7.675	5.130	6.180	6.190	7.030	5.505	4.580	5.700	7.170	5.495
Specific Conductance	93.95	18.20	36.0	30.80	38.00	23.10	31.20	8.00	170.0	436.0
Colour (Hazen Units)	2.50	1.00	140.0	2.50	12.50	77.50	5.00	1.00	3.00	2.00
Reactive Silica (mg Si/L)	1.106	.010	1.120	.257	2.400	.050	.090	.049	.560	.015
Nitrate+Nitrite (mg N/L)	.383	.110	.020	1.020	.079	.090	.250	.010	.054	.030
Fluoride (mg F/L)	.070	.150	.055	.120	.060	.050	.041	.040	.080	.070
Dissolved Organic Carbon (mg C/L)	1.60	2.00	11.87	.90	5.00	9.97	1.52	.60	1.73	.60

TABLE 4A. Comparison of Interlaboratory Median Values Between Studies

Parameter	Previous Data (Study No./Sample No.)										
	Lake Superior Water					Synthetic Reference Water					
	L8 1	L5 9	L4 10	L3 5	L1 11	L8 10	L6 10	L5 10	L4 11	L3 10	L1 15
Calcium	13.10	13.0	13.0	13.05	13.1	42.10	42.6	42.6	42.0	42.6	42.0
Magnesium	2.75	2.70	2.70	2.91	2.75	9.39	9.40	9.4	9.10	9.30	9.31
Sodium	1.20	1.3	1.24	1.23	1.25	18.90	19.0	19.0	18.95	18.90	19.0
Potassium	.500	.50	.50	.50	.525	.890	.890	0.900	.897	.930	.90
Chloride IC	1.220	1.3	1.20	1.20	(1.30)	102.4	106.0	106.0	(103.5)	(105.0)	(105.8)
Sulfate IC	3.150	3.4	3.3	3.20	(3.14)	37.25	37.4	37.9	(36.15)	(37.0)	36.0
Acidity (Gran)	.230	1.6	(1.0)	(1.12)	(1.8)	1.075	(1.50)	(1.8)	(1.45)	(1.40)	(1.3)
Alka (Gran)	41.0	40.7	-	-	-	-.130	.015	-.02	-	-	-
Alka (Total)	40.6	41.0	40.0	41.0	41.2	1.00	1.54	1.45	1.57	0.78	.80
pH	7.675	7.7	7.70	7.70	7.70	5.50	5.6	5.5	5.51	5.575	5.51
Conductance	93.95	94.0	93.2	94.0	93.0	436.0	444.0	446.0	434.0	437.5	440.0
Colour	2.50	2.5	4.0	5.0	2.5	2.0	5.0	2.5	2.0	2.5	2.5
Silica	1.106	1.10	1.100	1.000	1.11	.015	.007	.012	.010	-.001	.01
NO_3+NO_2	.383	.302	.305	.297	.300	.030	.030	.030	.032	.034	.032
DOC	1.60	-	2.30	-	5.31	.60	-	-	.700	-	.60

( ) Values in brackets are for a group of different methods.
Dates: L-1 (Mar. 1983); L-3 (July 1983); L-4 (Oct. 1983); L-5 (Mar. 1984); L-6 (July 1984); L8 (Jan. 1985)

TABLE 4B. Comparison of Interlaboratory Median Values Between Studies

Parameter	Previous Data (Study No./Sample No.)										
	Synthetic Reference Water				Synthetic Reference Water			ELA (Lake 239) 1982			
	L8 8	L6 3	L5 8	L4 7	L8 2	L4 6	L3 8	L8 5	L6 5	L1 6	IJC41 6
Calcium	.300	.310	.31	.30	.075	.040	.070	4.00	4.02	4.0	4.0
Magnesium	.070	.060	.07	.07	.720	.700	.73	1.00	1.00	1.00	.99
Sodium	.501	.510	.51	.52	.700	.711	.70	1.250	1.29	1.27	1.3
Potassium	.330	.33	.32	.32	1.075	1.09	1.09	.850	.845	.85	.87
Chloride IC	1.530	1.54	1.5	1.50	.840	.82	(.80)	.500	.520	(.52)	(.59)
Sulfate IC	.360	.350	.31	(.38)	3.045	3.025	(3.01)	5.260	5.21	(5.4)	(5.2)
Acidity (Gran)	1.150	1.50	1.5	(1.6)	2.02	(2.47)	(2.5)	1.00	1.92	(1.6)	-
Alka (Gran)	.190	.160	.15		-.280	-0.37		9.71	7.07	-	-
Alka (Total)	1.43	1.54	1.0	(1.5)	1.52	1.10	(.32)	10.85	10.4	9.95	10.50
pH	5.700	5.64	5.7	5.6	5.130	5.02	5.10	7.03	7.07	7.08	6.7
Conductance	8.00	8.0	8.1	7.8	18.20	18.6	18.8	38.0	38.6	37.8	38.3
Colour	1.00	5.0	2.0	3.0	1.00	3.0	2.5	12.5	15.0	10.5	19.0
Silica	.049	.049	.033	.04	.010	.008	-.002	2.40	2.40	2.32	2.41
NO_3+NO_2	.010	.009	.009	.009	.110	.102	.105	.079	.080	0.074	0.070
DOC	0.60	-	-	-	2.0	-	-	5.00	-	6.60	-

( ) Values in brackets are for a group of different methods.
Dates: IJC41 (Oct. 1982); L-1 (Mar. 1983); L-3 (July 1983); L-4 (Oct. 1983); L-5 (Mar. 1984); L-6 (July 1984); L-8 (Jan. 1985)

The influence of colour (refer to Table 3) on both sulfate and chloride is apparent in samples 3 and 6. The chloride IC results for these samples differ from the colorimetric method by about 0.5 µg Cl/ml. The influence of colour on sulfate is somewhat larger.

Performance of Laboratories

A laboratory that analyzes all samples and most if not all constituents can be viewed as very satisfactory when no bias is discerned and it provides results that are not flagged. Unsatisfactory or poor performance can be identified if a lab has an extreme frequency of bias and/or flags. This approach was discussed in the reports for studies L-5 and L-6.

Given in Table 5 is a summary of the frequency in which laboratories were seen with bias and with flags. The bias and flag frequency for study L-8 is abstracted from Table 2 and provided here for comparison to earlier studies. The frequency which is suggested as acceptable for a single study was given in an earlier report (L-5). The criteria are summarized below.

Satisfactory	if % bias is <15%	and % flags	<10%
Moderate	if % bias is >15 or <35%	and % flags	>10% or <25%
Poor	if % bias is >35%	and % flags	>25%

The above criteria for single study performance was used in Table 3 to alert the laboratories underlined that problems of bias or precision required their attention.

Table 5. Variation in % Bias and % Flags between Studies

Lab Code	% Bias (for parameter data sets)						% Flags (on all ranked results)					
	L-1	L-3	L-4	L-5	L-6	L-8	L-1	L-3	L-4	L-5	L-6	L-8
L002	30.7	25.0	7.7	8.3	0.0	13.3	5.9	11.7	7.7	6.5	8.0	9.5
L003	25.0	8.3	0.0	7.1	14.3	6.7	14.7	7.6	10.9	12.9	15.3	7.5
L004A	45.5	27.3	27.3	33.0	25.0	14.3	16.7	21.0	22.1	24.1	22.6	16.7
L004B	-	-	27.3	-	-	-	-	-	32.7	-	-	-
L005	-	-	-	-	0.0	-	-	-	-	-	25.0	-
L006	36.4	36.4	54.6	36.0	46.1	15.4	32.6	11.9	19.2	19.1	30.0	12.8
L007	50.0	44.4	-	20.0	11.1	11.1	33.6	46.3	-	30.0	1.1	7.8
L009	22.2	10.0	14.3	11.0	10.1	9.1	23.3	10.0	4.0	12.6	4.1	5.1
L010A	-	15.4	23.1	15.8	46.2	23.1	-	20.3	25.9	10.3	28.3	20.2
L010B	-	-	-	0.0	-	-	-	0	0	0.0	-	-
L011	41.7	23.1	36.4	16.7	0.0	36.4	11.8	20.8	21.6	20.2	4.4	14.4
L012	20.0	-	-	0.0	-	-	13.8	-	-	0.0	-	-
L013A	30.0	0.0	0.0	0.0	0.0	0.0	12.4	5.6	6.3	1.4	2.2	1.1
L013B	-	-	0.0	-	-	-	-	-	6.2	-	-	-
L014	16.7	16.7	10	0.0	0.0	18.2	12.0	17.0	17.7	18.4	18.5	7.6
L016	20.0	33.0	44.4	33.0	44.4	20.0	22.5	22.2	23.1	18.5	12.2	12.5
L018	-	-	-	50.0	-	-	-	-	-	26.5	-	-
L019	-	-	-	0.0	0.0	0.0	-	-	-	1.2	5.0	9.0
L020	33.3	27.3	0.0	0.0	15.4	14.3	17.9	12.6	13.6	10.7	5.7	16.1
L021A	45.4	556	-	-	36.4	0.0	40.3	44.2	-	-	24.7	11.3
L021B	33.0	-	44.4	44.0	-	-	43.1	-	25.3	12.3	-	-
L022	38.5	46.2	46.2	38.5	38.5	46.7	13.2	30.2	26.5	33.7	24.2	33.8
L023	30.8	0.0	7.7	0.0	7.7	6.7	24.8	12.0	6.0	11.6	9.9	17.4
L024	18.2	18.2	8.3	0.0	0.0	15.4	10.3	11.1	6.2	6.9	4.7	2.5
L025	-	15.4	0.0	11.0	11.1	10.0	-	12.8	11.0	15.3	11.4	3.1
L027	16.7	-	-	7.7	7.6	21.4	4.2	-	-	17.0	2.3	12.7
L028	-	-	-	50.0	100.0	50.0	-	-	-	50.0	57.9	15.0
L029	41.7	16.7	16.7	16.7	8.3	14.3	13.8	13.3	5.6	6.2	5.1	15.6
L030	-	-	33.0	0.0	14.2	0.0	-	-	9.4	9.4	0.0	5.1
L031A	7.1	8.3	16.7	0.0	8.3	28.6	1.8	7.0	14.1	5.5	6.1	9.0
L031B	-	-	-	0.0	-	-	-	-	-	0.0	-	-
L032	28.6	0.0	0.0	18.7	7.1	31.3	23.0	23.1	9.2	22.6	15.0	17.5
L033	-	23.1	9.1	8.3	0.0	-	-	38.7	19.7	26.9	31.0	-
L040	33.0	-	-	-	-	57.1	22.6	-	-	-	-	41.4
L041	-	16.7	-	-	-	-	-	3.4	-	-	-	-
L042	-	22.2	20.0	40.0	-	44.4	-	24.4	27.8	42.2	-	41.6
L043	-	-	-	-	-	16.7	-	-	-	-	-	29.4
L044	-	33.3	44.4	-	-	-	-	32.2	36.8	-	-	-
L045	23.1	8.3	41.7	7.7	41.7	7.1	7.4	7.2	8.9	4.6	6.9	0.8
L046	-	38.5	15.4	30.3	33.3	35.7	-	24.2	17.2	23.4	14.8	29.9
L048	-	-	-	0.0	8.3	15.4	-	-	-	10.5	12.7	7.9
L049	-	-	-	15.4	38.5	21.4	-	-	-	29.7	15.0	32.5
L050	-	-	-	0.0	50.0	25.0	-	-	-	11.1	10.5	33.3
L051	-	-	-	-	-	0.0	-	-	-	-	-	13.1
L053	11.1	-	22.2	0.0	-	0.0	2.1	-	6.1	1.0	-	4.0
L054	71.4	12.5	-	-	-	70.0	24.0	27.0	-	-	-	61.6
L056	66.7	30.0	-	-	-	-	63.1	42.7	-	-	-	-
L057	40.0	33.3	50.0	16.7	9.1	50.0	22.9	44.1	37.7	18.6	13.7	21.1
L058	0.0	8.3	27.3	0.0	0.0	0.0	0.5	8.9	10.7	7.8	11.3	12.0
L059	-	-	-	-	-	85.7	-	-	-	-	-	44.8
L060	-	50.0	72.7	41.8	33.0	8.3	-	34.5	42.9	35.9	19.3	10.0
L061	-	-	11.0	0.0	0.0	0.0	-	-	8.2	6.0	0.0	0.0
L062	-	-	-	28.6	20.0	12.5	-	-	-	27.3	5.4	10.8
L063	-	-	-	14.3	20.0	47.4	-	-	-	25.8	8.8	21.5
L064	-	-	-	0.0	18.2	33.3	-	-	-	14.4	15.2	12.2
L066	-	-	-	0.0	30.0	9.1	-	-	-	13.9	2.1	9.4

To simplify the overview of laboratory assessment the frequency of bias and flags are combined to create Table 6A. This format with similar criteria (given below) provides a convenient way of recognizing between studies those laboratories that are either satisfactory, moderate or poor.

Satisfactory	if	% bias + % flags	< 25%
Moderate	if	% bias + % flags	>25% or <60%
Poor	if	% bias + % flags	>60%

The above approach, although simple has merit in that laboratories designated as poor do indeed have difficulties in being comparable with their peer group. This comment may be verified by detailed scrutiny of the raw data (Appendix I) and their specific appraisals (Appendix II) found in each of the study reports. The connotation of poor does not mean they are unable to analyze soft waters but rather they are less qualified than their peers. Their peers are those labs identified as satisfactory. These laboratories are consistently found unbiased and are sufficiently precise to escape frequent flagging.

Regarding Table 6A some precautions are suggested. For instance the results in Table 6A reflect on the relative performance of laboratories who measured most but not necessarily all of the parameters (refer to index page of Appendix 1). Users of data may indeed be rewarded by a poor lab being able to perform consistently very well on only 2 or 3 of these 14 parameters. Users of data and

Table 6A. Summary of Study to Study Performance

Lab Code	% Bias + % Flags on LRTAP Studies						Average Score *
	L-1	L-3	L-4	L-5	L-6	L-8	
L002	36.6	36.7	15.4	14.1	8.0	22.8	19.4
L003	39.7	15.9	10.9	20.0	29.6	14.1	18.1
L004A	62.2	48.3	49.4	57.1	47.6	31.0	46.7
L004B	-	-	60.0	-		-	-
L005	-	-	-	-	25.0	-	25.0
L006	68.0	47.3	73.8	55.1	76.1	38.2	58.1
L007	83.6	90.7	-	50.0	12.2	18.9	43.0
L009	45.5	20.0	18.3	23.6	14.1	14.2	18.0
L010A	-	35.7	49.0	26.1	74.5	43.3	45.7
L010B	-	-	-	0.0	-	-	-
L011	53.5	43.9	58.0	36.9	4.4	50.8	38.8
L012	33.8	-	-	0.0	-	-	0
L013A	35.6	5.6	6.3	1.4	2.2	1.1	3.3
L013B	-	-	6.2	-	-	-	-
L014	28.7	33.7	27.7	18.4	18.5	25.8	24.8
L016	42.5	55.2	57.5	51.5	56.6	32.5	50.7
L018	-	-	-	76.5	-	-	76.5
L019	-	-	-	1.2	5.0	9.0	5.1
L020	51.2	39.9	13.6	10.7	21.1	30.4	23.1
L021A	85.7	99.8	-	-	61.1	11.3	59.6
L021B	76.1	-	69.7	56.3	-	-	-
L022	51.7	76.4	72.7	72.2	62.7	80.5	72.9
L023	55.6	12.0	13.7	11.6	17.6	24.1	15.8
L024	28.5	29.3	14.5	6.9	4.7	17.9	14.7
L025	-	28.2	11.0	26.3	22.5	13.1	20.2
L027	20.9	-	-	24.7	9.9	34.1	22.9
L028	-	-	-	100.0	157.9	65.0	107.6
L029	65.5	30.0	22.3	22.9	13.4	29.9	23.7
L030	-	-	42.4	7.4	14.2	5.1	17.3
L031A	8.9	15.3	30.8	5.5	14.4	38.0	20.8
L031B	-	-	-	0.0	-	-	-
L032	51.6	23.1	9.2	41.3	22.1	48.8	28.9
L033	-	61.8	28.8	35.2	25.0	-	37.7
L040	55.6	-	-	-	-	98.5	98.5
L041	-	20.1	-	-	-	-	20.1
L042	-	46.6	47.8	82.2	-	86.1	62.7
L043	-	-	-	-	-	46.1	46.1
L044	-	65.5	81.2	-	-	-	73.4
L045	30.5	15.5	50.6	12.3	48.6	7.9	27.0
L046	-	62.7	32.6	53.7	48.1	65.6	52.5
L048	-	-	-	10.5	21.0	23.3	18.3
L049	-	-	-	45.1	53.5	53.9	50.8
L050	-	-	-	11.1	60.5	58.3	43.3
L051	-	-	-	-	-	13.1	13.1
L053	13.2	-	28.3	1.0	-	5.0	11.4
L054	95.4	39.5	-	-	-	131.6	85.4
L056	129.8	72.7	-	-	-	-	72.7
L057	62.9	77.4	87.1	35.3	22.8	71.7	58.9
L058	0.5	17.2	38.0	7.8	11.3	12.0	17.3
L059	-	-	-	-	-	130.5	130.5
L060	-	84.5	115.6	77.7	52.3	18.3	69.7
L061	-	-	19.2	6.0	0.0	0.0	6.3
L062	-	-	-	55.9	25.4	23.3	34.8
L063	-	-	-	39.1	28.8	68.9	45.6
L064	-	-	-	14.4	33.4	45.5	31.1
L066	-	-	-	13.9	32.1	18.5	21.5

* Average score is the mean value of % bias + % flags for studies L3, 4, 5, 6 and 8 (Results on study L-1 are not included).

program managers should review all details before reacting. These external details on lab quality are found in Appendix I and II of all study reports. Another issue to recognize is some labs were discerned as biased yet had no single results flagged. This situation occurs if the flagging criteria is perhaps too loose and when a precise lab has but a small systematic error. The magnitude of the bias may be minor for the demands of the users of data. This is an issue that requires consultation between the user of data and his client laboratory.

On an overall basis this study was rather well handled by the participants. Several are revealing improvements. This may reflect a successful and constructive reaction to the interlaboratory program. A general overview in which laboratories are categorized from satisfactory to rather poor is given in Table 6B. This table summarizes the average performance from studies L3, 4, 5, 6 and 8 and is provided to allow project persons, program managers and laboratory staff to put their performance in perspective with their peers and to provide users of data information on the comparability of their client laboratories.

Table 6B. Summary of Study to Study Performance

Lab Code	Average Score (%)	Number of Studies	Lab Code	Average Score (%)	Number of Studies
L012	0.0	1	L033	37.7	4
L013	3.3	5	L011	38.8	5
L019	5.1	3	L007	43.0	4
L061	6.3	4	L050	43.3	3
1053	11.4	3	L063	45.6	3
L051	13.1	1	L010	45.7	5
L024	14.7	5	L043	46.1	1
L023	15.8	5	L004	46.7	5
L030	17.3	4	L016	50.7	5
L058	17.3	5	L049	50.8	3
L009	18.0	5	L046	52.5	5
L003	18.1	5	L006	58.1	5
L048	18.3	3	L057	58.9	5
L002	19.4	5	L021(A,B)	59.6	5
L041	20.1	1	L042	65.7	4
L025	20.2	5	L060	69.7	5
L031(A)	20.8	5	L056	72.7	1
L066	21.5	3	L022	72.9	5
L027	22.9	3	L044	73.4	2
L020	23.1	5	L018	76.5	1
L029	23.7	5	L054	85.4	2
L014	24.8	5	L040	98.5	1
L005	25.0	1	L028	107.6	3
L045	27.0	5	L059	130.5	1
L032	28.9	5			
L064	31.1	3			
L062	34.8	3			

Note (1) Maximum average score is 200% (all parameters biased and all ranked results are flagged).
(2) Average scores are abstracted from Table 6A

Satisfactory (well done) = scores of less than 15%
Satisfactory = scores of less than 25%
Moderate or Average = scores of less than 60; or over 25%
Poor (or very poor) = scores over 60%

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7. Youden, W.J. and E.H. Steiner, "Statistical Manual of the Association of Official Analytical Chemists", AOAC, PO Box 540, Benjamin Franklin Station, Washington, DC, 20044 (1975).

8. "Guidelines for In-lab Quality Control for LRTAP Projects", A Report of the Ad-Hoc Work Group on Quality Control to the LRTAP Quality Assurance and Methods Subgroup of the Federal-Provincial Research and Monitoring Co-ordinating Committee. The Guidelines are available from the LRTAP Liaison Office, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario M3H 5T4, Phone 416-667-4803/4885.

LIST OF PREVIOUS INTERLABORATORY STUDIES

1. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-1: Major Ions, Nutrients and Physical Properties in Water", March 1983.

2. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-2: Trace Metals in Water", March 1983.

3. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-3: Major Ions, Nutrients and Physical Properties in Water", January 1984.

4. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-4: Major Ions, Nutrients and Physical Properties in Water", February 1984.

5. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-5: Major Ions, Nutrients and Physical Properties in Water", July 1984.

6. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-6: Major Ions, Nutrients and Physical Properties in Water", September 1984.

7. K.I. Aspila and S. Todd, "LRTAP Intercomparison Study L-7: Trace Metals in Water", December 1984.

Copies of these reports are available from:
LRTAP Liaison Office
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4905 Dufferin Street
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Atlantic Region, Dartmouth, Nova Scotia

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Agriculture Canada

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Environmental Monitoring and Service Inc., Newbury Park, California

APPENDIX I: LABORATORY DATA

RESULTS REPORTED - INTERLABORATORY STUDY L-8

CONSTITUENT

1. Calcium 1

2. Magnesium 5

3. Sodium 9

4. Potassium 13

5. Chloride (IC method) 17
   Chloride (non-IC methods) 20
   Chloride (all methods) 22

6. Sulfate (IC method) 26
   Sulfate (non IC methods) 29
   Sulfate (all methods) 31

7. Gran Acidity 35
   Acidity to pH 8.5 36
   Acidity (all Methods) 38

8. Gran Alkalinity 40
   Total Alkalinity 42

9. pH 45

10. Specific Conductance 49

11. Colour 53

12. Reactive Silica 55

13. Nitrate plus nitrite 57

14. Fluoride 61

15. Dissolved organic carbon 63

85/04/25

PARAMETER: 20091 CALCIUM MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.50 BASIC ACCEPTABLE ERROR= .15 CONCENTRATION ERROR INCREMENT= .08
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	12.8	16.50	.17	28.50	1.75	9.50	2.97	12.00	3.96	13.00	2.02	17.00
L003	13.	21.50	.05H	0.00	1.7	6.50	3.0	15.50	4.0	18.50	2.0	11.50
L004	11.15 VL	2.00	.02	1.00	1.6 L	2.00	2.7 VL	3.00	3.6 L	4.00	1.8 VL	4.00
L006	12.10	8.00	.10	23.00	1.65	4.00	2.79 L	5.50	3.70 L	6.00	1.91	7.00
L007	12.52	11.00	.17	28.50	1.76	11.50	2.79 L	5.50	3.72 L	7.00	1.69 VL	1.00
L009	13.4	32.50	.07	18.00	1.8	20.00	3.1	26.00	4.0	18.50	2.0	11.50
L010	14.2 H	36.00	.5 VH	36.00	1.8	20.00	3.1	26.00	4.1	28.00	2.0	11.50
L011	11.9 L	6.00	.04	8.00	1.64 L	3.00	2.92	8.00	3.80	10.00	1.96	8.00
L013	12.9	18.00	.04	8.00	1.83	25.50	3.06	21.00	4.04	24.00	2.08	24.00
L014	15.6 VH	38.50	.12	25.00	1.89	30.00	3.17	35.00	4.12	30.50	2.18	33.00
L016	12.79	15.00	.03	3.00	1.80	20.00	3.08	23.50	4.12	30.50	2.01	15.50
L019	16.5 VH	40.00	.09	21.00	1.94	33.50	.13 VL	1.00	4.33 H	39.00	2.06	21.00
L020	12.7	13.50	.04	8.00	1.77	14.00	2.84 L	7.00	3.75	8.50	2.04	18.00
L021	12.69	12.00	.06	15.50	2.07 VH	38.00	2.95	11.00	4.30 H	37.00	2.27 H	34.00
L022	14. H	34.50	.49 VH	35.00	6.5 VH	40.00	3.5 VH	41.00	4.2	33.00	2.3 VH	35.50
L023	14.5 VH	37.00	.08	19.50	2.60 VH	39.00	3.25	38.00	4.30 H	37.00	2.14	30.00
L024	13.	21.50	.10	23.00	1.8	20.00	3.0	15.50	4.1	28.00	2.1	26.50
L025	13.3	30.50	.15	27.00	1.94	33.50	2.10 VL	2.00	3.30 VL	3.00	2.00	11.50
L027	11.7 L	5.00	.48 VH	34.00	1.68	5.00	2.93	9.00	3.75	8.50	2.10	26.50
L029	13.2	27.50	.024T	2.00	1.75	9.50	2.98	13.00	4.05	25.00	2.33 VH	37.00
L031	12.96	19.00	.26 H	31.00	1.79	16.00	3.11	29.50	4.01	22.00	2.15	31.00
L032	11.6 L	4.00	.130	26.00	1.56 VL	1.00	3.02	19.00	4.30 H	37.00	3.53 VH	40.00
L040	13.02	24.00	.06	15.50	2.03 VH	37.00	3.16	34.00	2.09 VL	1.00	2.07	22.50
L042	13.2	27.50	.03H	0.00	1.91	32.00	2.94	10.00	4.00	18.50	2.01	15.50
L043	13.4	32.50	.04	8.00	1.88	28.50	3.14	33.00	4.14	32.00	2.16	32.00
L045	12.8	16.50	.1	23.00	1.77	14.00	3.11	29.50	4.02	23.00	2.10	26.50
L046	11. VL	1.00	.04	8.00	2.02 H	36.00	3.11	29.50	2.8 VL	2.00	2.07	22.50
L048	13.2	27.50	.05H	0.00	1.77	14.00	3.05	20.00	4.23	34.00	1.75 VL	3.00
L049	13.3	30.50	.1H	0.00	1.8	20.00	3.2	36.50	4.1	28.00	1.7 VL	2.00
L051	12.50	10.00	.30 H	33.00	1.83	25.50	3.08	23.50	3.98	14.00	2.13	29.00
L053	13.2	27.50	.06	15.50	1.86	27.00	3.12	32.00	4.24	35.00	2.30 VH	35.50
L054	15.6 VH	38.50	.18	30.00	1.88	28.50	3.37 VH	39.00	3.99	15.00	2.45 VH	38.50
L057	12.3	9.00	.08	19.50	1.73	8.00	3.01	18.00	3.85	11.00	1.90 L	6.00
L058	11.5 VL	3.00	.06	15.50	1.81	24.00	2.77 L	4.00	3.61 L	5.00	1.89 L	5.00
L059	13.0	21.50	.1H	0.00	1.80	20.00	3.0	15.50	4.0	18.50	2.0	11.50
L060	13.1	25.00	.05	13.00	1.80	20.00	3.10	26.00	4.00	18.50	2.05	19.50
L061		0.00	.038	4.00		0.00	3.11	29.50		0.00		0.00
L062	13.	21.50	.04	8.00	1.7	6.50	3.0	15.50	3.9	12.00	2.0	11.50
L063	14.0 H	34.50	.27 H	32.00	1.97 H	35.00	3.48 VH	40.00	4.52 VH	40.00	2.45 VH	38.50
L064	12. L	7.00	.044	12.00	1.9	31.00	3.2	36.50	4.0	18.50	2.1	26.50
L066	12.70	13.50	.04	8.00	1.76	11.50	3.07	22.00	4.08	26.00	2.05	19.50
MEDIAN CONC.	13.000		.075		1.800		3.060		4.000		2.055	

85/04/25

PARAMETER: 20091 CALCIUM MG/L

SAMPLE LAB NO	7 REPORTED VALUE	7 RANK	8 REPORTED VALUE	8 RANK	9 REPORTED VALUE	9 RANK	10 REPORTED VALUE	10 RANK
L002	1.21	18.50	.31	26.00	11.0	10.00	40.6	11.00
L003	1.2	14.50	.29	10.50	11.	10.00	42.	18.00
L004	1.0 L	2.00	.2	1.00	9.9 VL	2.00	36.7 L	7.00
L006	1.18	11.00	.31	26.00	10.69	7.00	34.70 VL	4.00
L007	1.23	22.00	.27	5.50	12.45 H	34.00	44.4	32.00
L009	1.2	14.50	.34	32.50	11.6	22.50	40.7	12.00
L010	1.2	14.50	.3	19.00	12.7 H	35.00	47.2 VH	37.00
L011	1.10	5.50	.30	19.00	10.4 L	5.00	37.6 L	5.00
L013	1.21	18.50	.31	26.00	11.2	15.00	42.5	22.00
L014	1.28	29.00	.37	38.00	11.9	25.50		0.00
L016	1.27	26.50	.31	26.00	11.17	12.00	22.32 VL	2.00
L019	1.06 L	4.00	.24	2.50	13.1 VH	37.00	42.1	20.00
L020	1.16	8.50	.30	19.00	11.0	10.00	43.5	27.00
L021	1.44 H	37.50	.29	10.50	13.93 VH	39.00	48.58 VH	38.00
L022	1.6 VH	40.00	.30	19.00	12.	30.00	44.	29.00
L023	1.28	29.00	.28	7.00	12.8 VH	36.00	45.5 H	34.00
L024	1.2	14.50	.37	38.00	12.	30.00	44.	29.00
L025	1.31	32.00	.29	10.50	11.2	15.00	45.2	33.00
L027	1.37	36.00	.29	10.50	10.6 L	6.00	37.9 L	6.00
L029	1.16	8.50	.296	14.00	11.2	15.00	42.0	10.00
L031	1.28	29.00	.29	10.50	11.94	27.00	43.21	25.00
L032	1.04 L	3.00	.36	36.00	10.9	8.00	40.1	10.00
L040	1.24	23.50	.41	40.00	11.44	20.00	41.42	14.00
L042	1.27	26.50	.37	38.00	13.2 VH	38.00	46.6 H	36.00
L043	1.26	25.00	.34	32.50	11.7	24.00	43.4	26.00
L045	1.33	33.00	.29	10.50	11.6	22.50	41.6	15.50
L046	1.17	10.00	.34	32.50	9.4 VL	1.00	29. VL	3.00
L048	1.24	23.50	.26	4.00	11.9	25.50	44.0	29.00
L049	1.1	5.50	.3	19.00	11.4	18.50	40.	9.00
L051	1.36	35.00	.34	32.50	12.00	30.00	44.10	31.00
L053	1.34	34.00	.34	32.50	11.5	21.00	41.6	15.50
L054	1.46 VH	39.00	.59 VH	41.00	14.6 VH	40.00	48.9 VH	39.00
L057	1.13	7.00	.30	19.00	11.4	18.50	41.1	13.00
L058	.92 VL	1.00	.31	26.00	10.3 L	4.00	39.3	8.00
L059	1.2	14.50	.3	19.00	12.0	30.00	42.	18.00
L060	1.22	21.00	.30	19.00	11.2	15.00	42.4	21.00
L061	1.217	20.00	.325	29.00		0.00		0.00
L062	1.2	14.50	.24	2.50	12.	30.00	43.	24.00
L063	1.44 H	37.50	.30	19.00	12.2	33.00	46.0 H	35.00
L064	1.3	31.00	.34	32.50	10. VL	3.00	17. VL	1.00
L066	1.66 VH	41.00	.27	5.50	11.20	15.00	42.8	23.00
MEDIAN CONC.	1.220		.300		11.470		42.100	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	162.00	16.200	10			FLAME AAS
L003	126.50	14.056	9			20110
L004	28.00	2.800	10	VLLVLLLVLLVLL	BIASED LOW	20103L
L006	101.50	10.150	10	LLVL		FLAMEAA
L007	158.00	15.800	10	LLVLH		S.A.A
L009	208.00	20.800	10			FLAME AA
L010	263.00	26.300	10	HVHHVH		ICAP
L011	77.50	7.750	10	LLLL	BIASED LOW	
L013	202.00	20.200	10			FLAME AAS
L014	284.50	31.611	9	VH		A.A.S
L016	174.00	17.400	10	VL		A.A.S.
L019	219.00	21.900	10	VHVLHLVH		IC
L020	133.50	13.350	10	L		ICP
L021	272.50	27.250	10	VHHHHVHVH		AAS
L022	337.00	33.700	10	HVHVHVHVHVH	BIASED HIGH	ICP
L023	306.50	30.650	10	VHVHHVHH		ICAP FLAME AAS
L024	246.00	24.600	10			AAS-FLAME
L025	198.00	19.800	10	VLVL		FLAME AAS
L027	146.50	14.650	10	LVHLL		AAS
L029	169.50	16.950	10	VH		ICAP
L031	240.00	24.000	10	H		FLAME AAS
L032	184.00	18.400	10	LVLHVHL		FLAME-AA
L040	231.50	23.150	10	VHVL		FLAME AAS
L042	242.00	26.889	9	VHH		FLAME AA
L043	273.50	27.350	10			ICP
L045	214.00	21.400	10			AAS
L046	145.50	14.550	10	VLHVLVLVL		FLAME AAS
L048	180.50	20.056	9	VL		FLAME-AAS
L049	169.00	18.778	9	VL		
L051	263.50	26.350	10	H		A.A.
L053	275.50	27.550	10	VH	BIASED HIGH	FLAME AAS
L054	348.50	34.850	10	VHVHVHVHVHVHVH		FLAME-AA
L057	129.00	12.900	10	L		FLAME AA
L058	95.50	9.550	10	VLLLLLVLL		303-A
L059	168.50	18.722	9			A.A.
L060	198.00	19.800	10		INSUFFICIENT DATA	FLAME-AAS
L061	82.50	20.625	4			AAS
L062	146.00	14.600	10	HHHVHVHVHHH	BIASED HIGH	AAS
L063	344.50	34.450	10	LVLVL		ICP
L064	199.00	19.900	10	VH		FLAME-AA
L066	185.00	18.500	10			

OVERALL AVERAGE RANK IS 20.425

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L004	28.00	2.800	10	VLLVLLVLLVLL	BIASED LOW	20103L
L011	77.50	7.750	10	LLLL	BIASED LOW	
L058	95.50	9.550	10	VLLLLVLL		FLAME AA
L006	101.50	10.150	10	LLVL		FLAMEAA
L057	129.00	12.900	10	L		FLAME-AA
L020	133.50	13.350	10	L		ICP
L003	126.50	14.056	9			20110
L046	145.50	14.550	10	VLHVLVLVL		AAS
L062	146.00	14.600	10			AAS
L027	146.50	14.650	10	LVHLL		FLAME AAS
L007	158.00	15.800	10	LLVLH		S.A.A
L002	162.00	16.200	10			FLAME AAS
L029	169.50	16.950	10	VH		AAS
L016	174.00	17.400	10	VL		A.A.S.
L032	184.00	18.400	10	LVLHVHL		FLAME AAS
L066	185.00	18.500	10	VH		FLAME-AA
L059	168.50	18.722	9			303-A
L049	169.00	18.778	9	VL		FLAME-AAS
L025	198.00	19.800	10	VLVL		AAS-FLAME
L060	198.00	19.800	10			A.A.
L064	199.00	19.900	10	LVLVL		ICP
L048	180.50	20.056	9	VL		FLAME AAS
L013	202.00	20.200	10			FLAME AAS
L061	82.50	20.625	4		INSUFFICIENT DATA	FLAME-AAS
L009	208.00	20.800	10			FLAME AA
L045	214.00	21.400	10			ICP
L019	219.00	21.900	10	VHVLHLVH		IC
L040	231.50	23.150	10	VHVL		FLAME-AA
L031	240.00	24.000	10	H		ICAP
L024	246.00	24.600	10			
L010	263.00	26.300	10	HVHHVH		ICAP
L051	263.50	26.350	10	H		
L042	242.00	26.889	9	VHH		FLAME AAS
L021	272.50	27.250	10	VHHHHVHVH		AAS
L043	273.50	27.350	10			FLAME AA
L053	275.50	27.550	10	VH		A.A.
L023	306.50	30.650	10	VHVHHVHH		ICAP FLAME AAS
L014	284.50	31.611	9	VH		A.A.S
L022	337.00	33.700	10	HVHVHVHVHVH	BIASED HIGH	ICP
L063	344.50	34.450	10	HHHVHVHVHHH	BIASED HIGH	AAS
L054	348.50	34.850	10	VHVHVHVHVHVHVH	BIASED HIGH	FLAME AAS

OVERALL AVERAGE RANK IS 20.425

PARAMETER: 12091 MAGNESIUM MG/L

85/04/25

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.00 BASIC ACCEPTABLE ERROR= .05 CONCENTRATION ERROR INCREMENT= .10
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	3.0 H	36.00	.67	7.00	.61 L	1.00	.79 VL	1.00	.93 L	6.50	.37	3.00
L003	2.6	6.50	.72	21.00	.67	16.00	.89	19.00	1.0	21.00	.43	25.50
L004	2.60	6.50	.67	7.00	.67	16.00	.87	12.50	1.01	25.50	.41	14.00
L006	2.30 VL	1.00	.69	11.50	.65	7.50	.85	6.00	.91 VL	3.00	.41	14.00
L007	2.80	27.00	.73	25.50	.69	25.00	.91	25.50	1.01	25.50	.43	25.50
L009	2.7	12.50	.72	21.00	.67	16.00	.92	29.00	.98	14.00	.41	14.00
L010	3.0 H	36.00	.7	14.00	.7	27.50	.9	22.00	1.1 VH	35.00	.4	10.50
L011	2.60	6.50	.66 L	3.50	.68	21.50	.85	6.00	.90 VL	1.50	.40	10.50
L013	2.69	11.00	.72	21.00	.68	21.50	.91	25.50	1.00	21.00	.42	19.50
L014	2.88	30.00	.71	17.00	.66	11.00	.86	8.50	.96	10.00	.42	19.50
L016	3.17 VH	38.00	.75	29.50	.70	27.50	.92	29.00	1.03	30.00	.44	29.00
L019	2.9	31.50	.85 VH	39.00	.74 H	33.00	.88	17.00	1.03	30.00	.42	19.50
L020	2.92	33.00	.80 VH	36.00	.75 H	35.00	1.00 VH	37.00	1.14 VH	37.00	.49 H	36.00
L021	2.78	23.00	.61 VL	1.00	.72	31.00	.81 VL	2.00	.93 L	6.50	.39	7.00
L022	3.0 H	36.00	.79 H	34.00	.86 VH	39.50	.97 H	35.00	1.1 VH	35.00	.47	34.00
L023	3.31 VH	39.00	.919 VH	41.00	.65	7.50	1.12 VH	41.00	1.26 VH	40.00	.513 VH	37.00
L024	2.8	27.00	.69	11.50	.64	4.00	.87	12.50	.99	17.00	.37	3.00
L025	2.75	20.50	.725	24.00	.650	7.50	.900	22.00	1.00	21.00	.440	29.00
L027	2.55	3.00	.67	7.00	.66	11.00	.86	8.50	.94 L	8.00	.42	19.50
L029	2.71	14.50	.703	16.00	.661	13.00	.862	10.00	.970	12.00	.487 H	35.00
L031	2.74	19.00	.72	21.00	.68	21.50	.90	22.00	1.01	25.50	.43	25.50
L032	2.71	14.50	.772 H	33.00	.771 VH	37.00	.928	32.00	.988	15.00	.560 VH	39.00
L040	2.97	34.00	.76	32.00	.74 H	33.00	.92	29.00	.99	17.00	.46	33.00
L042	2.60	6.50	.68	10.00	.64	4.00	.83 L	3.00	.92 VL	4.50	.36 L	1.00
L043	2.67	10.00	.73	25.50	.68	21.50	.90	22.00	1.01	25.50	.42	19.50
L045	2.79	24.00	.75	29.50	.70	27.50	.92	29.00	1.04	32.00	.43	25.50
L046	2.6	6.50	.80 VH	36.00	.76 VH	36.00	1.02 VH	39.00	1.09 VH	33.00	.45	31.50
L048	2.75	20.50	.67	7.00	.66	11.00	.87	12.50	.95	9.00	.40	10.50
L049	2.8	27.00	.8 VH	36.00	.7	27.50	1.0 VH	37.00	1.1 VH	35.00	.4	10.50
L051	2.77	22.00	.66 L	3.50	.64	4.00	.85	6.00	.97	12.00	.37	3.00
L053	2.72	16.50	.74	27.00	.68	21.50	.90	22.00	1.02	28.00	.45	31.50
L054	2.90	31.50	.878 VH	40.00	.815 VH	38.00	1.00 VH	37.00	1.21 VH	39.00	.614 VH	40.00
L057	2.52 L	2.00	.70	14.00	.67	16.00	.88	17.00	.90 VL	1.50	.38	5.00
L058	2.7	12.50	.70	14.00	.71	30.00	.92	29.00	.97	12.00	.44	29.00
L059	2.6	6.50	.65 L	2.00	.63	2.00	.84 L	4.00	.92 VL	4.50	.39	7.00
L060	2.72	16.50	.75	29.50	.68	21.50	.93	33.00	1.03	30.00	.42	19.50
L061		0.00	.716	18.00		0.00	.874	15.00		0.00		0.00
L062	2.8	27.00	.67	7.00	.65	7.50	.87	12.50	1.0	21.00	.39	7.00
L063	3.70 VH	40.00	.82 VH	38.00	.86 VH	39.50	1.03 VH	40.00	1.19 VH	38.00	.52 VH	38.00
L064	2.8	27.00	.75	29.50	.74 H	33.00	.96 H	34.00	1.0	21.00	.42	19.50
L066	2.73	18.00	.72	21.00	.67	16.00	.88	17.00	.99	17.00	.42	19.50
MEDIAN CONC.	2.750		.720		.680		.900		1.000		.420	

PARAMETER: 12091 MAGNESIUM MG/L 85/04/25

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.30	5.00	.06	9.00	3.4	30.50	9.9	31.00
L003	.36	31.00	.07W	0.00	3.2	15.50	9.4	21.00
L004	.32	10.00	.05	5.00	3.08	5.00	9.3	16.50
L006	.34	22.00	.08	31.50	2.75 VL	2.00	7.93 VL	1.00
L007	.35	27.00	.08	31.50	3.30	23.50	9.60	23.50
L009	.34	22.00	.07	23.00	3.2	15.50	9.3	16.50
L010	.4 H	39.00	.1W	0.00	3.6 H	37.50	10.7 H	38.00
L011	.31	8.00	.06	9.00	3.10	7.00	8.80	6.00
L013	.34	22.00	.065	14.50	3.17	13.00	9.37	19.00
L014	.33	13.50	.07	23.00	3.16	11.50	9.07	8.00
L016	.36	31.00	.08	31.50	3.58 H	36.00	9.52	22.00
L019	.31	8.00	.06	9.00	3.5	34.00	9.2	12.50
L020	.38	34.00	.07	23.00	3.53	35.00	10.	33.50
L021	.29	2.50	.02	3.00	3.26	21.50	9.19	11.00
L022	.40 H	39.00	.08	31.50	3.6 H	37.50	10.	33.50
L023	.360	31.00	.080	31.50	3.92 VH	39.00	10.8 VH	39.00
L024	.28 L	1.00	.02T	3.00	3.4	30.50	10.1	36.50
L025	.360	31.00	.065	14.50	3.25	19.50	9.75	28.00
L027	.33	13.50	.06	9.00	3.10	7.00	9.30	16.50
L029	.331	17.00	.066	16.00	3.16	11.50	9.20	12.50
L031	.34	22.00	.06	9.00	3.40	30.50	9.62	25.00
L032	.389	36.00	.095	37.00	3.35	26.00	9.29	14.00
L040	.39	36.50	.07	23.00	3.26	21.50	9.01	7.00
L042	.29	2.50	.02	3.00	3.01	4.00	8.57	3.00
L043	.33	13.50	.07	23.00	3.11	9.00	9.10	9.00
L045	.35	27.00	.07	23.00	3.39	28.00	9.71	27.00
L046	.33	13.50	.07	23.00	3.2	15.50	10.	33.50
L048	.34	22.00	.07	23.00	3.10	7.00	10.0	33.50
L049	.4 H	39.00	.1W	0.00	2.5 VL	1.00	9.8	29.00
L051	.30	5.00	.01 L	1.00	3.44	33.00	9.81	30.00
L053	.36	31.00	.08	31.50	3.21	18.00	9.18	10.00
L054	.553 VH	41.00	.094	36.00	3.36	27.00	10.1	36.50
L057	.30	5.00	.06	9.00	2.93 L	3.00	8.61	4.00
L058	.34	22.00	.07	23.00	3.15	10.00	9.3	16.50
L059	.31	8.00	.07	23.00	3.2	15.50	8.4 L	2.00
L060	.34	22.00	.06	9.00	3.33	25.00	9.60	23.50
L061	.334	18.00	.069	17.00		0.00		0.00
L062	.33	13.50	.10	38.00	3.4	30.50	9.7	26.00
L063	.39	36.50	.09	35.00	4.17 VH	40.00	11.9 VH	40.00
L064	.35	27.00	.061	13.00	3.3	23.50	8.7	5.00
L066	.33	13.50	.07	23.00	3.25	19.50	9.38	20.00
MEDIAN CONC.	.340		.070		3.255		9.390	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	130.00	13.000	10	HLVLL		FLAME AAS
L003	176.50	19.611	9			12107
L004	118.00	11.800	10			12102L
L006	99.50	9.950	10	VLVLVLVL		FLAMEAA
L007	259.50	25.950	10			S.A.A.
L009	183.50	18.350	10			FLAME AA
L010	259.50	28.833	9	HVHHHH		ICAP
L011	79.50	7.950	10	LVL	BIASED LOW	
L013	188.00	18.800	10			FLAME AAS
L014	152.00	15.200	10			A.A.S
L016	303.50	30.350	10	VHH		A.A.S.
L019	233.50	23.350	10	VHH		IC
L020	339.50	33.950	10	VHHVHVHH	BIASED HIGH	ICP
L021	108.50	10.850	10	VLVLL		AAS
L022	355.00	35.500	10	HHVHHVHHH	BIASED HIGH	ICP
L023	346.00	34.600	10	VHVHVHVHVHVHVH	BIASED HIGH	ICAP FLAME AAS
L024	146.00	14.600	10	L		
L025	217.00	21.700	10			AAS-FLAME
L027	103.00	10.300	10	L		FLAME AAS
L029	157.50	15.750	10	H		AAS
L031	221.00	22.100	10			ICAP
L032	282.50	28.250	10	HVHVH		FLAME AAS
L040	266.00	26.600	10	H		FLAME-AA
L042	41.50	4.150	10	LVLL	BIASED LOW	FLAME AAS
L043	178.50	17.850	10			FLAME AA
L045	272.50	27.250	10			ICP
L046	267.50	26.750	10	VHVHVHVH		AAS
L048	156.00	15.600	10			FLAME AAS
L049	242.00	26.889	9	VHVHVHHVL		FLAME-AAS
L051	119.50	11.950	10	LL		
L053	237.00	23.700	10			A.A.
L054	366.00	36.600	10	VHVHVHVHVHVH	BIASED HIGH	FLAME AAS
L057	76.50	7.650	10	LVLL	BIASED LOW	FLAME-AA
L058	198.00	19.800	10			FLAME AA
L059	74.50	7.450	10	LLVLL	BIASED LOW	303-A
L060	229.50	22.950	10			A.A.
L061	68.00	17.000	4		INSUFFICIENT DATA	FLAME-AAS
L062	190.00	19.000	10			AAS
L063	385.00	38.500	10	VHVHVHVHVHVHVHVH	BIASED HIGH	AAS
L064	232.50	23.250	10	HH		ICP
L066	184.50	18.450	10			FLAME-AA

OVERALL AVERAGE RANK IS 20.559

MAGNESIUM

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L042	41.50	4.150	10	LVLL	BIASED LOW	FLAME AAS
L059	74.50	7.450	10	LLVLL	BIASED LOW	303-A
L057	76.50	7.650	10	LVLL	BIASED LOW	FLAME-AA
L011	79.50	7.950	10	LVL	BIASED LOW	
L006	99.50	9.950	10	VLVLVLVL		FLAMEAA
L027	103.00	10.300	10	L		FLAME AAS
L021	108.50	10.850	10	VLVLL		AAS
L004	118.00	11.800	10			12102L
L051	119.50	11.950	10	LL		
L002	130.00	13.000	10	HLVLL		FLAME AAS
L024	146.00	14.600	10	L		
L014	152.00	15.200	10			A.A.S
L048	156.00	15.600	10			FLAME AAS
L029	157.50	15.750	10	H		AAS
L061	58.00	17.000	4		INSUFFICIENT DATA	FLAME-AAS
L043	178.50	17.850	10			FLAME AA
L009	183.50	18.350	10			FLAME AA
L066	184.50	18.450	10			FLAME-AA
L013	188.00	18.800	10			FLAME AAS
L062	190.00	19.000	10			AAS
L003	176.50	19.611	9			12107
L058	198.00	19.800	10			FLAME AA
L025	217.00	21.700	10			AAS-FLAME
L031	221.00	22.100	10			ICAP
L060	229.50	22.950	10			A.A.
L064	232.50	23.250	10	HH		ICP
L019	233.50	23.350	10	VHH		IC
L053	237.00	23.700	10			A.A.
L007	259.50	25.950	10			S.A.A.
L040	266.00	26.600	10	H		FLAME-AA
L046	267.50	26.750	10	VHVHVHVH		AAS
L049	242.00	26.889	9	VHVHVHHVL		FLAME-AAS
L045	272.50	27.250	10			ICP
L032	282.50	28.250	10	HVHVH		FLAME AAS
L010	259.50	28.833	9	HVHHHH		ICAP
L016	303.50	30.350	10	VHH		A.A.S.
L020	339.50	33.950	10	VHHVHVHH	BIASED HIGH	ICP
L023	345.00	34.600	10	VHVHVHVHVHVHVH	BIASED HIGH	ICAP FLAME AAS
L022	355.00	35.500	10	HHVHHVHHH	BIASED HIGH	ICP
L054	366.00	36.600	10	VHVHVHVHVHVH	BIASED HIGH	FLAME AAS
L063	385.00	38.500	10	VHVHVHVHVHVHVHVH	BIASED HIGH	AAS

OVERALL AVERAGE RANK IS 20.559

85/04/25

PARAMETER# 11091 SODIUM MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .50 BASIC ACCEPTABLE ERROR= .20 CONCENTRATION ERROR INCREMENT= .14
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.30	31.50	.76	35.50	4.18	27.00	.35	39.00	1.42	37.00	.76	30.50
L003	1.2	17.00	.6	2.00	3.8	7.50	.10	4.00	1.2	12.50	.7	13.00
L004	1.20	17.00	.63	4.00	3.8	7.50	.12	8.50	1.21	17.00	.69	9.00
L006	1.17	9.00	.71	29.50	3.57	2.00	.21	37.00	1.26	24.00	.75	27.50
L007	1.01	2.00	.66	11.50	3.90	11.50	.15	16.50	1.01	1.00	.61	1.00
L009	1.2	17.00	.70	22.00	4.0	18.50	.16	21.50	1.2	12.50	.73	21.00
L010	1.4	37.50	1.3 VH	40.00	4.2	29.00	.2	35.00	1.4	35.50	.7	13.00
L011	1.14	5.50	.65	8.50	4.30	31.50	.13	10.50	1.20	12.50	.70	13.00
L013	1.25	27.00	.65	8.50	4.14	26.00	.14	12.00	1.28	27.00	.75	27.50
L014	1.11	4.00	.61	3.00	3.83	9.00	.07	1.00	1.17	6.00	.65	4.50
L016	1.14	5.50	.66	11.50	3.60	3.00	.15	16.50	1.09	2.00	.63	2.00
L019	1.23	24.00	.71	29.50		0.00	.11	7.00	1.31	31.50	.75	27.50
L020	1.34	35.50	.74	34.00	3.12 L	1.00	.16	21.50	1.12	3.00	.64	3.00
L020B	1.3	31.50	.7	22.00	4.1	24.50	.1	4.00	1.3	29.00	.8	34.00
L021	1.28	28.50	.71	29.50	4.43	34.00	.17	28.50	1.32	33.00	.68	7.50
L022	1.3	31.50	.7	22.00	4.3	31.50	.3	38.00	1.3	29.00	.8	34.00
L023	1.34	35.50	.72	32.00	11.3 VH	40.00	.17	28.50	1.31	31.50	.78	32.00
L024	1.3	31.50	.76	35.50	4.2	29.00	.13	10.50	1.3	29.00	.81	36.00
L025	1.10	3.00	.730	33.00	4.35	33.00	.185	33.00	1.25	21.50	.760	30.50
L027	1.23	24.00	.69	14.50	4.05	22.50	.15	16.50	1.27	25.50	.72	18.50
L029	1.20	17.00	.692	16.50	3.88	10.00	.146	13.00	1.20	12.50	.829	37.00
L031	1.19	12.00	.64	5.50	3.72	6.00	.15	16.50	1.16	5.00	.65	4.50
L032	1.16	7.00	.692	16.50	3.63	4.00	.167	25.00	1.19	7.50	.730	21.00
L040	1.28	28.50	.71	29.50	3.98	16.50	.18	32.00	1.50	38.00	.74	24.00
L042	1.17	9.00	.69	14.50	3.91	13.00	.17	28.50	1.19	7.50	.70	13.00
L043	1.23	24.00	.70	22.00	4.01	20.00	.16	21.50	1.25	21.50	.73	21.00
L045	1.2	17.00	.7	22.00	4.1	24.50	.10T	4.00	1.2	12.50	.7	13.00
L046	1.71 VH	40.00	1.56 VH	41.00	5.6 VH	38.00	.93 VH	41.00	1.95 VH	40.00	1.55 VH	39.00
L048	1.2	17.00	.70	22.00	4.2	29.00	.2	35.00	1.2	12.50	.70	13.00
L049	1.2	17.00	.5	1.00	3.9	11.50	.1	4.00	1.2	12.50	.7	13.00
L051	1.17	9.00	.65	8.50	4.03	21.00	.15	16.50	1.25	21.50	.71	17.00
L053	1.24	26.00	.70	22.00	3.98	16.50	.17	28.50	1.27	25.50	.74	24.00
L054	1.7 VH	39.00	1.2 VH	39.00	4.8 H	37.00	.7 VH	40.00	1.7 H	39.00	1.6 VH	40.00
L057	2.51 VH	41.00	2.35 VH	42.00	5.7[VH	39.00	1.75 VH	42.00	2.87 VH	41.00	2.00 VH	41.00
L058	1.20	17.00	.70	22.00	3.65	5.00	.17	28.50	1.23	19.00	.74	24.00
L059	1.0	1.00	.64	5.50	3.95	15.00	.15	16.50	1.14	4.00	.67	6.00
L060	1.18	11.00	.65	8.50	4.05	22.50	.12	8.50	1.22	18.00	.68	7.50
L061		0.00	.702	27.00		0.00	.162	24.00		0.00		0.00
L062	1.2	17.00	.67	13.00	4.0	18.50	.10	4.00	1.2	12.50	.75	27.50
L063	1.32	34.00	.87	37.00	4.73 H	36.00	.17	28.50	1.38	34.00	.80	34.00
L064	1.4	37.50	.95 H	38.00	4.7	35.00	.20	35.00	1.4	35.50	.83	38.00
L066	1.22	22.00	.70	22.00	3.94	14.00	.16	21.50	1.25	21.50	.72	18.50
MEDIAN CONC.	1.200		.700		4.020		.160		1.250		.730	

85/04/25

PARAMETER: 11091 SODIUM MG/L

SAMPLE LAB NO	7 REPORTED VALUE	RANK	8 REPORTED VALUE	RANK	9 REPORTED VALUE	RANK	10 REPORTED VALUE	RANK
L002	.34	30.00	.55	35.50	13.5	17.50	18.6	16.00
L003	.3	10.00	.4	2.00	13.3	11.50	18.9	21.00
L004	.28	3.00	.49	10.50	13.1	7.50	18.1	9.00
L006	.33	26.00	.53	31.50	11.38 L	2.00	15.57 L	1.00
L007	.30	10.00	.49	10.50	11.4 L	3.00	18.2	10.50
L009	.33	26.00	.52	26.50	13.5	17.50	18.3	12.00
L010	.3	10.00	.5	16.50	15.4	37.00	21.2	38.00
L011	.29	4.50	.48	8.50	13.4	14.00	18.4	13.00
L013	.34	30.00	.52	26.50	13.4	14.00	18.9	21.00
L014	.23	2.00	.43	4.00	13.1	7.50	18.0	7.00
L016	.30	10.00	.47	6.50	12.50	5.00	21.80 H	39.00
L019	.34	30.00	.55	35.50	13.8	23.50	19.1	28.00
L020	.36	35.00	.56	37.00	16.0 H	40.00	17.9	5.50
L020B	.3	10.00	.5	16.50	13.3	11.50	19.0	24.50
L021	.32	21.50	.50	16.50	15.89 H	39.00	22.80 H	40.00
L022	.4	37.00	.5	16.50	15.	36.00	20.	34.00
L023	.36	35.00	.52	26.50	15.5	38.00	20.9	36.00
L024	.42	38.00	.52	26.50	14.8	34.50	21.1	37.00
L025	.350	33.00	.545	34.00	14.5	32.00	20.0	34.00
L027	.31	16.50	.52	26.50	13.50	17.50	18.80	19.00
L029	.300	10.00	.502	22.00	13.2	9.00	17.9	5.50
L031	.31	16.50	.47	6.50	13.08	6.00	18.06	8.00
L032	.326	24.00	.444	5.00	13.5	17.50	18.5	14.50
L040	.36	35.00	.54	33.00	13.29	10.00	18.90	21.00
L042	.31	16.50	.50	16.50	13.7	20.00	17.8	4.00
L043	.31	16.50	.51	23.00	13.78	21.00	19.06	27.00
L045	.3	10.00	.5	16.50	13.8	23.50	18.5	14.50
L046	1.23 VH	41.00	1.08 VH	41.00	14.	27.00	19.	24.50
L048	.30	10.00	.50	16.50	3.5 VL	1.00	18.7	17.50
L049	.2	1.00	.3 L	1.00	13.8	23.50	19.7	31.50
L051	.32	21.50	.53	31.50	14.40	31.00	18.20	10.50
L053	.33	26.00	.50	16.50	13.8	23.50	18.7	17.50
L054	1.1 VH	40.00	1.0 VH	40.00	14.8	34.50	19.6	30.00
L057	1.84 VH	42.00	2.61 VH	42.00	14.6	33.00	19.7	31.50
L058	.32	21.50	.41	3.00	12.0	4.00	17.5	3.00
L059	.29	4.50	.48	8.50	13.4	14.00	16.7	2.00
L060	.30	10.00	.50	16.50	14.3	30.00	19.0	24.50
L061	.318	19.00	.528	30.00		0.00		0.00
L062	.34	30.00	.50	16.50	14.	27.00	20.	34.00
L063	.58 H	39.00	.66	39.00	14.	27.00	19.	24.50
L064	.34	30.00	.57	38.00	17. VH	41.00	23. H	41.00
L066	.32	21.50	.52	26.50	14.10	29.00	19.20	29.00
MEDIAN CONC.	.320		.501		13.780		18.900	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	299.50	29.950	10			FLAME AES
L003	100.50	10.050	10			11103
L004	93.00	9.300	10		BIASED LOW	11105L
L006	189.50	18.950	10	LL		FLAMEAA
L007	77.50	7.750	10	L	BIASED LOW	S.A.A.
L009	194.50	19.450	10			FLAME AA
L010	291.50	29.150	10	VH		ICAP
L011	121.50	12.150	10			
L013	219.50	21.950	10			IC
L014	48.00	4.800	10		BIASED LOW	A.E.S.
L016	101.00	10.100	10	H		A.A.S.
L019	236.50	26.278	9			IC
L020	215.50	21.550	10	LH		IC
L020B	207.50	20.750	10			AUTO-COL-FLAME
L021	278.00	27.800	10	HH		IC
L022	309.50	30.950	10			ICP
L023	335.00	33.500	10	VH	BIASED HIGH	ICAP FLAME AAS
L024	307.50	30.750	10			
L025	287.00	28.700	10			AAS-FLAME
L027	201.00	20.100	10			FLAME AAS
L029	152.50	15.250	10			AAS
L031	86.50	8.650	10		BIASED LOW	ICAP
L032	142.00	14.200	10			FLAME AAS
L040	267.50	26.750	10			FLAME-AA
L042	142.50	14.250	10			FLAME AAS
L043	217.50	21.750	10			FLAME AA
L045	157.50	15.750	10			FLAME AA
L046	372.50	37.250	10	VHVHVHVHVHVHVHVH	BIASED HIGH	AAS
L048	173.50	17.350	10	VL		FLAME-EMM
L049	116.00	11.600	10	L		FLAME-AAS
L051	188.00	18.800	10			
L053	226.00	22.600	10			A.A.
L054	378.50	37.850	10	VHVHHVHHVHVHVH	BIASED HIGH	FLAME AAS
L057	394.50	39.450	10	VHVHVHVHVHVHVHVH	BIASED HIGH	FLAME-AA,EMIS.
L058	147.00	14.700	10			FLAME AA
L059	77.00	7.700	10		BIASED LOW	303-A
L060	157.00	15.700	10			A.A.
L061	100.00	25.000	4		INSUFFICIENT DATA	FLAME-AAS
L062	200.00	20.000	10			AAS
L063	333.00	33.300	10	HH	BIASED HIGH	AAS
L064	369.00	36.900	10	HVHH	BIASED HIGH	IC
L066	225.50	22.550	10			FLAME-AA

OVERALL AVERAGE RANK IS 21.155

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L014	48.00	4.800	10		BIASED LOW	A.E.S.
L059	77.00	7.700	10		BIASED LOW	303-A
L007	77.50	7.750	10	L	BIASED LOW	S.A.A.
L031	86.50	8.650	10		BIASED LOW	ICAP
L004	93.00	9.300	10		BIASED LOW	11105L
L003	100.50	10.050	10			11103
L016	101.00	10.100	10	H		A.A.S.
L049	116.00	11.600	10	L		FLAME-AAS
L011	121.50	12.150	10			
L032	142.00	14.200	10			FLAME AAS
L042	142.50	14.250	10			FLAME AAS
L058	147.00	14.700	10			FLAME AA
L029	152.50	15.250	10			AAS
L060	157.00	15.700	10			A.A.
L045	157.50	15.750	10			FLAME AA
L048	173.50	17.350	10	VL		FLAME-EMM
L051	188.00	18.800	10			
L006	189.50	18.950	10	LL		FLAMEAA
L009	194.50	19.450	10			FLAME AA
L062	200.00	20.000	10			AAS
L027	201.00	20.100	10			FLAME AAS
L020B	207.50	20.750	10			AUTO-COL-FLAME
L020	215.50	21.550	10	LH		IC
L043	217.50	21.750	10			FLAME AA
L013	219.50	21.950	10			IC
L066	225.50	22.550	10			FLAME-AA
L053	226.00	22.600	10			A.A.
L061	100.00	25.000	4		INSUFFICIENT DATA	FLAME-AAS
L019	236.50	26.278	9			IC
L040	267.50	26.750	10			FLAME-AA
L021	278.00	27.800	10	HH		IC
L025	287.00	28.700	10			AAS-FLAME
L010	291.50	29.150	10	VH		ICAP
L002	299.50	29.950	10			FLAME AES
L024	307.50	30.750	10			
L022	309.50	30.950	10			ICP
L063	333.00	33.300	10	HH	BIASED HIGH	AAS
L023	335.00	33.500	10	VH	BIASED HIGH	ICAP FLAME AAS
L064	369.00	36.900	10	HVHH	BIASED HIGH	IC
L046	372.50	37.250	10	VHVHVHVHVHVHVHVH	BIASED HIGH	AAS
L054	378.50	37.850	10	VHVHHVHHVHVHVH	BIASED HIGH	FLAME AAS
L057	394.50	39.450	10	VHVHVHVHVHVHVHVH	BIASED HIGH	FLAME-AA,EMIS.

OVERALL AVERAGE RANK IS 21.155

SODIUM

85/04/25

PARAMETER: 19091 POTASSIUM MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .20 BASIC ACCEPTABLE ERROR= .05 CONCENTRATION ERROR INCREMENT= .16
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.54	36.00	1.18	38.50	.37 H	38.50	.20 VH	41.00	.98	37.00	.80	32.00
L003	.45	6.50	1.0	9.50	.26	7.00	.15 H	40.00	.75	3.50	.69	5.00
L004	.49	16.00	.96	4.50	.24	2.50	.02 L	2.00	.86	24.50	.76	20.50
L006	.46	8.50	.99	7.00	.27	11.50	.08	17.00	.77	6.50	.70	8.50
L007	.43	4.00	.94	2.00	.27	11.50	.07	9.50	.76	5.00	.68	4.00
L009	.52	31.00	1.1	28.00	.30	27.50	.086	23.00	.89	31.50	.80	32.00
L010	.50	19.00	1.17	37.00	.28	16.50	.08	17.00	.83	18.50	.77	24.50
L011	.58	38.50	1.18	38.50	.40 VH	40.00	.13	38.50	1.00	38.50	.88	38.00
L013	.51	25.00	1.10	28.00	.46 VH	41.00	.10	33.50	.85	22.00	.74	14.00
L014	.41	2.00	.95	3.00	.26	7.00	.06	4.50	.73	2.00	.67	2.50
L016	.50	19.00	1.09	24.00	.30	27.50	.07	9.50	.85	22.00	.83	35.00
L019	.51	25.00	1.12	33.00	.29	21.50	.09	27.00	.87	27.50	.76	20.50
L020	.60 H	40.50	1.12	33.00	.24	2.50	.08	17.00	.77	6.50	.70	8.50
L020B	.5	19.00	1.1	28.00	.3	27.50	.1	33.50	.8	12.50	.7	8.50
L021	.52	31.00	1.09	24.00	.28	16.50	.09	27.00	.92	34.00	.70	8.50
L022	.16T VL	1.00	.7 VL	1.00	.02T VL	1.00	-.17T VL	1.00	.7	1.00	.5 VL	1.00
L023	.51	25.00	1.12	33.00	.31	32.00	.09	27.00	.93	35.50	.82	34.00
L024	.52	31.00	1.2	40.00	.31	32.00	.09	27.00	.93	35.50	.86	37.00
L025	.520	31.00	1.13	35.00	.315	34.00	.075	13.00	.880	30.00	.795	30.00
L027	.51	25.00	1.07	19.00	.29	21.50	.08	17.00	.84	20.00	.76	20.50
L029	.477	13.00	1.06	15.50	.278	14.00	.084	22.00	.821	17.00	.756	18.00
L031	.48	14.50	.97	6.00	.27	11.50	.09	27.00	.78	8.00	.71	12.00
L032	.445	5.00	.995	8.00	.259	4.00	.093	31.00	.799	10.00	.670	2.50
L040	.54	36.00	1.15	36.00	.32	35.00	.10	33.50	.91	33.00	.85	36.00
L042	.51	25.00	1.07	19.00	.35	37.00	.10	33.50	.87	27.50	.78	27.50
L043	.47	11.00	1.04	12.50	.27	11.50	.07	9.50	.82	15.50	.75	16.00
L045	.45	6.50	1.07	19.00	.29	21.50	.05	3.00	.80	12.50	.70	8.50
L046	.58	38.50	1.28 H	42.00	.37 H	38.50	.11	36.00	1.01 H	40.00	.89	39.00
L048	.47	11.00	1.04	12.50	.28	16.50	.08	17.00	.80	12.50	.72	13.00
L049	.6 H	40.50	1.0	9.50	.3	27.50	.1H	0.00	1.0	38.50	1.0 VH	41.00
L051	.51	25.00	1.06	15.50	.30	27.50	.09	27.00	.82	15.50	.75	16.00
L053	.51	25.00	1.05	14.00	.29	21.50	.08	17.00	.85	22.00	.80	32.00
L054	.54	36.00	1.24	41.00	.34	36.00	.12	37.00	1.07 H	41.00	.95 H	40.00
L057	.52	31.00	1.11	31.00	.30	27.50	.13	38.50	.87	27.50	.78	27.50
L058	.53	34.00	1.07	19.00	.31	32.00	.09	27.00	.89	31.50	.79	29.00
L059	.46	8.50	.96	4.50	.26	7.00	.07	9.50	.75	3.50	.70	8.50
L060	.50	19.00	1.10	28.00	.29	21.50	.07	9.50	.86	24.50	.77	24.50
L061		0.00	1.08	22.00		0.00	.082	21.00		0.00		0.00
L062	.48	14.50	1.02	11.00	.26	7.00	.06	4.50	.80	12.50	.76	20.50
L063	.47	11.00	1.07	19.00	.28	16.50	.07	9.50	.83	18.50	.75	16.00
L064	.42	3.00	1.1	28.00	.26	7.00	.068	6.00	.79	9.00	.77	24.50
L066	.50	19.00	1.09	24.00	.29	21.50	.08	17.00	.87	27.50	.77	24.50
MEDIAN CONC.	.500		1.075		.290		.082		.850		.760	

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85/04/25

PARAMETER: 19091 POTASSIUM MG/L

SAMPLE LAB NO	7 REPORTED VALUE	7 RANK	8 REPORTED VALUE	8 RANK	9 REPORTED VALUE	9 RANK	10 REPORTED VALUE	10 RANK
L002	.75	37.50	.40	41.50	1.07	16.50	.89	21.00
L003	.67	12.50	.32	16.50	1.0	5.50	.85	8.50
L004	.71	25.50	.31	11.50	1.12	23.50	.97	29.00
L006	.66	9.50	.32	16.50	1.03	10.00	.81	7.00
L007	.64	6.00	.31	11.50	1.18	31.50	.94	27.00
L009	.73	33.00	.35	32.00	1.2	34.50	.99	33.50
L010	.70	21.50	.35	32.00	1.05	12.50	.86	11.50
L011	.75	37.50	.38	38.00	1.42 VH	40.00	1.45 VH	41.00
L013	.67	12.50	.31	11.50	1.07	16.50	.88	17.00
L014	.61	3.00	.32	16.50	.97	2.00	.75	3.00
L016	.72	29.50	.33	21.50	1.05	12.50	.89	21.00
L019	.71	25.50	.34	27.00	1.09	20.00	.91	24.50
L020	.77	39.00	.39	39.50	1.13	26.00	.92	26.00
L020B	.7	21.50	.3	7.50	1.0	5.50	.8	5.00
L021	.69	17.00	.32	16.50	1.14	27.50	.99	33.50
L022	.2 VL	1.00	-.05T VL	1.00	.6 VL	1.00	.4 VL	2.00
L023	.72	29.50	.35	32.00	1.16	30.00	.87	14.50
L024	.78	40.00	.37	37.00	1.2	34.50	.98	31.00
L025	.745	36.00	.365	36.00	1.12	23.50	.890	21.00
L027	.71	25.50	.34	27.00	1.06	14.00	.86	11.50
L029	.662	11.00	.335	24.00	10.8 VH	41.00	.886	19.00
L031	.65	7.50	.31	11.50	1.04	11.00	.87	14.50
L032	.736	35.00	.320	16.50	.985	3.00	.800	5.00
L040	.73	33.00	.34	27.00	1.19	33.00	1.03	38.00
L042	.72	29.50	.36	34.50	1.14	27.50	.23 VL	1.00
L043	.68	14.50	.33	21.50	1.07	16.50	.88	17.00
L045	.66	9.50	.29	5.00	1.07	16.50	.86	11.50
L046	.81	41.00	.40	41.50	1.18	31.50	1.00	36.00
L048	.68	14.50	.32	16.50	1.02	9.00	.85	8.50
L049	.7	21.50	.2 VL	2.00	1.3	37.50	1.0	36.00
L051	.69	17.00	.30	7.50	1.26	36.00	.98	31.00
L053	.70	21.50	.33	21.50	1.11	21.00	.91	24.50
L054	.82	42.00	.39	39.50	1.34 H	39.00	1.10 H	39.50
L057	.69	17.00	.34	27.00	1.12	23.50	.98	31.00
L058	.62	5.00	.33	21.50	1.15	29.00	.95	28.00
L059	.61	3.00	.30	7.50	1.00	5.50	.86	11.50
L060	.73	33.00	.36	34.50	1.08	19.00	.90	23.00
L061	.691	19.00	.347	30.00		0.00		0.00
L062	.61	3.00	.28	4.00	1.12	23.50	.80	5.00
L063	.65	7.50	.30	7.50	1.30	37.50	1.10 H	39.50
L064	.72	29.50	.27	3.00	1.0	5.50	1.0	36.00
L066	.71	25.50	.34	27.00	1.01	8.00	.88	17.00
MEDIAN CONC.	.700		.330		1.110		.890	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	339.50	33.950	10	HVH	BIASED HIGH	FLAME AES
L003	114.50	11.450	10	H		19103
L004	159.50	15.950	10	L		19102L
L006	102.00	10.200	10			FLAME AAS
L007	112.00	11.200	10			S.A.A
L009	306.00	30.600	10			FLAME AA
L010	210.00	21.000	10			FLAME AAS
L011	388.50	38.850	10	VHVHVH	BIASED HIGH	
L013	221.00	22.100	10	VH		IC
L014	45.50	4.550	10		BIASED LOW	A.E.S.
L016	221.50	22.150	10			A.A.S.(E)
L019	251.50	25.150	10			IC
L020	238.50	23.850	10	H		IC
L020B	168.50	16.850	10			AUTO-COL-FLAME
L021	235.50	23.550	10			IC
L022	11.00	1.100	10	VLVLVLVLVLVLVLVLVL	BIASED LOW	ICP
L023	292.50	29.250	10		BIASED HIGH	ICAP FLAME AAS
L024	345.00	34.500	10			AAS-FLAME
L025	289.50	28.950	10			FLAME AAS
L027	201.00	20.100	10			AAS
L029	194.50	19.450	10	VH		ICAP
L031	123.50	12.350	10			FLAME AAS
L032	120.00	12.000	10		BIASED HIGH	FLAME-AA
L040	340.50	34.050	10			FLAME AAS
L042	262.00	26.200	10	VL		FLAME AA
L043	145.50	14.550	10			FLAME AA
L045	113.50	11.350	10		BIASED HIGH	AAS
L046	384.00	38.400	10	HHH		FLAME-EMM
L048	131.00	13.100	10			FLAME-AAS
L049	254.00	28.222	9	HVHVL		
L051	218.00	21.800	10			A.A.
L053	220.00	22.000	10		BIASED HIGH	FLAME AAS
L054	391.00	39.100	10	HHHH		FLAME-AA,EMIS.
L057	281.50	28.150	10			FLAME AA
L058	256.00	25.600	10		BIASED LOW	303-A
L059	69.00	6.900	10			A.A.
L060	236.50	23.650	10		INSUFFICIENT DATA	FLAME-AAS
L061	92.00	23.000	4			AAS
L062	105.50	10.550	10			AAS
L063	182.50	18.250	10	H		IC
L064	151.50	15.150	10			FLAME-AA
L066	211.00	21.100	10			

OVERALL AVERAGE RANK IS 21.153

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L022	11.00	1.100	10	VLVLVLVLVLVLVLVLVL	BIASED LOW	ICP
L014	45.50	4.550	10		BIASED LOW	A.E.S.
L059	69.00	6.900	10		BIASED LOW	303-A
L006	102.00	10.200	10			FLAME AAS
L062	105.50	10.550	10			AAS
L007	112.00	11.200	10			S.A.A
L045	113.50	11.350	10			FLAME AA
L003	114.50	11.450	10	H		19103
L032	120.00	12.000	10			FLAME AAS
L031	123.50	12.350	10			ICAP
L048	131.00	13.100	10			FLAME-EMM
L043	145.50	14.550	10			FLAME AA
L064	151.50	15.150	10			IC
L004	159.50	15.950	10	L		19102L
L0208	168.50	16.850	10			AUTO-COL-FLAME
L063	182.50	18.250	10	H		AAS
L029	194.50	19.450	10	VH		AAS
L027	201.00	20.100	10			FLAME AAS
L010	210.00	21.000	10			FLAME AAS
L066	211.00	21.100	10			FLAME-AA
L051	218.00	21.800	10			
L053	220.00	22.000	10			A.A.
L013	221.00	22.100	10	VH		IC
L016	221.50	22.150	10			A.A.S.(E)
L061	92.00	23.000	4		INSUFFICIENT DATA	FLAME-AAS
L021	235.50	23.550	10			IC
L060	236.50	23.650	10			A.A.
L020	238.50	23.850	10	H		IC
L019	251.50	25.150	10			IC
L058	256.00	25.600	10			FLAME AA
L042	262.00	26.200	10	VL		FLAME AAS
L057	281.50	28.150	10			FLAME-AA,EMIS.
L049	254.00	28.222	9	HVHVL		FLAME-AAS
L025	289.50	28.950	10			AAS-FLAME
L023	292.50	29.250	10			ICAP FLAME AAS
L009	306.00	30.600	10			FLAME AA
L002	339.50	33.950	10	HVH	BIASED HIGH	FLAME AES
L040	340.50	34.050	10		BIASED HIGH	FLAME-AA
L024	345.00	34.500	10		BIASED HIGH	
L046	384.00	38.400	10	HHH	BIASED HIGH	AAS
L011	386.50	38.850	10	VHVHVH	BIASED HIGH	
L054	391.00	39.100	10	HHHH	BIASED HIGH	FLAME AAS

OVERALL AVERAGE RANK IS 21.153

POTASSIUM

85/04/25

PARAMETER: 17000 CHLORIDE IC MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.50 BASIC ACCEPTABLE ERROR= .25 CONCENTRATION ERROR INCREMENT= .15
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.36	25.00	.99	26.00		0.00	.90	25.50	.70	25.00	.59	23.00
L004	1.18	6.50	.90	22.00	5.34	20.00	.85	23.00	.53	21.00	.54	17.50
L006	1.28	20.00	.73	3.00	5.12	14.00	.90	25.50	.45	5.50	.48	8.00
L007	1.27	18.50	.86	16.50	4.90	6.50	.81	20.00	.52	19.00	.67	20.50
L009	1.1	2.50	.72	2.00	4.8	5.00	.64	1.50	.41	3.00	.41	3.00
L011	1.23	15.00	.810	8.50	4.38	2.00	.71	5.00	.48	8.00	.46	6.50
L013	1.29	21.00	.82	10.50	4.92	8.00	.75	8.50	.51	16.50	.51	13.50
L014	1.2	10.00	.8	7.00	5.1	13.00	.8	18.00	.5	12.50	.5	10.50
L019	1.15	4.00	.82	10.50	5.2	15.50	.74	6.50	.48	8.00	.50	10.50
L020	1.20	10.00	.95	25.00	4.98	11.00	.78	13.00	.50	12.50	.52	15.00
L021	1.24	16.00	.86	16.50	5.28	17.00	.78	13.00	.51	16.50	.53	16.00
L022	1.2	10.00	.5 L	1.00	5.3	18.50	.7	4.00	.2 L	2.00	.2 L	1.00
L025	1.18	6.50	.81	8.50	3.79 VL	1.00	.74	6.50	.50	12.50	.54	17.50
L028	1.1	2.50	.74	4.00	4.9	6.50	.64	1.50	.51	16.50	.42	4.00
L029	1.22	13.50	.77	5.50	4.94	9.00	.75	8.50	.49	10.00	.74	25.00
L032	1.47	26.00	.94	24.00	5.37	21.00	.84	21.50	.56	23.00	.60	24.00
L046	.84 VL	1.00	.83	12.00	4.73	4.00	.76	10.00	.1W VL	1.00	.28	2.00
L048	1.20	10.00	.84	13.50	4.95	10.00	.78	13.00	.48	8.00	.50	10.50
L050	1.27	18.50	.84	13.50	6.2 H	24.00	.78	13.00	.45	5.50	.44	5.00
L051	1.30	23.00	1.00	27.00	5.30	18.50	<1.00	0.00	1.00 VH	26.00	1.00 VH	26.00
L058	1.3	23.00	.9	22.00	6.8 VH	25.00	.8	18.00	.5	12.50	.5	10.50
L060	1.17	5.00	.77	5.50	5.09	12.00	.69	3.00	.43	4.00	.46	6.50
L061		0.00	.85	15.00		0.00	.79	16.00		0.00		0.00
L062	1.3	23.00	.89	19.50	5.4	22.00	.80	18.00	.53	21.00	.58	22.00
L063	1.22	13.50	.90	22.00	4.65	3.00	.84	21.50	.53	21.00	.55	19.00
L064	1.2	10.00	.89	19.50	5.7	23.00	.89	24.00	.60	24.00	.57	20.50
L066	1.26	17.00	.88	18.00	5.20	15.50	.78	13.00	.51	16.50	.51	13.50
MEDIAN CONC.	1.220		.840		5.100		.780		.500		.510	

PARAMETER: 17000 CHLORIDE IC MG/L 85/04/25

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	3.63	24.00	1.66	22.00		0.00		0.00
L004	3.65	25.00	1.98 VH	27.00	27.03	15.00	122.03 H	22.00
L006	3.18	12.00	1.41	4.50	26.27	14.00	99.59	5.00
L007	3.60	22.50	1.85 H	26.00	28.8	22.00	94.0	3.00
L009	3.6	22.50	1.5	12.50		0.00		0.00
L011	3.18	12.00	1.41	4.50	27.1	16.00	110.0	21.00
L013	3.28	15.00	1.45	9.00	27.8	20.00	107.	17.50
L014	3.1	5.50	1.5	12.50	27.2	17.50	19.8 VL	1.00
L019	4.30 VH	27.00	1.53	14.00	27.2	17.50	100.9	10.00
L020	3.01	1.00	1.55	16.00	24.8	6.00	104.8	16.00
L021	3.36	16.00	1.57	17.00	27.59	19.00	102.57	13.00
L022	3.1	5.50	1.3	1.00	28.	21.00	104.	15.00
L025	3.15	10.00	1.47	10.00	24.0	2.50	98.5	4.00
L028	3.1	5.50	1.4	3.00	25.6	11.00	70. VL	2.00
L029	3.11	8.00	1.43	7.00	25.0	8.50	100.	7.50
L032	3.42	20.00	1.68	23.00	24.80	6.00	107.6	19.00
L046	3.02	2.00	1.44	8.00	24.8	6.00	103.	14.00
L048	3.12	9.00	1.42	6.00	21.4 L	1.00	100.	7.50
L050	3.05	3.00	1.54	15.00	25.5	10.00	108.	20.00
L051	3.40	18.50	1.60	19.50	24.00	2.50	100.	7.50
L058	4.0 VH	26.00	1.6	19.50	25.	8.50	107.	17.50
L060	3.20	14.00	1.48	11.00	24.5	4.00	102.	11.00
L061	3.40	18.50	1.58	18.00		0.00		0.00
L062	3.1	5.50	1.7	24.50	30. H	23.00		0.00
L063	3.18	12.00	1.38	2.00	25.9	13.00	100.	7.50
L064	3.5	21.00	1.7	24.50	40. VH	24.00	160. VH	23.00
L066	3.38	17.00	1.61	21.00	25.8	12.00	102.4	12.00
MEDIAN CONC.	3.200		1.530		25.850		102.400	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	170.50	24.357	7		BIASED HIGH	DIONEX IC
L004	199.00	19.900	10	VHH		17209L
L006	111.50	11.150	10			DIONEX
L007	174.50	17.450	10	H		IC
L009	52.00	6.500	8			
L011	98.50	9.850	10			
L013	139.50	13.950	10			IC
L014	107.50	10.750	10	VL		IC
L019	123.50	12.350	10	VH		IC
L020	125.50	12.550	10			IC
L021	160.00	16.000	10			IC
L022	79.00	7.900	10	LLL		IC
L025	79.00	7.900	10	VL		ION-CHROMATOG
L028	56.50	5.650	10	VL	BIASED LOW	SINGLE-COL IC
L029	102.50	10.250	10			
L032	207.50	20.750	10		BIASED HIGH	DIONEX IC
L046	60.00	6.000	10	VLVL	BIASED LOW	HPLC-IC
L048	88.50	8.850	10	L		IC
L050	127.50	12.750	10	H		IC
L051	168.50	18.722	9	VHVH		IC
L058	102.50	10.250	10	VHVH		IC
L060	76.00	7.600	10			IC
L061	67.50	16.875	4		INSUFFICIENT DATA	IC
L062	175.50	19.833	9	H		IC
L063	134.50	13.450	10			IC
L064	213.50	21.350	10	VHVH	BIASED HIGH	IC
L066	155.50	15.550	10			IC

OVERALL AVERAGE RANK IS 13.381

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L028	56.50	5.650	10	VL	BIASED LOW	SINGLE-COL IC
L046	60.00	6.000	10	VLVL	BIASED LOW	HPLC-IC
L009	52.00	6.500	8			
L060	76.00	7.600	10			IC
L025	79.00	7.900	10	VL		ION-CHROMATOG
L022	79.00	7.900	10	LLL		IC
L048	86.50	8.650	10	L		IC
L011	98.50	9.850	10			
L029	102.50	10.250	10			
L014	107.50	10.750	10	VL		IC
L006	111.50	11.150	10			DIONEX
L019	123.50	12.350	10	VH		IC
L020	125.50	12.550	10			IC
L050	127.50	12.750	10	H		IC
L063	134.50	13.450	10			IC
L013	139.50	13.950	10			IC
L066	155.50	15.550	10			IC
L021	160.00	16.000	10			IC
L061	67.50	16.875	4		INSUFFICIENT DATA	IC
L007	174.50	17.450	10	H		IC
L058	182.50	18.250	10	VHVH		IC
L051	168.50	18.722	9	VHVH		IC
L062	178.50	19.833	9	H		IC
L004	199.00	19.900	10	VHH		17209L
L032	207.50	20.750	10		BIASED HIGH	DIONEX IC
L064	213.50	21.350	10	VHVH	BIASED HIGH	IC
L002	170.50	24.357	7		BIASED HIGH	DIONEX IC

OVERALL AVERAGE RANK IS 13.381

85/04/25

PARAMETER: 17001 CHLORIDE NON IC METHODS MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.50 BASIC ACCEPTABLE ERROR= .25 CONCENTRATION ERROR INCREMENT= .15
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002B	1.37	17.00	1.10	17.00	6.02	18.00	.92	17.00	.75	12.00	.95	10.50
L003	1.0 L	3.00	.7	4.00	5.1	5.50	.6	3.00	L.5	0.00	L.5	0.00
L004B	1.28	10.00	.81	6.50	5.53	11.00	.80	11.00	.63	10.00	.95	10.50
L006B	1.35	16.00	.899	10.00	6.04	19.00	.790	8.00	.859	14.00	1.07	15.00
L009B		0.00		0.00		0.00		0.00		0.00		0.00
L010	1.3	13.00	1.5 VH	20.00	5.6	13.00	.9	15.00	.8	13.00	1.1	17.00
L016	1.10	5.00	.50 VL	2.00	7.70 VH	21.00	.50 L	1.50	.21 VL	1.00	1.00	13.00
L020B	1.3	13.00	.9	12.00	5.8	16.00	.9	15.00	.6	8.00	.9	7.50
L023	2.0M	0.00	2.0M	0.00	5.0	4.00	2.0M	0.00	2.0M	0.00	2.0M	0.00
L024	1.2	7.00	.81	6.50	5.1	5.50	.75	6.00	.44	4.50	.46 VL	1.00
L027	1.23	9.00	.83	8.00	5.16	7.00	.77	7.00	.49	6.00	.54 VL	3.00
L031	1.4	18.00	1.0	15.00	5.2	8.00	.8	11.00	.4	2.50	.5 VL	2.00
L031B		0.00		0.00		0.00	1.1 H	21.00		0.00		0.00
L040	.80 VL	1.00	.48 VL	1.00	4.47 L	3.00	.64	4.00	.44	4.50	.67 L	5.00
L042	2.02 VH	20.00	1.06	16.00	4.00 VL	1.50	.94	18.00	.97 H	16.00	.94	9.00
L043	2.5 VH	21.00	1.5 VH	20.00	10. VH	22.00	2.5 VH	22.00	1.4 VH	19.00	2.1 VH	19.00
L045	1.3	13.00	.9	12.00	5.6	13.00	.8	11.00	.6	8.00	.8	6.00
L046B	1.3	13.00	.8	5.00	6.0	17.00	.9	15.00	.6	8.00	.9	7.50
L048B	1.0 L	3.00	.6 L	3.00	5.3	9.00	.5 L	1.50	.4	2.50	.6 L	4.00
L049	1. L	3.00	1.M	0.00	4. VL	1.50	1.M	0.00	1.M	0.00	1.M	0.00
L053	1.2	7.00	1.2 H	18.00	5.7	15.00	.8	11.00	.9 H	15.00	1.1	17.00
L054	1.5	19.00	1.5 VH	20.00	7.2 VH	20.00	1.0	19.50	1.0 H	17.50	1.0	13.00
L061B		0.00	.86	9.00		0.00	.80	11.00		0.00		0.00
L062B	1.3	13.00	.97	14.00	5.5	10.00	.73	5.00	1.0 H	17.50	1.1	17.00
L063B	1.2	7.00	.90	12.00	5.60	13.00	1.0	19.50	.7	11.00	1.0	13.00
MEDIAN CONC.	1.300		.900		5.565		.800		.630		.950	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002B	3.46	21.00	1.66	19.00	25.8	12.00	101.	7.00
L003	3.3	16.00	1.4	6.00	25.	9.00	104.	13.00
L004B	3.39	20.00	1.59	16.00	24.90	7.00	105.67	17.00
L006B	3.31	19.00	1.51	13.50	27.20	22.00	102.2	10.00
L009B		0.00		0.00	22.8	3.00	102.	9.00
L010	3.1	6.50	1.5	10.00	25.9	13.00	106.	18.00
L016	3.15	8.00	1.30	4.00	25.00	9.00		0.00
L020B	3.2	10.00	1.4	6.00	25.5	11.00	104.	13.00
L023	3.0	5.00	2.0 VH	22.00	27.	20.50	101.	7.00
L024	3.3	16.00	1.5	10.00	26.	15.00	101.	7.00
L027	3.25	12.00	1.51	13.50	26.11	18.00	105.2	16.00
L031	3.2	10.00	1.5	10.00	26.	15.00	103.	11.00
L031B		0.00		0.00		0.00		0.00
L040	2.42 VL	2.00	1.12 VL	2.00	16.92 VL	1.00	42.80 VL	1.00
L042	2.50 L	3.00	1.86 H	21.00	24.4	6.00	108.	20.00
L043	7.4 VH	23.00	3.5 VH	23.00	47. VH	23.00	135. VH	22.00
L045	3.3	16.00	1.6	17.50	23.7	4.00	96.5	3.00
L046B	3.2	10.00	1.5	10.00	27.	20.50	99.	4.00
L048B	3.1	6.50	1.2 L	3.00	24.3	5.00	100.	5.00
L049	2. VL	1.00	1. VL	1.00	22.	2.00	86. L	2.00
L053	3.3	16.00	1.6	17.50	26.1	17.00	104.	13.00
L054	3.5	22.00	1.4	6.00	26.4	19.00	105.	15.00
L061B	3.28	13.00	1.52	15.00		0.00		0.00
L062B	2.9	4.00	1.5	10.00	26.	15.00	107.	19.00
L063B	3.3	16.00	1.7	20.00	25.	9.00	110.	21.00
MEDIAN CONC.	3.250		1.500		25.800		103.500	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002B	150.50	15.050	10			COLOR-THIOCYA
L003	59.50	7.438	8	L		17205
L004B	119.00	11.900	10			17203L
L006B	146.50	14.650	10			AUTOANALYSER
L009B	12.00	6.000	2		INSUFFICIENT DATA	T.S.E.
L010	138.50	13.850	10	VH		TECHNICON
L016	64.50	7.167	9	VLVHLVL		THIOCYANATE
L020B	111.50	11.150	10			AUTO COL-MER.TH
L023	58.50	11.700	5	VH		THIOCYANATE
L024	78.50	7.850	10	VL		NON IC
L027	99.50	9.950	10	VL		AUTO FERRICYANIDE
L031	102.50	10.250	10	VL		TITRATION
L031B	21.00	21.000	1	H	INSUFFICIENT DATA	ION EXCHANGE
L040	24.50	2.450	10	VLVLLLVLVLVLVL	BIASED LOW	HG-THIOCYANATE
L042	130.50	13.050	10	VHVLHLH		SP COND
L043	214.00	21.400	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	
L045	103.50	10.350	10			HG THIOCYANATE
L046B	110.00	11.000	10			TECHNICON
L048B	42.50	4.250	10	LLLLL	BIASED LOW	TECHNICON
L049	10.50	1.750	6	LVLVLVLL	BIASED LOW	A.A. HG THIOCYANAT
L053	146.50	14.650	10	HH		TITRIMETRIC
L054	171.00	17.100	10	VHVHH		TITRATION
L061B	48.00	12.000	4		INSUFFICIENT DATA	AAII
L062B	124.50	12.450	10	H		COLRIMETRIC
L063B	141.50	14.150	10			FESCN DISCR.

OVERALL AVERAGE RANK IS 11.298

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L049	10.50	1.750	6	LVLVLVLL	BIASED LOW	A.A. HG THIOCYANAT
L040	24.50	2.450	10	VLVLLLVLVLVLVL	BIASED LOW	HG-THIOCYANATE
L048B	42.50	4.250	10	LLLLL	BIASED LOW	TECHNICON
L009B	12.00	6.000	2		INSUFFICIENT DATA	T.S.E.
L016	64.50	7.167	9	VLVHLVL		THIOCYANATE
L003	59.50	7.438	8	L		17205
L024	78.50	7.850	10	VL		NON IC
L027	99.50	9.950	10	VL		AUTO FERRICYANIDE
L031	102.50	10.250	10	VL		TITRATION
L045	103.50	10.350	10			HG THIOCYANATE
L046B	110.00	11.000	10			TECHNICON
L020B	111.50	11.150	10			AUTO COL-MER.TH
L023	58.50	11.700	5	VH		THIOCYANATE
L004B	119.00	11.900	10			17203L
L061B	48.00	12.000	4		INSUFFICIENT DATA	AAII
L062B	124.50	12.450	10	H		COLRIMETRIC
L042	130.50	13.050	10	VHVLHLH		SP COND
L010	138.50	13.850	10	VH		TECHNICON
L063B	141.50	14.150	10			FESCN DISCR.
L053	146.50	14.650	10	HH		TITRIMETRIC
L006B	146.50	14.650	10			AUTOANALYSER
L002B	150.50	15.050	10			COLOR-THIOCYA
L054	171.00	17.100	10	VHVHH		TITRATION
L031B	21.00	21.000	1	H	INSUFFICIENT DATA	ION EXCHANGE
L043	214.00	21.400	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	

OVERALL AVERAGE RANK IS 11.298

85/04/25

PARAMETER: 17092 CHLORIDE (ALL METHODS) MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.50 BASIC ACCEPTABLE ERROR= .25 CONCENTRATION ERROR INCREMENT=°.15
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.36	41.00	.99	39.00		0.00	.90	36.50	.70	33.50	.59	24.00
L002B	1.37	42.00	1.10	43.00	6.02 H	40.00	.92	41.00	.75	35.00	.95 VH	33.50
L003	1.0	4.00	.7	4.00	5.1	18.00	.6	4.00	.3W	0.00	.3W	0.00
L004	1.18	12.50	.90	32.50	5.34	28.00	.85	35.00	.53	25.00	.54	18.00
L004B	1.28	29.50	.81	13.50	5.53	32.00	.80	26.50	.63	32.00	.95 VH	33.50
L006	1.28	29.50	.73	6.00	5.12	20.00	.90	38.50	.45	9.50	.48	8.00
L006B	1.35	40.00	.899	29.00	6.04 H	41.00	.79	21.50	.86 H	37.00	1.07 VH	39.00
L007	1.27	27.50	.86	24.00	4.90	9.50	.81	31.00	.52	23.00	.57	21.50
L009	1.1	7.00	.72	5.00	4.8	8.00	.64	6.00	.41	5.00	.41	2.00
L009B		0.00		0.00		0.00		0.00		0.00		0.00
L010	1.3	35.50	1.5 VH	46.00	5.6	34.00	.9	38.50	.8 H	36.00	1.1 VH	41.00
L011	1.23	23.50	.810	13.50	4.38 L	4.00	.71	9.00	.48	12.00	.46	6.00
L013	1.29	31.00	.82	16.50	4.92	11.00	.75	14.00	.51	20.50	.51	14.50
L014	1.2	17.00	.8	10.50	5.1	18.00	.8	26.50	.5	17.00	.5	11.00
L016	1.10	7.00	.50 L	2.00	7.70 VH	45.00	.50 L	2.50	.21 L	2.00	1.00 VH	36.50
L019	1.15	10.00	.82	16.50	5.2	23.00	.74	11.50	.48	12.00	.50	11.00
L020	1.20	17.00	.95	37.00	4.98	14.00		0.00		0.00		0.00
L020B	1.3	35.50	.9	32.50	5.8	38.00	.840	33.00	.550	27.00	.710	28.00
L021	1.24	25.00	.86	24.00	5.28	25.00	.78	18.50	.51	20.50	.53	16.00
L023	2.0W	0.00	2.0W	0.00	5.0	15.00	2.0W	0.00	2.0W	0.00	2.0W	0.00
L024	1.2	17.00	.81	13.50	5.1	18.00	.75	14.00	.44	7.50	.46	6.00
L025	1.18	12.50	.81	13.50	3.79 VL	1.00	.74	11.50	.50	17.00	.54	18.00
L027	1.23	23.50	.83	18.50	5.16	21.00	.077 VL	1.00	.49	14.50	.54	18.00
L028	1.1	7.00	.74	7.00	4.9	9.50	.64	6.00	.51	20.50	.42	3.00
L029	1.22	21.50	.77	8.50	4.94	12.00	.75	14.00	.49	14.50	.74	29.00
L031	1.4	43.00	1.0	40.50	5.2	23.00	.8	26.50	.4	3.50	.5	11.00
L031B		0.00		0.00		0.00	1.1 H	45.00		0.00		0.00
L032	1.147	9.00	.94	36.00	5.37	29.00	.84	33.00	.56	28.00	.60	25.50
L040	.00 VL	1.00	.48 VL	1.00	4.47	5.00	.64	6.00	.44	7.50	.67	27.00
L042	2.02 VH	45.00	1.06	42.00	4.00 L	2.50	.94	42.00	.97 VH	39.00	.94 H	32.00
L043	2.5 VH	46.00	1.5 VH	46.00	10. VH	46.00	2.5 VH	46.00	1.4 VH	43.00	2.1 VH	43.00
L045	1.3	35.50	.9	32.50	5.6	34.00	.8	26.50	.6	30.00	.8	30.00
L046	.84 VL	2.00	.83	18.50	4.73	7.00	.76	16.00	.1W VL	1.00	.28 L	1.00
L046B	1.3	35.50	.8	10.50	6.0	39.00	.9	38.50	.6	30.00	.9 H	31.00
L048	1.20	17.00	.84	20.50	4.95	13.00	.78	18.50	.48	12.00	.50	11.00
L048B	1.0	4.00	.6 L	3.00	5.3	26.50	.5 L	2.50	.4	3.50	.6	25.50
L049	1.	4.00	1.W	0.00	4. L	2.50	1.W	0.00	1.W	0.00	1.W	0.00
L050	1.27	27.50	.84	20.50	6.2 H	42.00	.78	18.50	.45	9.50	.44	4.00
L051	1.30	35.50	1.00	40.50	5.30	26.50	<1.00	0.00	1.00 VH	40.50	1.00 VH	36.50
L053	1.2	17.00	1.2 H	44.00	5.7	36.50	.8	26.50	.9 VH	38.00	1.1 VH	41.00
L054	1.5 H	44.00	1.5 VH	46.00	7.2 VH	44.00	1.0	43.50	1.09 VH	42.00	1.0 VH	36.50
L058	1.3	35.50	.9	32.50	6.8 VH	43.00	.8	26.50	.5	17.00	.5	11.00
L060	1.17	11.00	.77	8.50	5.09	16.00	.69	8.00	.43	6.00	.46	6.00
L061		0.00	.85	22.00		0.00	.79	21.50		0.00		0.00
L061B		0.00	.86	24.00		0.00	.80	26.50		0.00		0.00
L062	1.3	35.50	.89	27.50	5.4	30.00	.80	26.50	.53	25.00	.58	23.00
L062B	1.3	35.50	.97	38.00	5.5	31.00	.73	10.00	1.0 VH	40.50	1.1 VH	41.00
L063	1.22	21.50	.90	32.50	4.65	6.00	.84	33.00	.53	25.00	.55	20.00
L063B	1.2	17.00	.90	32.50	5.60	34.00	1.0	43.50	.7	33.50	1.0 VH	36.50
L064	1.2	17.00	.89	27.50	5.7	36.50	.89	36.00	.60	30.00	.57	21.50
L066	1.26	26.00	.88	26.00	5.20	23.00	.78	18.50	.51	20.50	.51	14.50
MEDIAN CONC.	1.230		.860		5.200		.800		.510		.570	

PARAMETER: 17092 CHLORIDE (ALL METHODS) MG/L

85/04/25

SAMPLE LAB NO	7 REPORTED VALUE	7 RANK	8 REPORTED VALUE	8 RANK	9 REPORTED VALUE	9 RANK	10 REPORTED VALUE	10 RANK
L002	3.63	44.00	1.66	38.50		0.00		0.00
L002B	3.46	39.00	1.66	38.50	25.8	22.50	101.	18.00
L003	3.3	29.00	1.4	7.00	25.	16.00	104.	27.50
L004	3.65	45.00	1.98 VH	46.00	27.03	35.00	122.03 H	42.00
L004B	3.39	35.00	1.59	32.00	24.90	13.00	105.67	32.00
L006	3.18	19.00	1.41	9.50	26.27	31.00	99.59	9.00
L006B	3.31	32.00	1.51	25.50	27.2	38.00	102.0	21.00
L007	3.6	42.50	1.85 H	44.00	28.8	42.00	94.0	5.00
L009	3.6	42.50	1.5	21.00		0.00		0.00
L009B		0.00		0.00	22.8	3.00	102.	21.00
L010	3.1	10.00	1.5	21.00	25.9	24.50	106.	33.00
L011	3.18	19.00	1.41	9.50	27.1	36.00	110.0	40.50
L013	3.28	25.50	1.45	14.00	27.8	41.00	107.	35.00
L014	3.1	10.00	1.5	21.00	27.2	38.00	19.8 VL	1.00
L016	3.15	16.50	1.30	4.00	25.0	16.00	100.0	12.50
L019	4.30 VH	47.00	1.53	28.00	27.2	38.00	100.9	16.00
L020		0.00		0.00		0.00		0.00
L020B	3.105	13.00	1.475	16.00	25.15	19.00	104.40	29.00
L021	3.36	33.00	1.57	30.00	27.59	40.00	102.57	24.00
L023	3.0	5.00	2.0 VH	47.00	27.	33.50	101.	18.00
L024	3.3	29.00	1.5	21.00	26.	27.00	101.	18.00
L025	3.15	16.50	1.47	15.00	24.0	5.50	98.5	7.00
L027	3.25	24.00	1.51	25.50	26.11	30.00	105.2	31.00
L028	3.1	10.00	1.4	7.00	25.6	21.00	70. VL	3.00
L029	3.11	14.00	1.43	12.00	25.0	16.00	100.	12.50
L031	3.2	22.00	1.5	21.00	26.	27.00	103.	25.50
L031B		0.00		0.00		0.00		0.00
L032	3.42	38.00	1.68	40.00	24.8	11.50	107.6	37.00
L040	2.42 VL	2.00	1.12 VL	2.00	16.92 VL	1.00	42.80 VL	2.00
L042	2.50 L	3.00	1.86 H	45.00	24.4	9.00	108.	38.50
L043	7.4 VH	48.00	3.5 VH	48.00	47. VH	45.00	135. VH	43.00
L045	3.3	29.00	1.6	34.50	23.7	4.00	96.5	6.00
L046	3.02	6.00	1.44	13.00	24.8	11.50	103.	25.50
L046B	3.2	22.00	1.5	21.00	27.	33.50	99.	8.00
L048	3.12	15.00	1.42	11.00	24.1	7.00	100.	12.50
L048B	3.1	10.00	1.2 L	3.00	24.3	8.00	100.	12.50
L049	2. VL	1.00	1. VL	1.00	22.	2.00	86. L	4.00
L050	3.05	7.00	1.54	29.00	25.5	20.00	108.	38.50
L051	3.40	36.50	1.60	34.50	24.00	5.50	100.	12.50
L053	3.3	29.00	1.6	34.50	26.1	29.00	104.	27.50
L054	3.5	40.50	1.4	7.00	26.4	32.00	105.	30.00
L058	4.0 H	46.00	1.6	34.50	25.	16.00	107.	35.00
L060	3.20	22.00	1.48	17.00	24.5	10.00	102.	21.00
L061	3.40	36.50	1.58	31.00		0.00		0.00
L061B	3.28	25.50	1.52	27.00		0.00		0.00
L062	3.1	10.00	1.7	42.00	30. H	43.00		0.00
L062B	2.9	4.00	1.5	21.00	26.	27.00	107.	35.00
L063	3.18	19.00	1.38	5.00	25.9	24.50	100.	12.50
L063B	3.3	29.00	1.7	42.00	25.	16.00	110.	40.50
L064	3.5	40.50	1.7	42.00	40. VH	44.00	160. VH	44.00
L066	3.38	34.00	1.61	37.00	25.8	22.50	102.4	23.00
MEDIAN CONC.	3.265		1.505		25.800		102.200	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	258.50	36.929	7			DIONEX IC
L002B	352.50	35.250	10	HVH		COLOR-THIOCYA
L003	109.50	13.688	8			17205
L004	319.00	31.900	10	VHH		17209L
L004B	273.00	27.900	10	VH		17203L
L006	180.00	18.000	10			DIONEX
L006B	324.00	32.400	10	HHVH		AUTOANALYZER
L007	270.00	27.000	10	H		IC
L009	96.50	12.063	8		INSUFFICIENT DATA	I.S.E.
L009B	24.00	12.000	2			TECHNICON
L010	319.50	31.950	10	VHHVH		
L011	173.00	17.300	10	L		IC
L013	223.00	22.300	10			IC
L014	170.00	17.000	10	VL		THIOCYANATE
L016	144.00	14.400	10	LVHLLVH		IC
L019	213.00	21.300	10	VH	INSUFFICIENT DATA	IC
L020	68.00	22.667	3			AUTO COL-MER.TH
L020B	271.00	27.100	10			IC
L021	256.00	25.600	10			THIOCYANATE
L023	118.50	23.700	5	VH		NON IC
L024	171.00	17.100	10			IC
L025	117.50	11.750	10	VL		AUTO FERRICYANIDE
L027	207.00	20.700	10	VL	BIASED LOW	SINGLE COLUMN IC
L028	94.00	9.400	10	VL		TITRATION
L029	154.00	15.400	10		INSUFFICIENT DATA	IONEXCHANGE
L031	243.00	24.300	10			DIONEX IC
L031B	45.00	45.000	1	H	BIASED LOW	HG THIOCYANATE
L032	287.00	28.700	10			SP COND
L040	54.50	5.450	10	VLVLVLVLVLVL	BIASED HIGH	
L042	298.00	29.800	10	VHLVHHLH		HG THIOCYANATE
L043	454.00	45.400	10	VHVHVHVHVHVHVHVHVHVH	BIASED LOW	HPLC-IC
L045	262.00	26.200	10			TECHNICON
L046	101.50	10.150	10	VLVLL		IC
L046B	269.00	26.900	10	H	BIASED LOW	TECHNICON
L048	137.50	13.750	10		BIASED LOW	A.A. HG THIOCYANAT
L048B	98.50	9.850	10	LLL		IC
L049	14.50	2.417	6	LVLVLL		IC
L050	216.50	21.650	10	H		TITRIMETRIC
L051	268.50	29.833	9	VHVH	BIASED HIGH	TITRATION
L053	323.00	32.300	10	HVHVH		IC
L054	365.50	36.550	10	HVHVHVHVH		IC
L058	297.00	29.700	10	VHH	INSUFFICIENT DATA	IC
L060	125.50	12.550	10		INSUFFICIENT DATA	AAII
L061	111.00	27.750	4			IC
L061B	103.00	25.750	4			COLORIMETRIC
L062	262.50	29.167	9	H		IC
L062B	283.00	28.300	10	VHVH		FESCN DISCR.
L063	199.00	19.900	10			IC
L063B	324.50	32.450	10	VH		IC
L064	339.00	33.900	10	VHVH		
L066	245.00	24.500	10			

OVERALL AVERAGE RANK IS 23.333

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L049	14.50	2.417	6	LVLVLL	BIASED LOW	A.A. HG THIOCYANAT
L040	54.50	5.450	10	VL VL VL VL VL VL	BIASED LOW	HG THIOCYANATE
L028	94.00	9.400	10	VL	BIASED LOW	SINGLE COLUMN IC
L048B	98.50	9.850	10	LLL	BIASED LOW	TECHNICON
L046	101.50	10.150	10	VLVLL	BIASED LOW	HPLC-IC
L025	117.50	11.750	10	VL		IC
L009B	24.00	12.000	2		INSUFFICIENT DATA	I.S.E.
L009	96.50	12.063	8			IC
L060	125.50	12.550	10			17205
L003	109.50	13.688	8			IC
L048	137.50	13.750	10			THIOCYANATE
L016	144.00	14.400	10	LVHLLVH		
L029	154.00	15.400	10			IC
L014	170.00	17.000	10	VL		NON IC
L024	171.00	17.100	10			
L011	173.00	17.300	10	L		DIONEX
L006	180.00	18.000	10			IC
L063	199.00	19.900	10			AUTO FERRICYANIDE
L027	207.00	20.700	10	VL		IC
L019	213.00	21.300	10	VH		IC
L050	216.50	21.650	10	H		IC
L013	223.00	22.300	10		INSUFFICIENT DATA	IC
L020	68.00	22.667	3			THIOCYANATE
L023	118.50	23.700	5	VH		TITRATION
L031	243.00	24.300	10			IC
L066	245.00	24.500	10			IC
L021	256.00	25.600	10		INSUFFICIENT DATA	AAII
L061B	103.00	25.750	4			HG THIOCYANATE
L045	262.00	26.200	10			TECHNICON
L046B	269.00	26.900	10	H		IC
L007	270.00	27.000	10	H		AUTO COL-MER.TH
L020B	271.00	27.100	10		INSUFFICIENT DATA	IC
L061	111.00	27.750	4			17203L
L004B	279.00	27.900	10	VH		COLORIMETRIC
L062B	283.00	28.300	10	VHVH		DIONEX IC
L032	287.00	28.700	10			IC
L062	262.50	29.167	9	H		IC
L058	297.00	29.700	10	VHH		SP COND
L042	298.00	29.800	10	VHLVHHLH		IC
L051	268.50	29.833	9	VHVH		17209L
L004	319.00	31.900	10	VHH		TECHNICON
L010	319.50	31.950	10	VHHVH		TITRIMETRIC
L053	323.00	32.300	10	HVHVH		AUTOANALYZER
L006B	324.00	32.400	10	HHVH		FESCN DISCR.
L063B	324.50	32.450	10	VH		IC
L064	339.00	33.900	10	VHVH		COLOR-THIOCYA
L002B	352.50	35.250	10	HVH	BIASED HIGH	TITRATION
L054	365.50	36.550	10	HVHVHVHVH		DIONEX IC
L002	258.50	36.929	7		INSUFFICIENT DATA	IONEXCHANGE
L031B	45.00	45.000	1	H	BIASED HIGH	
L043	454.00	45.400	10	VHVHVHVHVHVHVHVHVHVH		

OVERALL AVERAGE RANK IS 23.333

85/04/25

PARAMETER: 16000 SULFATE,IC METHOD MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.00 BASIC ACCEPTABLE ERROR= .50 CONCENTRATION ERROR INCREMENT= .20
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	3.37	27.00	3.20	27.00		0.00	5.83	26.00	5.55	26.00	5.15	24.50
L003	2.8	6.00	2.8	4.00	2.6	4.00	5.2	2.00	5.0	4.00	4.4	1.00
L004	3.05	8.00	2.99	8.00	2.75	14.50	5.60	17.00	5.27	16.00	4.85	11.50
L006	2.68	4.00	2.79	3.00	2.91	25.00	5.24	4.00	5.00	4.00	4.95	18.00
L007	3.30	26.00	3.07	17.00	2.77	17.00	5.70	24.00	5.45	21.00	4.77	7.00
L009	3.1	10.50	3.1	21.00	2.7	8.50	5.5	11.00	5.6	27.50	4.7	3.00
L011	3.23	24.00	3.08	19.00	2.78	19.00	5.89	27.00	5.53	24.00	5.15	24.50
L013	3.10	10.50	3.19	25.00	2.69	6.00	5.61	19.00	5.26	14.50	4.73	4.50
L014	2.9	7.00	3.2	27.00	2.7	8.50	5.4	8.00	5.0	4.00	4.8	8.50
L019	3.15	16.50	3.07	17.00	2.73	11.50	5.62	20.50	5.48	22.00	4.81	10.00
L020	3.28	25.00	3.16	24.00	2.84	24.00	5.38	7.00	7.66 VH	29.00	7.66 VH	29.00
L021	3.20	21.00	3.07	17.00	2.77	17.00	5.62	20.50	5.35	20.00	4.90	15.00
L022	4.9 VH	29.00	3.3	29.00	3.3	26.00	5.6	17.00	5.5	23.00	5.0	20.00
L024	3.21	23.00	3.01	14.00	2.83	23.00	5.52	13.00	5.16	10.00	4.73	4.50
L025	3.15	16.50	3.00	11.50	2.75	14.50	5.45	9.00	5.15	8.50	4.90	15.00
L027	2.61	3.00	2.55	1.00	1.96 L	1.00	5.23	3.00	4.90	2.00	4.59	2.00
L028	3.2	21.00	3.8 H	30.00	3.5 H	27.50	5.5	11.00	5.1	6.50	5.1	22.50
L029	3.15	16.50	2.99	8.00	2.77	17.00	5.33	6.00	5.28	17.00	6.76 VH	28.00
L032	3.20	21.00	3.11	23.00	2.80	21.00	5.75	25.00	5.34	19.00	4.88	13.00
L046	2.7	5.00	2.6	2.00	2.0 L	2.00	6.7	30.00	5.1	6.50	5.2	26.00
L048	3.14	13.50	2.96	6.00	2.65	5.00	5.60	17.00	5.15	8.50	5.30	27.00
L050	2.4 L	2.00	2.95	5.00	2.35	3.00	6.65	29.00	5.17	11.00	4.85	11.50
L051	2.20 L	1.00	3.00	11.50	3.50 H	27.50	4.30 L	1.00	4.30	1.00	4.80	8.50
L058	3.1	10.50	3.1	21.00	2.8	21.00	5.9	28.00	5.3	18.00	5.0	20.00
L060	3.14	13.50	3.02	15.00	2.73	11.50	5.64	22.00	5.21	13.00	4.92	17.00
L061		0.00	3.00	11.50		0.00	5.54	15.00		0.00		0.00
L062	3.1	10.50	3.0	11.50	2.7	8.50	5.3	5.00	5.6	27.50	4.9	15.00
L063	3.18	19.00	3.10	21.00	2.74	13.00	5.65	23.00	5.54	25.00	5.10	22.50
L064	3.5	28.00	3.2	27.00	2.8	21.00	5.5	11.00	5.2	12.00	5.0	20.00
L066	3.15	16.50	2.99	8.00	2.70	8.50	5.53	14.00	5.26	14.50	4.75	6.00
MEDIAN CONC.	3.150		3.045		2.750		5.570		5.260		4.900	

PARAMETER: 16000 SULFATE,IC METHOD MG/L 85/04/25

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	3.29	12.00	.40	20.00		0.00		0.00
L003	3.2	6.50	.5	23.50	22.	12.00		0.00
L004	3.37	17.00	.36	14.50	22.76	19.00	41.55	26.00
L006	3.02	5.00	.13	2.00	18.43	1.00	36.45	8.00
L007	3.25	9.00	.51	25.00	22.9	22.50	38.6	24.00
L009	3.3	13.50	.35	10.50	22.6	18.00	37.7	17.50
L011	3.36	15.50	.50H	0.00	22.2	14.50	38.1	23.00
L013	3.20	6.50	.33	3.50	21.5	7.50	36.6	10.00
L014	3.9	30.00	.5	23.50	20.2	3.00	36.7	11.00
L019	3.36	15.50	.34	6.00	22.2	14.50	37.5	15.50
L020	2.66	2.00	.34	6.00	21.7	9.00	37.1	13.00
L021	3.40	21.50	.33	3.50	22.86	21.00	36.48	9.00
L022	3.5	26.50	.6	27.00	31. VH	28.00	38.	20.50
L024	3.27	10.00	.41	21.00	22.8	20.00	37.7	17.50
L025	3.40	21.50	.35	10.50	22.0	12.00	37.5	15.50
L027	2.95	4.00	.46	22.00	21.75	10.00	36.25	7.00
L028	3.4	21.50	.6	27.00	21.5	7.50	35.6	5.00
L029	3.38	18.00	.37	17.00	22.5	17.00	37.0	12.00
L032	3.42	25.00	.35	10.50	23.83	25.00	35.74	6.00
L046	2.9	3.00	.1H	1.00	19.1	2.00	34.7	2.00
L048	3.40	21.50	.35	10.50	21.	5.00	38.	20.50
L050	2.35 L	1.00	.35	10.50	27.1 H	27.00	37.4	14.00
L051	3.50	26.50	<1.0	0.00	21.00	5.00	35.00	3.00
L058	3.0	29.00	.6	27.00	22.	12.00	38.	20.50
L060	3.39	19.00	.38	19.00	21.0	5.00	35.2	4.00
L061	3.28	11.00	.35	10.50		0.00		0.00
L062	3.7	28.00	.36	14.50	23.	24.00		0.00
L063	3.41	24.00	.34	6.00	22.9	22.50	38.9	25.00
L064	3.3	13.50	.37	17.00	24.	26.00	38.	20.50
L066	3.22	8.00	.37	17.00	22.4	16.00	34.3	1.00
MEDIAN CONC.	3.360		.360		22.200		37.250	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	162.50	23.214	7			DIONEX-IC
L003	63.00	7.000	9			16309
L004	151.50	15.150	10			16309L
L006	74.00	7.400	10			DIONEX
L007	192.50	19.250	10			IC
L009	141.00	14.100	10			
L011	190.50	21.167	9			
L013	107.00	10.700	10			IC
L014	130.50	13.050	10			IC
L019	149.00	14.900	10			IC
L020	168.00	16.800	10	VHVH		IC
L021	165.50	16.550	10			IC
L022	246.00	24.600	10	VHVH	BIASED HIGH	IC
L024	156.00	15.600	10			IC
L025	134.50	13.450	10			ION-CHROMATOG
L027	55.00	5.500	10	L	BIASED LOW	SUPRESSED ELUENT
L028	179.50	17.950	10	HH		SINGLE COLUMN IC
L029	156.50	15.650	10	VH		
L032	188.50	18.850	10			DIONEX IC
L046	79.50	7.950	10	L		HPLC-IC
L048	134.50	13.450	10			IC
L050	114.00	11.400	10	LLH		IC
L051	85.00	9.444	9	LHL		IC
L058	207.00	20.700	10			IC
L060	139.00	13.900	10			IC
L061	48.00	12.000	4		INSUFFICIENT DATA	IC
L062	144.50	16.056	9			IC
L063	201.00	20.100	10			IC
L064	196.00	19.600	10			IC
L066	109.50	10.950	10			IC

OVERALL AVERAGE RANK IS 14.875

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LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L027	55.00	5.500	10	L	BIASED LOW	SUPRESSED ELUENT
L003	63.00	7.000	9			16309
L006	74.00	7.400	10			DIONEX
L046	73.50	7.950	10	L		HPLC-IC
L051	85.00	9.444	9	LHL		IC
L013	107.00	10.700	10			IC
L066	109.50	10.950	10			IC
L050	114.00	11.400	10	LLH		IC
L061	48.00	12.000	4		INSUFFICIENT DATA	IC
L014	130.50	13.050	10			IC
L025	134.50	13.450	10			ION-CHROMATOG
L048	134.50	13.450	10			IC
L060	139.00	13.900	10			IC
L009	141.00	14.100	10			
L019	149.00	14.900	10			IC
L004	151.50	15.150	10			16309L
L024	156.00	15.600	10			IC
L029	156.50	15.650	10	VH		
L062	144.50	16.056	9			IC
L021	165.50	16.550	10			IC
L020	168.00	16.800	10	VHVH		IC
L028	179.50	17.950	10	HH		SINGLE COLUMN IC
L032	188.50	18.850	10			DIONEX IC
L007	192.50	19.250	10			IC
L064	196.00	19.600	10			IC
L063	201.00	20.100	10			IC
L058	207.00	20.700	10			IC
L011	190.50	21.167	9			
L002	162.50	23.214	7			DIONEX-IC
L022	246.00	24.600	10	VHVH	BIASED HIGH	IC

OVERALL AVERAGE RANK IS 14.875

SULFATE IC METHOD

85/04/25

PARAMETER: 16001 SULFATE NON IC METHODS MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.00 BASIC ACCEPTABLE ERROR= .50 CONCENTRATION ERROR INCREMENT= .20
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002B	3.60	14.00	3.40	14.50	7.1 VH	16.00	6.0	15.00	6.2	11.50	6.4	13.00
L003B	3.1	7.00	3.0	8.00	2.8 L	2.50	5.4	4.50	5.2	5.00	5.6	6.50
L004B	3.30	10.00	2.90	4.00	6.55 VH	15.00	5.65	11.00	5.80	9.50	6.80	14.00
L006B	2.45 L	1.00	2.98	6.00	5.60 VH	13.50	5.23	1.00	5.18	4.00	5.91	9.00
L016	2.69	2.00	2.79	2.00	2.85 L	4.00	5.47	8.00	5.09	2.00	5.29	4.00
L023	2.9	3.00	3.0	8.00	4.9	10.50	5.4	4.50	5.1	3.00	5.6	6.50
L031	3.8	15.00	3.4	14.50	2.8 L	2.50	6.0	15.00	5.5	8.00	5.0	2.00
L031B		0.00		0.00		0.00	5.4	4.50		0.00		0.00
L043	3.3	10.00	2.2 L	1.00	5.5 H	12.00	5.5	9.00	8.8 VH	15.00	9.5 VH	15.00
L045	3.4	12.50	3.3	13.00	3.4	5.00	6.4	17.00	6.4	13.00	5.6	6.50
L046B	3.0	5.00	2.8	3.00	4.9	10.50	5.4	4.50	4.9	1.00	5.0	2.00
L048B	3.3	10.00	3.2	12.00	5.6 VH	13.50	5.4	4.50	5.3	6.00	6.1	10.50
L049	3.	5.00	4. H	16.00	1.W VL	1.00	6.	15.00	7. H	14.00	5.	2.00
L053	3.0	5.00	3.0	8.00	3.7	6.00	5.4	4.50	5.4	7.00	5.6	6.50
L054	8. VH	16.00	5. VH	17.00	4.	8.00	10. VH	18.00	12. VH	16.00	10. VH	16.00
L061B		0.00	2.97	5.00		0.00	5.63	10.00		0.00		0.00
L062B	3.2	8.00	3.1	10.50	3.8	7.00	5.7	12.00	5.8	9.50	6.1	10.50
L063B	3.4	12.50	3.1	10.50	4.3	9.00	5.9	13.00	6.2	11.50	6.2	12.00
MEDIAN CONC.	3.250		3.000		4.150		5.565		5.650		5.755	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002B	4.1	15.00	.40	6.50	21.4	4.00	39.9	14.00
L003B	3.3	4.00	.5	11.00	21.8	6.00	35.5	4.50
L004B	3.35	6.00		0.00	22.25	10.00	38.60	13.00
L006B	3.40	9.00	.139	2.00	21.2	3.00	35.5	4.50
L016	3.07	2.00	.09	1.00	18.57	2.00	20.32 VL	1.00
L023	3.3	4.00	.20	4.00	22.	8.50	35.	3.00
L031	3.4	9.00	.4	6.50	23.5	14.00	37.2	9.00
L031B		0.00		0.00		0.00		0.00
L043	4.0	14.00	<1.	0.00	22.5	11.50	65. VH	15.00
L045	3.4	9.00	.6	13.00	21.8	6.00	38.0	11.00
L046B	3.0	1.00	.2	4.00	15. VL	1.00	25. VL	2.00
L048B	3.5	12.50	.2	4.00	21.8	6.00	36.6	6.00
L049	5. VH	16.50	1.W	0.00	26.	15.00	38.	11.00
L053	3.3	4.00	.5	11.00	22.5	11.50	37.1	8.00
L054	5. VH	16.50	1. H	14.00	62. VH	16.00	104. VH	16.00
L061B	3.40	9.00	.42	8.00		0.00		0.00
L062B	3.5	12.50	.49	9.00	23.	13.00	38.	11.00
L063B	3.4	9.00	.5	11.00	22.	8.50	37.	7.00
MEDIAN CONC.	3.400		.410		22.000		37.150	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002B	123.50	12.350	10	VH		COLOR-MTB
L003B	59.00	5.900	10	L		16304
L004B	92.50	10.278	9	VH		16306L
L006B	53.00	5.300	10	LVH		AUTOANALYZER
L016	28.00	2.800	10	LVL	BIASED LOW	M.T.B.
L023	55.00	5.500	10			METHYLTHYMOL BLUE
L031	95.50	9.550	10	L		CALMAGITE
L031B	4.50	4.500	1		INSUFFICIENT DATA	ION EXCHANGE
L043	102.50	11.389	9	LHVHVHVH		
L045	106.00	10.600	10			U.V.-M.T.B.
L046B	34.00	3.400	10	VLVL	BIASED LOW	TECHNICON
L048B	85.00	8.500	10	VH		TECHNICON
L049	95.50	10.611	9	HVLHVH		TURBIDIMETRIC
L053	71.50	7.150	10			COLORIMETRIC
L054	153.50	15.350	10	VHVHVHVHVHVHHVHVH	BIASED HIGH	TURBIDITY
L061B	32.00	8.000	4		INSUFFICIENT DATA	AAII
L062B	103.00	10.300	10			TURBIDIMETRY
L063B	104.00	10.400	10			AUTO-TURB

OVERALL AVERAGE RANK IS 8.630

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L016	28.00	2.800	10	LVL	BIASED LOW	M.T.B.
L046B	34.00	3.400	10	VLVL	BIASED LOW	TECHNICON
L031B	4.50	4.500	1		INSUFFICIENT DATA	ION EXCHANGE
L006B	53.00	5.300	10	LVH		AUTOANALYZER
L023	55.00	5.500	10			METHYLTHYMOL BLUE
L003B	59.00	5.900	10	L		16304
L053	71.50	7.150	10			COLORIMETRIC
L061B	32.00	8.000	4		INSUFFICIENT DATA	AAII
L048B	85.00	8.500	10	VH		TECHNICON
L031	95.50	9.550	10	L		CALMAGITE
L004B	92.50	10.278	9	VH		16306L
L062B	103.00	10.300	10			TURBIDIMETRY
L063B	104.00	10.400	10			AUTO-TURB
L045	106.00	10.600	10			U.V.-M.T.B.
L049	95.50	10.611	9	HVLHVH		TURBIDIMETRIC
L043	102.50	11.389	9	LHVHVHVH		
L002B	123.50	12.350	10	VH		COLOR-MTB
L054	153.50	15.350	10	VHVHVHVHVHVHHVHVH	BIASED HIGH	TURBIDITY

OVERALL AVERAGE RANK IS 8.630

85/04/25

PARAMETER: 16092 SULFATE (ALL METHODS) MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.00 BASIC ACCEPTABLE ERROR= .50 CONCENTRATION ERROR INCREMENT= .20
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	3.37	38.00	3.20	38.50		0.00	5.83	38.00	5.55	34.00	5.15	27.50
L002B	3.60	42.00	3.40	43.50	7.1 VH	44.00	6.0	43.00	6.2	39.50	6.4 H	40.00
L003	2.8	8.00	2.8	6.50	2.6	5.00	5.2	2.00	5.0	5.00	4.4	1.00
L003B	3.1	17.00	3.0	19.00	2.8	23.00	5.4	12.00	5.2	16.50	5.6	32.50
L004	3.05	14.00	2.99	14.00	2.75	15.50	5.60	26.00	5.27	21.00	4.85	11.50
L004B	3.30	35.50	2.90	8.00	6.55 VH	43.00	5.65	33.50	5.80	37.50	6.80 VH	42.00
L006	2.68	5.00	2.79	4.50	2.91	29.00	5.24	5.00	5.00	5.00	4.95	18.00
L006B	2.45	3.00	2.98	12.00	5.60 VH	41.50	5.23	3.50	5.18	15.00	5.91	36.00
L007	3.3	35.50	3.07	26.00	2.77	18.00	5.70	35.50	5.45	28.00	4.77	7.00
L009	3.1	17.00	3.1	31.00	2.7	9.50	5.5	19.50	5.6	35.50	4.7	3.00
L011	3.23	32.00	3.08	28.00	2.78	20.00	5.89	39.00	5.53	32.00	5.15	27.50
L013	3.10	17.00	3.19	36.00	2.69	7.00	5.61	28.00	5.26	19.50	4.73	4.50
L014	2.9	9.50	3.2	38.50	2.7	9.50	5.4	12.00	5.0	5.00	4.8	8.50
L016	2.69	6.00	2.79	4.50	2.85	28.00	5.47	17.00	5.09	7.00	5.29	30.00
L019	3.15	23.50	3.07	26.00	2.73	12.50	5.62	29.50	5.48	29.00	4.81	10.00
L020	3.28	33.00	3.16	35.00	2.84	27.00	5.38	8.00	7.66 VH	43.00	7.66 VH	43.00
L021	3.20	28.50	3.07	26.00	2.77	18.00	5.62	29.50	5.35	26.00	4.90	15.00
L022	4.9 VH	44.00	3.3	41.50	3.3	30.00	5.6	26.00	5.5	30.50	5.0	21.50
L023	2.9	9.50	3.0	19.00	4.9 VH	38.50	5.4	12.00	5.1	9.00	5.6	32.50
L024	3.21	31.00	3.01	23.00	2.83	26.00	5.52	22.00	5.16	13.00	4.73	4.50
L025	3.15	23.50	3.0	19.00	2.75	15.50	5.55	16.00	5.15	11.50	4.90	15.00
L027	2.61	4.00	2.55	2.00	1.96 L	2.00	5.23	3.50	4.90	2.50	4.59	2.00
L028	3.2	28.50	3.8 H	45.00	3.5 H	32.50	5.5	19.50	5.1	9.00	5.1	25.50
L029	3.15	23.50	2.99	14.00	2.77	18.00	5.33	7.00	5.28	22.00	6.76 VH	41.00
L031	3.8	43.00	3.4	43.50	2.8	23.00	6.0	43.00	5.5	30.50	5.0	21.50
L031B		0.00		0.00		0.00	5.4	12.00		0.00		0.00
L032	3.20	28.50	3.11	34.00	2.80	23.00	5.75	37.00	5.34	25.00	4.88	13.00
L043	3.3	35.50	2.2 L	1.00	5.5 VH	40.00	5.5	19.50	8.8 VH	44.00	9.5 VH	44.00
L045	3.4	39.50	3.3	41.50	3.4	31.00	6.4	45.00	6.4	41.00	5.6	32.50
L046	2.7	7.00	2.6	3.00	2.0 L	3.00	6.7	47.00	5.1	9.00	5.2	29.00
L046B	3.0	12.00	2.8	6.50	4.9 VH	38.50	5.4	12.00	4.9	2.50	5.0	21.50
L048	3.14	20.50	2.96	10.00	2.65	6.00	5.60	26.00	5.15	11.50	5.90	35.00
L048B	3.3	35.50	3.2	38.50	5.6 VH	41.50	5.4	12.00	5.3	23.50	6.1	37.50
L049	3.	12.00	4. H	46.00	1.N VL	1.00	6.	43.00	7. H	42.00	5.	21.50
L050	2.4 L	2.00	2.95	9.00	2.35	4.00	6.65	46.00	5.17	14.00	4.85	11.50
L051	2.20 L	1.00	3.00	19.00	3.50 H	32.50	4.30 L	1.00	4.30	1.00	4.80	8.50
L053	3.0	12.00	3.0	19.00	3.7 H	34.00	5.4	12.00	5.4	27.00	5.6	32.50
L054	8. VH	45.00	5. VH	47.00	4. VH	36.00	10. VH	48.00	12. VH	45.00	10. VH	45.00
L058	3.1	17.00	3.1	31.00	2.8	23.00	5.9	40.50	5.3	23.50	5.0	21.50
L060	3.14	20.50	3.02	24.00	2.73	12.50	5.64	32.00	5.21	18.00	4.92	17.00
L061		0.00	3.00	19.00		0.00	5.54	24.00		0.00		0.00
L061B		0.00	2.97	11.00		0.00	5.63	31.00		0.00		0.00
L062	3.1	17.00	3.0	19.00	2.7	9.50	5.3	6.00	5.6	35.50	4.9	15.00
L062B	3.2	28.50	3.1	31.00	3.8 VH	35.00	5.7	35.50	5.8	37.50	6.1	37.50
L063	3.18	26.00	3.10	31.00	2.74	14.00	5.65	33.50	5.54	33.00	5.10	25.50
L063B	3.4	39.50	3.1	31.00	4.3 VH	37.00	5.9	40.50	6.2	39.50	6.2 H	39.00
L064	3.5	41.00	3.2	38.50	2.8	23.00	5.5	19.50	5.2	16.50	5.0	21.50
L066	3.15	23.50	2.99	14.00	2.70	9.50	5.53	23.00	5.26	19.50	4.75	6.00
MEDIAN CONC.	3.150		3.020		2.800		5.570		5.300		5.000	

85/04/25

PARAMETER: 16092 SULFATE (ALL METHODS) MG/L

SAMPLE LAB NO	7 REPORTED VALUE	7 RANK	8 REPORTED VALUE	8 RANK	9 REPORTED VALUE	9 RANK	10 REPORTED VALUE	10 RANK
L002	3.29	14.00	.40	25.00		0.00		0.00
L002B	4.1	45.00	.40	25.00	21.4	9.00	39.9	37.00
L003	3.2	8.50	.5	33.00	22.	19.00		0.00
L003B	3.3	17.00	.5	33.00	21.8	15.00	35.5	7.50
L004	3.37	23.00	.36	18.50	22.76	30.00	41.55	38.00
L004B	3.35	20.00		0.00	22.25	24.00	38.60	34.50
L006	3.02	6.00	.13	2.00	18.43	2.00	36.45	12.00
L006B	3.40	30.00	.14	3.00	21.2	8.00	35.5	7.50
L007	3.25	11.00	.51	36.00	22.9	33.50	38.6	34.50
L009	3.3	17.00	.35	14.50	22.6	29.00	37.7	24.50
L011	3.36	21.50	.50W	0.00	22.2	22.50	38.1	33.00
L013	3.20	8.50	.33	7.50	21.5	10.50	36.6	14.50
L014	3.9	43.00	.5	33.00	20.2	4.00	36.7	16.00
L016	3.07	7.00	.09	1.00	25.0	40.00	100.0 VH	40.00
L019	3.36	21.50	.34	10.00	22.2	22.50	37.5	22.50
L020	2.66	2.00	.34	10.00	21.7	12.00	37.1	19.50
L021	3.40	30.00	.33	7.50	22.66	32.00	36.40	13.00
L022	3.5	38.50	.6	38.50	31. VH	43.00	38.	29.00
L023	3.3	17.00	.20	5.00	22.	19.00	35.	4.50
L024	3.27	12.00	.41	27.00	22.8	31.00	37.7	24.50
L025	3.40	30.00	.35	14.50	22.0	13.00	37.5	22.50
L027	2.95	4.00	.46	29.00	21.75	13.00	36.25	11.00
L028	3.4	30.00	.6	38.50	21.5	10.50	35.6	9.00
L029	3.38	24.00	.37	21.00	22.5	27.00	37.0	17.50
L031	3.4	30.00	.4	25.00	23.5	37.00		0.00
L031B		0.00		0.00		0.00		0.00
L032	3.42	36.00	.35	14.50	23.83	38.00	35.74	10.00
L043	4.0	44.00	<1.	0.00	22.5	27.00	65. VH	39.00
L045	3.4	30.00	.6	38.50	21.8	15.00	38.0	29.00
L046	2.9	3.00	.1W	0.00	19.1	3.00	34.7	3.00
L046B	3.0	5.00	.2	5.00	15. VL	1.00	25. VL	1.00
L048	3.40	30.00	.35	14.50	21.	6.00	38.	29.00
L048B	3.5	38.50	.2	5.00	21.8	15.00	36.6	14.50
L049	5. VH	46.50	1.W	0.00	26.	41.00	38.	29.00
L050	2.35 L	1.00	.35	14.50	27.1 H	42.00	37.4	21.00
L051	3.50	38.50	<1.0	0.00	21.00	6.00	35.00	4.50
L053	3.3	17.00	.5	33.00	22.5	27.00	37.1	19.50
L054	5. VH	46.50	1. H	41.00	62. VH	44.00	104. VH	41.00
L058	3.8	42.00	.6	38.50	22.	19.00	38.	29.00
L060	3.39	25.00	.38	23.00	21.0	6.00	35.2	6.00
L061	3.28	13.00	.35	14.50		0.00		0.00
L061B	3.40	30.00	.42	28.00		0.00		0.00
L062	3.7	41.00	.36	18.50	23.	35.50		0.00
L062B	3.5	38.50	.49	30.00	23.	35.50	38.	29.00
L063	3.41	35.00	.34	10.00	22.9	33.50	38.9	36.00
L063B	3.4	30.00	.5	33.00	22.	19.00	37.	17.50
L064	3.3	17.00	.37	21.00	24.	39.00	38.	29.00
L066	3.22	10.00	.37	21.00	22.4	25.00	34.3	2.00
MEDIAN CONC.	3.380		.370		22.200		37.400	

SULFATE (ALL METHODS)

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	215.00	30.714	7			DIONEX-IC
L002B	368.00	36.800	10	VHH	BIASED HIGH	COLOR-MTB
L003	88.00	9.778	9		BIASED LOW	16309
L003B	192.50	19.250	10			16304
L004	211.50	21.150	10			16309L
L004B	278.00	30.889	9	VHVH		16306L
L006	88.50	8.850	10		BIASED LOW	DIONEX
L006B	159.50	15.950	10	VH		AUTOANALYZER
L007	265.00	26.500	10			IC
L009	200.50	20.050	10			
L011	255.50	28.389	9			
L013	153.00	15.300	10			IC
L014	179.00	17.900	10			IC
L016	180.50	18.050	10	VH		M.T.B.
L019	207.00	20.700	10			IC
L020	232.50	23.250	10	VHVH		IC
L021	225.50	22.550	10			IC
L022	342.50	34.250	10	VHVH		IC
L023	166.00	16.600	10	VH		METHYLTHYMOL BLUE
L024	214.00	21.400	10			IC
L025	186.50	18.650	10			IC
L027	73.00	7.300	10	L	BIASED LOW	SUPRESSED ELUENT
L028	248.00	24.800	10	HH		SINGLE COLUMN IC
L029	215.00	21.500	10	VH		
L031	296.50	32.944	9			CALMAGITE
L031B	12.00	12.000	1		INSUFFICIENT DATA	ION EXCHANGE
L032	259.00	25.900	10			DIONEX IC
L043	294.00	32.667	9	LVHVHVHVH		
L045	343.00	34.300	10			U.V.-M.T.B.
L046	107.00	11.889	9	L		HPLC-IC
L046B	105.00	10.500	10	VHVLVL	BIASED LOW	TECHNICON
L048	188.50	18.850	10			IC
L048B	261.50	26.150	10	VH		TECHNICON
L049	282.00	31.333	9	HVLHVH		TURBIDIMETRIC
L050	165.00	16.500	10	LLH		IC
L051	112.00	12.444	9	LHL		IC
L053	233.00	23.300	10	H		COLORIMETRIC
L054	438.50	43.850	10	VHVHVHVHVHVHVHHVHVH	BIASED HIGH	TURBIDITY
L058	285.00	28.500	10			IC
L060	184.00	18.400	10			IC
L061	70.50	17.625	4		INSUFFICIENT DATA	IC
L061B	100.00	25.000	4		INSUFFICIENT DATA	AAII
L062	197.00	21.889	9			IC
L062B	338.00	33.800	10	VH		TURBIDIMETRY
L063	277.50	27.750	10			IC
L063B	326.00	32.600	10	VHH		AUTO-TURB
L064	266.00	26.600	10			IC
L066	153.50	15.350	10			IC

OVERALL AVERAGE RANK IS 22.906

SULFATE (ALL METHODS)

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L027	73.00	7.300	10	L	BIASED LOW	SUPRESSED ELUENT
L006	88.50	8.850	10		BIASED LOW	DIONEX
L003	88.00	9.778	9		BIASED LOW	16309
L046B	105.00	10.500	10	VHVLVL	BIASED LOW	TECHNICON
L046	107.00	11.889	9	L		HPLC-IC
L031B	12.00	12.000	1		INSUFFICIENT DATA	ION EXCHANGE
L051	112.00	12.444	9	LHL		IC
L013	153.00	15.300	10			IC
L066	153.50	15.350	10			IC
L006B	159.50	15.950	10	VH		AUTOANALYZER
L050	165.00	16.500	10	LLH		IC
L023	166.00	16.600	10	VH		METHYLTHYMOL BLUE
L061	70.50	17.625	4		INSUFFICIENT DATA	IC
L014	179.00	17.900	10			IC
L016	180.50	18.050	10	VH		M.T.B.
L060	184.00	18.400	10			IC
L025	186.50	18.650	10			IC
L048	188.50	18.850	10			IC
L003B	192.50	19.250	10			16304
L009	200.50	20.050	10			
L019	207.00	20.700	10			IC
L004	211.50	21.150	10			16309L
L024	214.00	21.400	10			IC
L029	215.00	21.500	10	VH		
L062	197.00	21.889	9			IC
L021	225.50	22.550	10			IC
L020	232.50	23.250	10	VHVH		IC
L053	233.00	23.300	10	H		COLORIMETRIC
L028	248.00	24.800	10	HH		SINGLE COLUMN IC
L061B	100.00	25.000	4		INSUFFICIENT DATA	AATI
L032	259.00	25.900	10			DIONEX IC
L048B	261.50	26.150	10	VH		TECHNICON
L007	265.00	26.500	10			IC
L064	266.00	26.600	10			IC
L063	277.50	27.750	10			IC
L011	255.50	28.389	9			
L058	285.00	28.500	10			IC
L002	215.00	30.714	7			DIONEX-IC
L004B	278.00	30.889	9	VHVH		16306L
L049	282.00	31.333	9	HVLHVH		TURBIDIMETRIC
L063B	326.00	32.600	10	VHH		AUTO-TURB
L043	294.00	32.667	9	LVHVHVHVH		
L031	296.50	32.944	9			CALMAGITE
L062B	338.00	33.800	10	VH		TURBIDIMETRY
L022	342.50	34.250	10	VHVH		IC
L045	343.00	34.300	10			U.V.-M.T.B.
L002B	368.00	36.800	10	VHH	BIASED HIGH	COLOR-MTB
L054	438.50	43.850	10	VHVHVHVHVHVHVHHVHVH	BIASED HIGH	TURBIDITY

OVERALL AVERAGE RANK IS 22.906

SULFATE (ALL METHODS)

85/04/25

PARAMETER: 01089 GRAN ACIDITY MG/LCACO3

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.00 BASIC ACCEPTABLE ERROR= .75 CONCENTRATION ERROR INCREMENT= .50
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L020		0.00	2.6	6.00	6.7 VH	6.00	3.9 VH	6.00	4.6 VH	5.00	6.8 VH	6.00
L021		0.00	2.25	4.00	3.52	5.00	1.57	3.00		0.00	3.06	3.00
L025	0.	2.00	1.78	3.00	3.32	3.00	1.66	4.00	.82	2.00	3.16	4.00
L030	.46	3.00	2.29	5.00	3.36	4.00	1.78	5.00	1.09	4.00	3.17	5.00
L032	-.10T	1.00	1.38	2.00	2.98	2.00	.815	2.00	.450	1.00	2.58	2.00
L063	1.072 H	4.00	-.523 VL	1.00	1.274 L	1.00	.594	1.00	1.001	3.00	.818 L	1.00
L066		0.00		0.00		0.00		0.00		0.00		0.00
MEDIAN CONC.	.230		2.015		3.340		1.615		1.001		3.110	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L020	5.3 H	7.00	1.9	6.00		0.00	2.7 VH	6.00
L021	3.76	6.00	1.45	5.00		0.00	1.00	3.00
L025	3.21	5.00	.89	3.00	.84	3.00	1.15	4.00
L030	3.07	4.00	1.41	4.00	1.06	4.00	1.20	5.00
L032	2.22	3.00	.601	2.00	.445	1.00	.843	2.00
L063	1.849	2.00	.028 L	1.00	.584	2.00	.256 L	1.00
L066	1.80	1.00		0.00		0.00		0.00
MEDIAN CONC.	3.070		1.150		.712		1.075	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L020	48.00	6.000	8	VHVHVHVHHVH	BIASED HIGH	ELECTR/GRAN
L021	29.00	4.143	7			GRAN TITRATION
L025	33.00	3.300	10			NAOH-AUTO-TITN
L030	43.00	4.300	10			NAOH-AUTO-TITRA
L032	18.00	1.800	10		BIASED LOW	AUTO. TITRIMETRY
L063	17.00	1.700	10	HVLLLLL	BIASED LOW	
L066	1.00	1.000	1		INSUFFICIENT DATA	AUTO TITRATION

OVERALL AVERAGE RANK IS 3.375

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L066	1.00	1.000	1		INSUFFICIENT DATA	AUTO TITRATION
L063	17.00	1.700	10	HVLLLLL	BIASED LOW	
L032	18.00	1.800	10		BIASED LOW	AUTO. TITRIMETRY
L025	33.00	3.300	10			NAOH-AUTO-TITN
L021	29.00	4.143	7			GRAN TITRATION
L030	43.00	4.300	10			NAOH-AUTO-TITRA
L020	48.00	6.000	8	VHVHVHVHHVH	BIASED HIGH	ELECTR/GRAN

OVERALL AVERAGE RANK IS 3.375

35

85/04/25

PARAMETER: 01090 ACIDITY TO PH 8.3 MG/LCACO3

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.00 BASIC ACCEPTABLE ERROR= .75 CONCENTRATION ERROR INCREMENT= .50
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002		0.00	1.11	2.00		0.00		0.00		0.00		0.00
L010	2.0	10.50	2.9	12.00	3.9	10.00	2.0	11.00	2.0	11.00	2.9	5.00
L011	1.22	6.00	2.35	8.00	4.23	12.00	1.88	9.00	1.60	9.50	3.76	11.00
L016	1.6	9.00	2.4	9.50	4.4	13.00	1.7	5.50	1.5	8.00	2.8	4.00
L022	3. VH	13.00	3.	14.00	5.	14.00	2.	11.00	3. VH	12.00	5.	14.50
L023	1.00W	0.00	2.23	6.00	2.54	3.00	2.09	13.00	1.23	6.00	3.23	8.00
L025	.60	3.00	1.85	5.00	3.27	5.00	1.71	7.00	.96	4.00	3.10	7.00
L029	2.44 H	12.00	2.77	11.00	3.89	9.00	1.70	5.50	1.60	9.50	3.34	9.00
L030	1.33	7.00	2.40	9.50	3.45	6.00	1.86	8.00	1.37	7.00	3.05	6.00
L032	.652	4.00	1.48	4.00	3.22	4.00	.976	3.00	.848	3.00	2.75	3.00
L042	3.09 VH	14.00	6.18 VH	16.00	6.94 H	16.00	5.02 VH	15.00	10.4 VH	14.00	12.7 VH	16.00
L043	2.00	10.50	3.0	14.00	4.00	11.00	2.00	11.00	1.00	5.00	4.00	12.50
L046	1.5	8.00	3.0	14.00	3.7	7.00	1.1	4.00		0.00	4.0	12.50
L049		0.00		0.00		0.00		0.00		0.00		0.00
L054	1.W	0.00	8. VH	17.00	6. H	15.00	1.W	0.00	1.W	0.00	5.	14.50
L062	.33 L	2.00	.26 L	1.00	.33 VL	1.00	.15 L	1.00	.21 L	1.00	.20 VL	1.00
L063B	.802	5.00	1.448	3.00	1.130 L	2.00	.488 L	2.00	.644	2.00	.984 L	2.00
L066	.31 L	1.00	2.32	7.00	3.77	8.00	2.73	14.00	6.03 VH	13.00	3.60	10.00
MEDIAN CONC.	1.415		2.400		3.830		1.860		1.435		3.285	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.42 L	3.00		0.00		0.00		0.00
L010	2.9	6.00	1.5	11.00	2.9 VH	13.00	2.0	10.50
L011	3.95	12.00	1.50	11.00	1.22	8.00	3.76 VH	13.00
L016	2.8	5.00	1.5	11.00	1.6	11.00	1.8	9.00
L022	5.	16.50	2.	14.00	2.	12.00	2.	10.50
L023	3.04	7.00	1.31	8.00	1.20	6.50	1.54	8.00
L025	3.34	9.00	.91	4.00	.99	5.00	1.19	5.00
L029	3.60	10.50	1.35	9.00	1.55	10.00	1.51	7.00
L030	3.23	8.00	1.53	13.00	1.44	9.00	1.25	6.00
L032	2.45	4.00	.738	3.00	.770	3.00	.970	3.00
L042	13.1 VH	18.00	6.94 VH	16.00	4.24 VH	15.00	10.4 VH	16.00
L043	4.00	13.50	1.00	5.00	3.00 VH	14.00	2.50	12.00
L046	3.6	10.50	1.3	7.00	1.2	6.50	8.0 VH	15.00
L049	4.	13.50		0.00		0.00		0.00
L054	5.	16.50	3. VH	15.00	1.W	0.00	4. VH	14.00
L062	.18 VL	1.00	.16 L	1.00	.21 L	1.00	.12 L	1.00
L063B	1.306 L	2.00	.324 L	2.00	.482	2.00	.461 L	2.00
L066	4.17	15.00	1.15	6.00	.92	4.00	1.17	4.00
MEDIAN CONC.	3.470		1.330		1.220		1.670	

ACIDITY TO PH 8.3

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	5.00	2.500	2	L	INSUFFICIENT DATA	TITRA-AUTOINF.PT
L010	100.00	10.000	10	VH		POTENTIOMETRIC TIT
L011	99.50	9.950	10	VH		
L016	85.00	8.500	10			TITRATION
L022	131.50	13.150	10	VHVH	BIASED HIGH	TITRA. TO PH 8.3
L023	65.50	7.278	9			POTENTIOMETRIC
L025	54.00	5.400	10			NAOH-AUTO-TITN
L029	92.50	9.250	10	H		AUTOMATED TITR
L030	79.50	7.950	10			NAOH-AUTO-TITRA
L032	34.00	3.400	10		BIASED LOW	AUTO. TITRIMETRY
L042	155.00	15.600	10	VHVHHVHVHVHVHVHVHVH	BIASED HIGH	
L043	108.50	10.850	10	VH		
L046	84.50	9.389	9	VH		TITRATION
L049	13.50	13.500	1		INSUFFICIENT DATA	PH METER
L054	92.00	15.333	6	VHHVHVH	BIASED HIGH	TITRATION
L062	11.00	1.100	10	LLVLLLVLVLLLL	BIASED LOW	AUTOTITRIMETRY
L063B	24.00	2.400	10	LLLLLL	BIASED LOW	EP TITR.
L066	82.00	8.200	10	LVH		AUTO TITRATION

OVERALL AVERAGE RANK IS 8.395

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L062	11.00	1.100	10	LLVLLLVLVLLLL	BIASED LOW	AUTOTITRIMETRY
L063B	24.00	2.400	10	LLLLLL	BIASED LOW	EP TITR.
L002	5.00	2.500	2	L	INSUFFICIENT DATA	TITRA-AUTOINF.PT
L032	34.00	3.400	10		BIASED LOW	AUTO. TITRIMETRY
L025	54.00	5.400	10			NAOH-AUTO-TITN
L023	65.50	7.278	9			POTENTIOMETRIC
L030	79.50	7.950	10			NAOH-AUTO-TITRA
L066	82.00	8.200	10	LVH		AUTO TITRATION
L016	85.00	8.500	10			TITRATION
L029	92.50	9.250	10	H		AUTOMATED TITR
L046	84.50	9.389	9	VH		TITRATION
L011	99.50	9.950	10	VH		
L010	100.00	10.000	10	VH		POTENTIOMETRIC TIT
L043	108.50	10.850	10	VH		
L022	131.50	13.150	10	VHVH	BIASED HIGH	TITRA. TO PH 8.3
L049	13.50	13.500	1		INSUFFICIENT DATA	PH METER
L054	92.00	15.333	6	VHHVHVH	BIASED HIGH	TITRATION
L042	156.00	15.600	10	VHVHHVHVHVHVHVHVHVH	BIASED HIGH	

OVERALL AVERAGE RANK IS 8.395

ACIDITY TO PH 8.3

85/04/25

PARAMETER: 01091 ACIDITY(ALL METHODS) MG/LCACO3

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.00 BASIC ACCEPTABLE ERROR= .75 CONCENTRATION ERROR INCREMENT= .50
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002		0.00	1.11	3.00		0.00		0.00		0.00		0.00
L010	2.0 H	14.50	2.9	18.00	3.9	15.00	2.0	16.00	2.0	15.00	2.9	6.00
L011	1.22	10.00	2.35	13.00	4.23	17.00	1.88	14.00	1.60	13.50	3.76	15.00
L016	1.6	13.00	2.4	14.50	4.4	18.00	1.7	9.50	1.5	12.00	3.8	16.00
L020		0.00	2.6	16.00	6.7 VH	21.00	3.9 VH	20.00	4.6 VH	17.00	6.8 VH	21.00
L021		0.00	2.25	10.00	3.52	11.00	1.57	7.00		0.00	3.06	8.00
L022	3. VH	17.00	3.	20.00	5.	19.00	2.	16.00	3. VH	16.00	5.	19.50
L023	1.00W	0.00	2.23	9.00	2.54	4.00	2.09	18.00	1.23	10.00	3.23	12.00
L025	0. L	2.00	1.78	7.00	3.32	8.00	1.66	8.00	.85	5.00	3.16	10.00
L025B	.60	6.00	1.85	8.00	3.27	7.00	1.71	11.00	.96	6.00	3.10	9.00
L029	2.44 VH	16.00	2.77	17.00	3.89	14.00	1.70	9.50	1.60	13.50	3.34	13.00
L030	.46	5.00	2.29	11.00	3.36	9.00	1.78	12.00	1.09	9.00	3.17	11.00
L030B	1.33	11.00	2.40	14.50	3.45	10.00	1.86	13.00	1.37	11.00	3.05	7.00
L032	-.10T VL	1.00	1.38	4.00	2.98	5.00	.815	4.00	.450	2.00	2.58	4.00
L032B	.652	7.00	1.48	6.00	3.22	6.00	.976	5.00	.848	4.00	2.75	5.00
L042	3.09 VH	18.00	6.18 VH	22.00	6.94 VH	22.00	5.02 VH	21.00	10.4 VH	19.00	12.7 VH	22.00
L043	2.00 H	14.50	3.0	20.00	4.00	16.00	2.00	16.00	1.00	7.00	4.00	17.50
L046	1.5	12.00	3.0	20.00	3.7	12.00	1.1	6.00		0.00	4.0	17.50
L049		0.00		0.00		0.00		0.00		0.00		0.00
L054	1.W	0.00	8. VH	23.00	6. H	20.00	1.W	0.00	1.W	0.00	5.	19.50
L062	.33	4.00	.26 L	2.00	.33 VL	1.00	.15 L	1.00	.21 L	1.00	.20 VL	1.00
L063	1.072	9.00	-.523 VL	1.00	1.274 L	3.00	.594 L	3.00	1.001	8.00	.818 L	2.00
L063B	.802	8.00	1.448	5.00	1.130 L	2.00	.488 L	2.00	.644	3.00	.984 L	3.00
L066		0.00		0.00		0.00		0.00		0.00		0.00
L066B	.31 L	3.00	2.32	12.00	3.77	13.00	2.73	19.00	6.03 VH	18.00	3.60	14.00
MEDIAN CONC.	1.146		2.320		3.610		1.710		1.230		3.200	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.42	3.00		0.00		0.00		0.00
L010	2.9	8.00	1.5	16.00	2.9 VH	17.00	2.0	15.50
L011	3.95	18.00	1.50	16.00	1.22	12.00	3.76 VH	19.00
L016	3.8	17.00	1.5	16.00	1.6	15.00	1.8	14.00
L020	5.3 H	24.00	1.9	19.00		0.00	2.7 H	18.00
L021	3.76	16.00	1.45	14.00		0.00	1.00	6.00
L022	5.	22.50	2.	20.00	2.	16.00	2.	15.50
L023	3.04	9.00	1.31	11.00	1.20	10.50	1.54	13.00
L025	3.21	11.00	.89	6.00	.84	6.00	1.15	7.00
L025B	3.34	13.00	.91	7.00	.99	8.00	1.19	9.00
L029	3.60	14.50	1.35	12.00	1.55	14.00	1.51	12.00
L030	3.07	10.00	1.41	13.00	1.06	9.00	1.20	10.00
L030B	3.23	12.00	1.53	18.00	1.44	13.00	1.25	11.00
L032	2.22	6.00	.601	4.00	.445	2.00	.843	4.00
L032B	2.45	7.00	.738	5.00	.770	5.00	.970	5.00
L042	13.1 VH	25.00	6.94 VH	22.00	4.24 VH	19.00	10.4 VH	22.00
L043	4.00	19.50	1.00	8.00	3.00 VH	18.00	2.50 H	17.00
L046	3.6	14.50	1.3	10.00	1.2	10.50	8.0 VH	21.00
L049	4.	19.50		0.00		0.00		0.00
L054	5.	22.50	3. VH	21.00	1.W	0.00	4. VH	20.00
L062	.18 VL	1.00	.16 L	2.00	.21 L	1.00	.12 L	1.00
L063	1.849	5.00	.028 L	1.00	.584	4.00	.256 L	2.00
L063B	1.306 L	2.00	.324 L	3.00	.482	3.00	.481	3.00
L066	1.80	4.00		0.00		0.00		0.00
L066B	4.17	21.00	1.15	9.00	.92	7.00	1.17	8.00
MEDIAN CONC.	3.340		1.330		1.200		1.380	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	6.00	3.000	2		INSUFFICIENT DATA	TITRA-AUTOINF.PT
L010	141.00	14.100	10	HVH		POTENTIOMETRIC
L011	147.50	14.750	10	VH		
L016	145.00	14.500	10			TITRATION
L020	156.00	19.500	8	VHVHVHVHHH	BIASED HIGH	ELECTRA/GRAN
L021	72.00	10.286	7			GRAN TITRATION
L022	181.50	18.150	10	VHVH	BIASED HIGH	TITRA TO PH 8.3
L023	96.50	10.722	9			POTENTIOMETRIC
L025	70.00	7.000	10	L		NAOH-TITRATION
L025B	84.00	8.400	10			NAOH-TITRATION
L029	135.50	13.550	10	VH		
L030	99.00	9.900	10			
L030B	120.50	12.050	10			
L032	36.00	3.600	10	VL	BIASED LOW	AUTO TITRIMETRY
L032B	55.00	5.500	10		BIASED LOW	AUTO TITRIMETRY
L042	212.00	21.200	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	
L043	153.50	15.350	10	HVHH		
L046	123.50	13.722	9	VH		TITRATION
L049	19.50	19.500	1		INSUFFICIENT DATA	PH METER
L054	126.00	21.000	6	VHHVHVH	BIASED HIGH	TITRATION
L062	15.00	1.500	10	LVLLLVLVLLLL	BIASED LOW	AUTOTITRIMETRY
L063	38.00	3.800	10	VLLLLLL	BIASED LOW	
L063B	34.00	3.400	10	LLLLL	BIASED LOW	EP TITR.
L066	4.00	4.000	1		INSUFFICIENT DATA	AUTO TITRATION
L066B	124.00	12.400	10	LVH		AUTO TITRATION

OVERALL AVERAGE RANK IS 11.244

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L062	15.00	1.500	10	LVLLLVLVLLLL	BIASED LOW	AUTOTITRIMETRY
L002	6.00	3.000	2		INSUFFICIENT DATA	TITRA-AUTOINF.PT
L063B	34.00	3.400	10	LLLLL	BIASED LOW	EP TITR.
L032	36.00	3.600	10	VL	BIASED LOW	AUTO TITRIMETRY
L063	38.00	3.800	10	VLLLLLL	BIASED LOW	
L066	4.00	4.000	1		INSUFFICIENT DATA	AUTO TITRATION
L032B	55.00	5.500	10		BIASED LOW	AUTO TITRIMETRY
L025	70.00	7.000	10	L		NAOH-TITRATION
L025B	84.00	8.400	10			NAOH-TITRATION
L030	99.00	9.900	10			
L021	72.00	10.286	7			GRAN TITRATION
L023	96.50	10.722	9			POTENTIOMETRIC
L030B	120.50	12.050	10			
L066B	124.00	12.400	10	LVH		AUTO TITRATION
L029	135.50	13.550	10	VH		
L046	123.50	13.722	9	VH		TITRATION
L010	141.00	14.100	10	HVH		POTENTIOMETRIC
L016	145.00	14.500	10			TITRATION
L011	147.50	14.750	10	VH		
L043	153.50	15.350	10	HVHH		
L022	181.50	18.150	10	VHVH	BIASED HIGH	TITRA TO PH 8.3
L049	19.50	19.500	1		INSUFFICIENT DATA	PH METER
L020	156.00	19.500	8	VHVHVHVHHH	BIASED HIGH	ELECTRA/GRAN
L054	126.00	21.000	6	VHHVHVH	BIASED HIGH	TITRATION
L042	212.00	21.200	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	

OVERALL AVERAGE RANK IS 11.244

PARAMETER: 06282 GRAN TITRA ALK MG/LCACO3

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .05 BASIC ACCEPTABLE ERROR= .75 CONCENTRATION ERROR INCREMENT= .10
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L003		0.00	.3	8.00		0.00		0.00		0.00	.8	7.50
L004	38.16	3.00	-.33	3.00	2.88	4.00	1.21	3.00	9.34	4.00	.54	3.00
L014	820. VH	11.00	-6. VL	1.00	61. VH	11.00	29. VH	11.00	214. VH	11.00	5. VH	10.00
L020	46.5 H	9.00	0.0W	0.00	3.5	7.00	1.5	7.00	7.6 L	1.00	0.0W	0.00
L024	37.39	2.00	-.20	6.00	2.94	5.00	1.37	5.00	9.12	3.00	.66	5.00
L027	41.56	7.00	-.28T	4.50	2.56	2.00	.70	2.00	9.42	5.00	.05T	1.00
L030	40.6	5.00	-.28	4.50	2.82	3.00	1.32	4.00	9.71	6.00	.59	4.00
L032	42.4	8.00	1.57 VH	9.00	4.76 H	9.00	3.98 VH	9.00	10.13	8.00	.787	6.00
L053	40.5	4.00	.1	7.00	3.7	8.00	1.7	8.00	10.0	7.00	1.5	9.00
L058	41.	6.00	.1N	0.00	3.3	6.00	1.4	6.00	10.4	9.00	.8	7.50
L063	37.362	1.00	-.822	2.00	2.190 L	1.00	.635	1.00	8.350	2.00	.248	2.00
L066	48.1 H	10.00		0.00	5.28 VH	10.00	7.18 VH	10.00	13.18 VH	10.00	5.98 VH	11.00
MEDIAN CONC.	41.000		-.280		3.300		1.400		9.710		.787	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L003	-1.3	6.00	-.1	3.00		0.00	-.4	3.50
L004	-1.29	7.00	.21	6.00	12.97	3.00	-.13	6.00
L014	-29. VL	1.00	6. VH	10.00	283. VH	11.00	-4. VL	1.00
L020	0.0W	0.00	.3	7.00	13.6	4.00	.1	8.00
L024	-1.27	8.00	.17	5.00	12.94	2.00	-.01	7.00
L027	-1.40T	5.00	-.25T	2.00	14.86	8.00	-.19T	5.00
L030	-1.44	4.00	.12	4.00	13.7	5.00	-.40	3.50
L032	-1.1T	9.00	.802	9.00	15.94	9.00	.128	9.00
L053	-1.0	10.00	.4	8.00	14.1	7.00	.3	10.00
L058	-3.0 VL	2.00	.1N	0.00	14.	6.00	.4	11.00
L063	-2.419 L	3.00	-.500	1.00	11.832 L	1.00	-.711	2.00
L066		0.00		0.00	16.30 H	10.00		0.00
MEDIAN CONC.	-1.350		.190		14.000		-.130	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L003	28.00	5.600	5			10110
L004	42.00	4.200	10			10110L
L014	78.00	7.800	10	VHVLVHVHVHVHVLVHVHVL		TITRAPROCESSOR
L020	43.00	6.143	7	HL		ELECTR/GRAN
L024	48.00	4.800	10			
L027	41.50	4.150	10			POTENTIO EVAL
L030	43.00	4.300	10			H2SO4-AUTO-TITRA
L032	85.00	8.500	10	VHHVH		AUTO. TITRIMETRY
L053	78.00	7.800	10			TITRIMETRIC
L058	53.50	6.688	8	VL		GRAN TITRATION
L063	16.00	1.600	10	LLL	BIASED LOW	
L066	61.00	10.167	6	HVHVHVHVHH	BIASED HIGH	AUTO TITRATION

OVERALL AVERAGE RANK IS 5.821

GRAN TITRA ALK

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L063	16.00	1.600	10	LLL	BIASED LOW	POTENTIO EVAL
L027	41.50	4.150	10			10110L
L004	42.00	4.200	10			H2SO4-AUTO-TITRA
L030	43.00	4.300	10			
L024	48.00	4.800	10			10110
L003	28.00	5.600	5			ELECTR/GRAN
L020	43.00	6.143	7	HL		GRAN TITRATION
L058	53.50	6.688	8	VL		TITRAPROCESSOR
L014	78.00	7.800	10	VHVLVHVHVHVHVLVHVHVL		TITRIMETRIC
L053	78.00	7.800	10			AUTO. TITRIMETRY
L032	85.00	8.500	10	VHHVH		AUTO TITRATION
L066	61.00	10.167	6	HVHVHVHVHH	BIASED HIGH	

OVERALL AVERAGE RANK IS 5.821

GRAN TITRA ALK

85/04/25

PARAMETER: G6192 TOTAL ALKALINITY MG/LCACO3

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.6--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.50 BASIC ACCEPTABLE ERROR= 1.20 CONCENTRATION ERROR INCREMENT= .08
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	39.7	10.00		0.00	3.45	15.00	1.99	12.00	9.0	2.00	.49 L	4.00
L003	38.3	3.00		0.00	2.7	8.00	1.4	4.50	9.0	2.00		0.00
L004	38.8	5.00	.7	6.00	2.6	7.00	1.1	3.00	9.5	5.00	.2 VL	2.00
L006	39.91	11.00	0. L	2.50	2.06 L	4.00	1.47	7.00	11.57	21.00	0. VL	1.00
L009	41.3	19.00	2.42	18.00	6.15 VH	26.00	3.59 H	27.00	11.3	18.50	2.69	24.00
L010	36.8	1.00	1.0	7.50	3.3	14.00	2.0	15.00	10.3	13.00	1.3	9.50
L011	40.0	12.50	.10N	0.00	3.24	13.00	2.16	18.00	9.73	7.00	2.16	15.00
L014	41.0	17.00	-.30 VL	1.00	3.10	11.00	1.45	6.00	10.8	14.00	.25 L	3.00
L016	37.5	2.00	0. L	2.50	2.2	5.00	1.0	1.50	9.8	8.50	.5 L	5.00
L022	39.	6.00	1.T	7.50	2. L	2.00	2.	15.00	10.	11.00	1.T	7.50
L023	41.0	17.00	3.00 H	19.00	5.00 H	22.00	2.00	15.00	12.0	23.00	2.00	12.50
L024	39.36	7.00	1.63	14.00	4.82 H	20.00	3.07	25.00	10.99	16.00	2.54	21.00
L027	44.13	25.00	1.99	15.00	5.19 H	24.00	3.09	26.00	11.19	17.00	2.37	17.00
L029	39.6	9.00	.4W	0.00	2.27	6.00	1.62T	11.00	9.30	4.00	2.44	18.00
L030	42.4	23.00	1.54	12.00	5.04 H	23.00	3.06	24.00	11.6	22.00	2.54	21.00
L031	41.	17.00	.2 L	4.00	3.0	10.00	1.5	8.00	9.8	8.50	1.3	9.50
L031B		0.00		0.00		0.00	1.7	10.00		0.00		0.00
L032	44.46	26.00	3.47 VH	20.00	6.45 VH	27.00	5.82 VH	28.00	12.03	24.00	2.65	23.00
L042	42.3	21.50	30.6 VH	22.00	28.2 VH	28.00	34.5 VH	29.00	16.9 VH	27.00	9.8 VH	26.00
L043	43.	24.00	2.	16.00	3.2	12.00	2.	15.00	9.6	6.00	2.	12.50
L045	40.0	12.50	.5	5.00	3.5	16.00	1.4	4.50	9.9	10.00	1.9	11.00
L046	38.5	4.00		0.00	2.8	9.00	1.6	9.00	19.2 VH	28.00	.8 L	6.00
L048	40.6	14.50	1.62	13.00	4.87 H	21.00	3.05	23.00	11.4	20.00	2.54	21.00
L049	55. VH	28.00	11. VH	21.00	2. L	2.00	1.	1.50	9.	2.00	1.	7.50
L053	41.7	20.00	1.5	11.00	4.8 H	19.00	3.0	21.50	11.3	18.50	2.5	19.00
L054	49. VH	27.00	1.H	0.00	2. L	2.00	2.	15.00	13. H	26.00	1.H	0.00
L057	42.3	21.50	2.4	17.00	5.8 VH	25.00	3.0	21.50	12.4	25.00	2.9	25.00
L060	40.6	14.50	1.4	10.00	4.6	18.00	2.9	20.00	10.9	15.00	2.3	16.00
L063	39.435	8.00	1.228	9.00	4.022	17.00	2.649	19.00	10.288	12.00	2.044	14.00
MEDIAN CONC.	40.600		1.520		3.375		2.000		10.850		2.022	

PARAMETER: 06192 TOTAL ALKALINITY MG/LCACO3 85/04/25

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002		0.00	.49	6.00	14.3	16.00	.35	8.00
L003		0.00		0.00	13.0	4.50		0.00
L004	1.3	14.00	.1 L	1.50	13.0	4.50	.2	5.50
L006	.615	9.00	.585	7.00	14.0	12.50	0.	2.50
L009	.75	11.00	3.10 H	23.00	15.6	22.50	2.77 H	24.00
L010	1.0W	0.00	1.0	10.00	12.7	1.50	1.0	11.00
L011	.10W	0.00	.65	8.00	13.2	7.00	.22	7.00
L014	-1.45 VL	1.00	.30	4.50	14.2	15.00	-.2	1.00
L016	0.	2.50	.3	4.50	13.5	9.00	0.	2.50
L022	0.W	0.00	1.T	10.00	13.	4.50	1.T	11.00
L023	1.00	13.00	2.00	18.50	15.0	19.00	1.00	11.00
L024	.37	8.00	1.90	17.00	14.78	18.00	1.72	19.00
L027	.34	7.00	1.55	13.00	17.22 H	25.00	1.69	18.00
L029	.4W	0.00	.4W	0.00	12.7	1.50	1.60T	16.00
L030	.27	5.00	1.76	15.00	15.6	22.50	1.73	20.00
L031	.1W	0.00	.1 L	1.50	13.	4.50	.1	4.00
L031B		0.00		0.00		0.00		0.00
L032	.705	10.00	2.63 H	21.00	17.81 VH	26.00	1.960	22.00
L042	8.2 VH	16.00	28.2 VH	24.00	36.1 VH	28.00	17.2 VH	25.00
L043	1.5	15.00	2.	18.50	14.	12.50	1.0	11.00
L045	0.0W	0.00	0.0W	0.00	14.0	12.50	0.0W	0.00
L046		0.00	.2 L	3.00	13.4	8.00	.2	5.50
L048	.8W	0.00	2.03	20.00	15.2	20.50	1.83	21.00
L049		0.00	1.	10.00	14.	12.50	1.	11.00
L053	.3	6.00	1.8	16.00	14.7	17.00	1.6	16.00
L054	1.W	0.00	1.W	0.00	19. VH	27.00	1.W	0.00
L057	.9	12.00	3.0 H	22.00	16.6 H	24.00	2.3 H	23.00
L060	.1T	4.00	1.6	14.00	15.2	20.50	1.6	16.00
L063	0.000	2.50	1.309	12.00	13.709	10.00	1.193	14.00
MEDIAN CONC.	.493		1.430		14.100		1.000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	73.00	9.125	8	L		TITRA-AUTOINF.PT
L003	22.00	4.400	5		BIASED LOW	10101
L004	53.50	5.350	10	VLL	BIASED LOW	10101L
L006	77.50	7.750	10	LLVL		TITROPROCESSOR
L009	213.00	21.300	10	VHHHH	BIASED HIGH	
L010	82.50	9.167	9			POTENTIOMETRIC TIT
L011	87.50	10.938	8			
L014	73.50	7.350	10	VLLVL		TITRAPROCESSOR
L016	43.00	4.300	10	LL	BIASED LOW	TITRATION
L022	74.50	8.278	9	L		TITRATION TO 4.5
L023	170.00	17.000	10	HH		POTENTIOMETRIC
L024	165.00	16.500	10	H		
L027	187.00	18.700	10	HH		POTENTIO/4.5PH
L029	65.50	9.357	7			
L030	187.50	18.750	10	H		H2SO4-AUTO-TITRA
L031	67.00	7.444	9	LL		TITRATION
L031B	10.00	10.000	1		INSUFFICIENT DATA	ION EXCHANGE
L032	227.00	22.700	10	VHVHVHHVH	BIASED HIGH	AUTO. TITRIMETRY
L042	246.50	24.650	10	VHVHVHVHVHVHVHVHVH	BIASED HIGH	
L043	142.50	14.250	10			
L045	71.50	10.214	7			AUTOMATED BROMOPHE
L046	72.50	9.063	8	VHLL		TITRATION 4.5,4.2
L048	174.00	19.333	9	H		TITRATION
L049	95.50	10.611	9	VHVHL		PH TO 4.5
L053	164.00	16.400	10	H		TITRIMETRIC
L054	97.00	19.400	5	VHLHVH		TITRATION
L057	216.00	21.600	10	VHHHH	BIASED HIGH	POTENT.
L060	148.00	14.800	10			TITR.
L063	117.50	11.750	10			EP TITRA.

OVERALL AVERAGE RANK IS 13.480

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L016	43.00	4.300	10	LL	BIASED LOW	TITRATION
L003	22.00	4.400	5		BIASED LOW	10101
L004	53.50	5.350	10	VLL	BIASED LOW	10101L
L014	73.50	7.350	10	VLLVL		TITRAPROCESSOR
L031	67.00	7.444	9	LL		TITRATION
L006	77.50	7.750	10	LLVL		TITROPROCESSOR
L022	74.50	8.278	9	L		TITRATION TO 4.5
L046	72.50	9.063	8	VHLL		TITRATION 4.5,4.2
L002	73.00	9.125	8	L		TITRA-AUTOINF.PT
L010	82.50	9.167	9			POTENTIOMETRIC TIT
L029	65.50	9.357	7		INSUFFICIENT DATA	ION EXCHANGE
L031B	10.00	10.000	1			AUTOMATED BROMOPHE
L045	71.50	10.214	7			PH TO 4.5
L049	95.50	10.611	9	VHVHL		
L011	87.50	10.938	8			EP TITRA.
L063	117.50	11.750	10			
L043	142.50	14.250	10			TITR.
L060	148.00	14.800	10			TITRIMETRIC
L053	164.00	16.400	10	H		
L024	165.00	16.500	10	H		POTENTIOMETRIC
L023	170.00	17.000	10	HH		POTENTIO/4.5PH
L027	167.00	18.700	10	HH		H2SO4-AUTO-TITRA
L030	187.50	18.750	10	H		TITRATION
L048	174.00	19.333	9	H		TITRATION
L054	97.00	19.400	5	VHLHVH		
L009	213.00	21.300	10	VHHHH	BIASED HIGH	POTENT.
L057	216.00	21.600	10	VHHHH	BIASED HIGH	AUTO. TITRIMETRY
L032	227.00	22.700	10	VHVHVHHVH	BIASED HIGH	
L042	246.50	24.650	10	VHVHVHVHVHVHVHVHVH	BIASED HIGH	

OVERALL AVERAGE RANK IS 13.480

TOTAL ALKALINITY

85/04/25

PARAMETER: 01092 PH PH UNITS

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.00 BASIC ACCEPTABLE ERROR= .25 CONCENTRATION ERROR INCREMENT=0.00
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	7.8	35.50	5.1	17.00	6.2	25.00	6.0	9.50	7.1	26.50	5.4	12.50
L003	7.8	35.50	5.4 H	40.50	6.1	13.50	6.4	39.00	7.1	26.50	5.5	20.50
L004	7.5	7.50	5.0	7.50	6.0	8.00	6.2	26.00	6.9	11.00	5.3	10.00
L006	7.68	23.00	5.13	22.50	6.19	23.00	6.22	29.50	7.12	30.00	5.56	29.50
L007	7.54	11.50	5.22	32.50	6.17	20.00	6.17	20.50	6.98	14.00	5.54	25.50
L009	7.76	32.00	5.19	27.00	6.35	36.50	6.26	33.00	7.24	39.00	5.58	32.00
L010	7.2 VL	2.50	5.4 H	40.50	5.9 L	5.50	5.8 VL	4.50	6.8	7.00	5.2 L	8.00
L011	7.79	34.00	5.30	37.00	6.39	39.00	6.23	31.00	7.26	40.00	5.58	32.00
L013	7.68	23.00	5.01	9.00	6.40	40.00	6.25	32.00	6.86	8.00	5.43	17.00
L014	7.88	38.00	5.21	31.00	6.23	28.00	6.30	36.50	7.23	38.00	5.24 L	9.00
L016	7.6	15.00	5.0	7.50	6.1	13.50	6.2	26.00	7.0	18.50	5.4	12.50
L019	7.73	30.50	5.24	34.00	6.15	16.50	6.14	18.50	7.07	23.50	5.68	39.00
L020	7.48	6.00	5.19	27.00	6.18	21.50	6.04	12.50	6.95	12.00	4.98 VL	1.00
L021	7.78	33.00	5.08	14.50	6.25	31.00	6.04	12.50	7.13	31.00	5.53	24.00
L022	7.51	9.00	4.95	6.00	5.66 VL	2.00	6.02	11.00	6.87	9.50	5.18 L	6.50
L023	7.70	26.50	5.10	17.00	6.15	16.50	6.20	26.00	7.00	18.50	5.50	20.50
L024	7.73	30.50	5.13	22.50	6.16	18.50	6.20	26.00	7.00	18.50	5.51	22.00
L025	7.69	25.00	5.06	12.50	6.10	13.50	6.19	22.50	7.01	21.00	5.58	32.00
L027	7.576	13.00	5.248	35.00	6.180	21.50	6.190	22.50	7.143	34.00	5.395	11.00
L029	7.67	20.50	5.22	32.50	6.31	33.00	6.29	35.00	7.07	23.50	5.83 H	41.00
L030	7.65	18.00	5.06	12.50	6.04	9.00	5.91 L	7.00	7.11	29.00	5.41	14.00
L031	7.63	17.00	5.34	39.00	6.35	36.50	6.22	29.50	7.14	32.50	5.52	23.00
L032	7.67	20.50	6.08 VH	43.00	6.44 H	41.00	6.67 VH	42.00	7.18	35.00	5.54	25.50
L040	7.30 L	4.50	4.55 VL	1.00	5.80 VL	3.50	5.60 VL	1.50	6.40 VL	2.00	5.05 VL	4.00
L042	7.6	15.00	5.3	37.00	6.1	13.50	6.1	16.00	7.0	18.50	5.6	36.00
L043	8.00 H	41.00	5.60 VH	42.00	6.05	10.00	6.00	9.50	6.65 VL	4.00	5.70	40.00
L045	7.54	11.50	5.08	14.50	6.08	11.00	6.81 VH	43.00	6.99	16.00	5.47	19.00
L046	7.84	37.00	5.17	24.50	6.36	38.00	6.31	38.00	7.34 H	41.00	5.42	15.50
L048	7.72	28.50	5.17	24.50	6.24	29.50	6.10	16.00	7.10	26.50	5.55	27.50
L049	7.3 L	4.50	4.7 VL	3.50	5.9 L	5.50	5.8 VL	4.50	6.7 L	5.50	5.1 VL	5.00
L050	7.19 VL	1.00	4.82 L	5.00	5.93	7.00	5.86 L	6.00	6.7 L	5.50	5.18 L	6.50
L051	7.90	40.00	5.20	29.50	6.20	25.00	6.50 H	40.00	7.20	36.50	5.60	36.00
L053	7.72	28.50	5.12	21.00	6.29	32.00	6.17	20.50	7.10	26.50	5.59	34.00
L054	7.5	7.50	4.7 VL	3.50	5.8 VL	3.50	5.7 VL	3.00	6.5 VL	3.00	5.0 VL	2.50
L057	7.66	19.00	5.19	27.00	6.24	29.50	6.05	14.00	7.05	22.00	5.56	29.50
L058	7.89	39.00	5.03	10.00	6.32	34.00	6.20	26.00	7.14	32.50	5.42	15.50
L059	7.2 VL	2.50	4.6 VL	2.00	5.6 VL	1.00	5.6 VL	1.50	6.3 VL	1.00	5.0 VL	2.50
L060	7.60	15.00	5.05	11.00	6.22	27.00	6.10	16.00	6.98	14.00	5.45	18.00
L061		0.00	5.11	19.50		0.00	6.27	34.00		0.00		0.00
L062	7.7	26.50	5.3	37.00	6.2	25.00	6.3	36.50	7.2	36.50	5.6	36.00
L063	8.05 H	42.00	5.10	17.00	6.56 VH	42.00	6.61 VH	41.00	7.41 VH	42.00	5.84 H	42.00
L064	7.52	10.00	5.11	19.50	6.16	18.50	5.99	8.00	6.87	9.50	5.55	27.50
L066	7.68	23.00	5.20	29.50	6.33	35.00	6.14	18.50	6.98	14.00	5.64	38.00
MEDIAN CONC.	7.675		5.130		6.180		6.190		7.030		5.505	

PARAMETER: 01092 PH PH UNITS 85/04/25

SAMPLE LAB NO	7 REPORTED VALUE	RANK	8 REPORTED VALUE	RANK	9 REPORTED VALUE	RANK	10 REPORTED VALUE	RANK
L002	4.5	15.00	5.6	14.00	7.1	17.50	5.5	24.00
L003	4.5	15.00	5.7	24.00	7.2	28.00	5.3	4.00
L004	4.6	27.50	5.6	14.00	6.9 L	7.50	5.4	10.50
L006	4.59	24.50	5.67	19.00	6.97	12.00	5.37	7.00
L007	4.60	27.50	5.65	17.00	7.10	17.50	5.53	28.50
L009	4.64	36.00	5.77	34.00	7.44 H	41.00	5.49	21.00
L010	4.3 L	4.50	5.2 VL	4.00	6.9 L	7.50	5.2 L	2.00
L011	4.62	34.00	5.78	35.00	7.33	38.00	5.55	31.50
L013	4.65	37.00	5.57	10.00	7.13	19.00	5.48	19.50
L014	4.44	9.00	5.79	36.50	7.30	35.50	5.65	39.00
L016	4.4	6.50	5.5	9.00	7.2	28.00	5.5	24.00
L019	4.63	35.00	5.73	29.50	7.18	24.00	5.60	34.50
L020	4.58	21.50	5.79	36.50	7.09	16.00	5.43	13.50
L021	4.55	18.00	5.70	24.00	7.18	24.00	5.52	27.00
L022	4.41	8.00	5.07 VL	2.00	6.95	9.50	5.46	17.50
L023	4.60	27.50	5.75	32.50	7.15	20.00	5.55	31.50
L024	4.59	24.50	5.75	32.50	7.18	24.00	5.53	28.50
L025	4.48	13.00	5.71	27.50	7.20	28.00	5.42	12.00
L027	4.584	23.00	5.279 VL	7.00	7.179	22.00	5.356	6.00
L029	4.71	40.00	5.84	41.00	7.08	15.00	5.62	36.00
L030	4.56	19.00	5.65	17.00	7.26	34.00	5.38	8.00
L031	4.61	31.50	5.68	20.00	7.21	31.00	5.63	37.00
L032	4.72	41.00	6.33 VH	43.00	7.37	40.00	5.68	41.00
L040	4.25 L	2.50	4.80 VL	1.00	6.80 L	5.50	5.40	10.50
L042	4.7	38.50	5.8	38.50	7.0	14.00	5.6	34.50
L043	4.90 H	43.00	5.80	38.50	6.50 VL	1.50	5.65	39.00
L045	4.57	20.00	5.58	11.50	6.99	13.00	5.57	33.00
L046	4.46	12.00	5.69	21.00	7.25	33.00	5.54	30.00
L048	4.75	42.00	5.71	27.50	7.16	21.00	5.46	17.50
L049	4.3 L	4.50	5.2 VL	4.00	6.8 L	5.50	5.1 VL	1.00
L050	4.45	10.50	5.26 VL	6.00	6.67 VL	4.00	5.48	19.50
L051	4.60	27.50	5.60	14.00	7.20	28.00	5.50	24.00
L053	4.58	21.50	5.70	24.00	7.31	37.00	5.50	24.00
L054	4.4	6.50	5.2 VL	4.00	6.6 VL	3.00	5.3	4.00
L057	4.70	38.50	5.70	24.00	6.95	9.50	5.50	24.00
L058	4.25 L	2.50	5.73	29.50	7.30	35.50	5.44	15.00
L059	4.2 VL	1.00	5.4 L	8.00	6.5 VL	1.50	5.3	4.00
L060	4.54	17.00	5.58	11.50	7.24	32.00	5.43	13.50
L061	4.61	31.50	5.74	31.00		0.00		0.00
L062	4.5	15.00	5.7	24.00	7.2	28.00	6.4 VH	42.00
L063	4.45	10.50	5.83	40.00	7.62 VH	42.00	5.65	39.00
L064	4.61	31.50	5.65	17.00	6.96	11.00	5.39	9.00
L066	4.61	31.50	6.00 H	42.00	7.34	39.00	5.45	16.00
MEDIAN CONC.	4.580		5.700		7.170		5.495	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	196.50	19.650	10			PH METER-COMB-ELEC
L003	246.50	24.650	10	H		10301
L004	129.50	12.950	10	L		10301L
L006	220.00	22.000	10			METER
L007	214.50	21.450	10			RADIOMETER
L009	331.50	33.150	10	H		
L010	86.00	8.600	10	VLHLVLLLVLLL	BIASED LOW	POTENTIOMETRIC
L011	351.50	35.150	10		BIASED HIGH	
L013	214.50	21.450	10			GLASS ELECTRODE
L014	300.50	30.050	10	L		ORION
L016	160.50	16.050	10			
L019	285.00	28.500	10			ELECTROMETRIE
L020	167.50	16.750	10	VL		ELECTROMETER
L021	239.00	23.900	10			ELECTRODE
L022	81.00	8.100	10	VLLVL	BIASED LOW	
L023	236.50	23.650	10			ELECTROMETRIC
L024	247.50	24.750	10			
L025	207.00	20.700	10			ELECTRODE
L027	195.00	19.500	10	VL		POTENTIOMETRIC
L029	317.50	31.750	10	H		FISHER ELECT
L030	167.50	16.750	10	L		PH METER
L031	297.00	29.700	10			ELECTROMETRIC
L032	372.00	37.200	10	VHHVHVH	BIASED HIGH	PH METER
L040	36.00	3.600	10	LVLVLVLVLVLLVLL	BIASED LOW	COMB. ELECTRODE
L042	261.50	26.150	10			
L043	268.50	26.850	10	HVHVLHVL		ELECTROMETRIC
L045	192.50	19.250	10	VH		POTENTIOMETRIC
L046	290.00	29.000	10	H		ELECTRODE
L048	260.50	26.050	10			METER
L049	43.50	4.350	10	LVLLVLLVLLVLLVL	BIASED LOW	
L050	71.00	7.100	10	VLLLLLLVLVL	BIASED LOW	
L051	300.50	30.050	10	H		
L053	269.00	26.900	10			PH METER
L054	40.50	4.050	10	VLVLVLVLVLVLVL	BIASED LOW	ELECTRODE
L057	237.00	23.700	10			POTENT.
L058	239.50	23.950	10	L		ELECTRODE
L059	25.00	2.500	10	VLVLVLVLVLVLVLLVL	BIASED LOW	423
L060	175.00	17.500	10			ELECTRODE
L061	116.00	29.000	4		INSUFFICIENT DATA	METER/ELECTRODE
L062	306.50	30.650	10	VH		
L063	357.50	35.750	10	HVHVHVHHVH	BIASED HIGH	GLASS
L064	161.50	16.150	10			ELECTRODE
L066	286.50	28.650	10	H		

OVERALL AVERAGE RANK IS 21.703

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L059	25.00	2.500	10	VL VL VL VL VL VL VLL VL	BIASED LOW	423
L040	36.00	3.600	10	LVL VL VL VL VL L VLL	BIASED LOW	COMB. ELECTRODE
L054	40.50	4.050	10	VL VL VL VL VL VL VL	BIASED LOW	ELECTRODE
L049	43.50	4.350	10	LVLLVLL VLL VLLVL	BIASED LOW	METER
L050	71.00	7.100	10	VLLLLLVL VL	BIASED LOW	
L022	81.00	8.100	10	VLLVL	BIASED LOW	
L010	86.00	8.600	10	VLHLVLLLVLLL	BIASED LOW	POTENTIOMETRIC
L004	129.50	12.950	10	L		10301L
L016	160.50	16.050	10			ELECTRODE
L064	161.50	16.150	10			ELECTROMETER
L020	167.50	16.750	10	VL		PH METER
L030	167.50	16.750	10	L		ELECTRODE
L060	175.00	17.500	10			ELECTROMETRIC
L045	192.50	19.250	10	VH		POTENTIOMETRIC
L027	195.00	19.500	10	VL		PH METER-COMB-ELEC
L002	196.50	19.650	10			ELECTRODE
L025	207.00	20.700	10			RADIOMETER
L007	214.50	21.450	10			GLASS ELECTRODE
L013	214.50	21.450	10			METER
L006	220.00	22.000	10			ELECTROMETRIC
L023	236.50	23.650	10			POTENT.
L057	237.00	23.700	10			ELECTRODE
L021	239.00	23.900	10			ELECTRODE
L058	239.50	23.950	10	L		10301
L003	246.50	24.650	10	H		
L024	247.50	24.750	10			ELECTRODE
L048	260.50	26.050	10			
L042	261.50	26.150	10			
L043	268.50	26.850	10	HVHVLHVL		PH METER
L053	269.00	26.900	10			ELECTROMETRIE
L019	285.00	28.500	10			
L066	286.50	28.650	10	H		POTENTIOMETRIC
L046	290.00	29.000	10	H		METER/ELECTRODE
L061	116.00	29.000	4		INSUFFICIENT DATA	ELECTROMETRIC
L031	297.00	29.700	10			
L051	300.50	30.050	10	H		ORION
L014	300.50	30.050	10	L		
L062	306.50	30.650	10	VH		FISHER ELECT
L029	317.50	31.750	10	H		
L009	331.50	33.150	10	H		
L011	351.50	35.150	10		BIASED HIGH	
L063	357.50	35.750	10	HVHVHVHHVH	BIASED HIGH	GLASS
L032	372.00	37.200	10	VHHVHVH	BIASED HIGH	PH METER

OVERALL AVERAGE RANK IS 21.703

PH

85/04/25

PARAMETER: 00392 SPECIFIC CONDUCTANCE UMHO/CM

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR=50.00 BASIC ACCEPTABLE ERROR= 2.80 CONCENTRATION ERROR INCREMENT= .08
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	95.1	26.00	18.6	25.00	36.7	25.00	31.9	29.00	39.6	31.00	23.9	22.00
L003	95.	24.00	18.	15.00	36.	17.00	30.	11.00	36.	18.00	23.	14.00
L004	94.8	22.00	18.7	26.00	36.5	23.50	31.1	26.00	38.0	18.00	24.1	28.00
L006	85.0 L	4.00	17.1	6.00	33.7	4.00	28.1	4.00	35.2	4.00	21.0	4.00
L007	95.7	28.00	16.1	5.00	34.5	6.00	29.1	6.00	36.6	6.00	21.5	5.00
L009	90.4	6.00	17.7	11.00	35.3	10.50	29.6	8.00	37.7	15.00	22.3	8.00
L010	98.0	31.00	26.0 VH	34.00	37.3	32.00	32.3	33.00	39.0	25.50	24.0	25.00
L011	95.0	24.00	19.0	29.50	37.0	28.00	31.4	28.00	38.0	18.00	24.9	31.00
L013	93.0	13.50	20.4	33.00	36.4	22.00	30.8	17.50	38.1	21.00	23.3	19.50
L014	92.	9.50	18.	15.00	36.	17.00	32.	31.00	38.	18.00	24.	25.00
L019	93.9	17.00	18.4	21.00	36.5	23.50	33.5	34.00	39.0	25.50	23.3	19.50
L021	96.0	29.00	19.0	29.50	37.0	28.00	31.0	22.00	39.5	30.00	23.7	21.00
L022	92.	9.50	19.	29.50	37.	28.00	32.	31.00	40.	32.50	24.	25.00
L023	93.2	16.00	18.4	21.00	36.3	20.50	30.8	17.50	39.2	20.00	24.4	29.50
L024	92.	9.50	18.4	21.00	35.3	10.50	31.0	22.00	37.3	12.50	25.2	32.00
L025	95.5	27.00	18.5	23.50	37.2	31.00	31.3	27.00	39.3	29.00	24.0	25.00
L027	94.	19.50	17.4	7.00	36.	17.00	31.	22.00	38.	18.00	23.	14.00
L029	92.0	9.50	17.7	11.00	35.6	13.00	30.1	13.00	38.3	22.00	26.2 H	33.00
L030	88.7	5.00	18.2	18.50	36.3	20.50	30.2	15.00	37.1	11.00	23.2	18.00
L031	93.	13.50	17.5	8.50	34.9	7.00	29.8	9.00	37.5	14.00	22.4	9.00
L032	93.0	13.50	18.5	23.50	35.5	12.00	30.2	15.00	37.3	12.50	23.0	14.00
L040	74.5 VL	1.00	14.4 L	1.00	30.0 VL	2.50	26.2 VL	3.00	30.4 VL	2.00	20.3 L	3.00
L043	102. H	33.00	17.5	8.50	34.2	5.00	29.5	7.00	36.	5.00	22.2	7.00
L045	94.	19.50	17.7	11.00	35.9	14.00	30.2	15.00	38.5	23.00	22.7	10.00
L046	78. VL	3.00	15. L	2.50	12. VL	1.00	25. VL	1.00	30. VL	1.00	18. VL	1.00
L049	101. H	32.00	15. L	2.50	35.	8.50	30.	11.00	37.	8.50	22.	6.00
L057	94.	19.50	19.	29.50	36.	17.00	31.	22.00	37.	8.50	23.	14.00
L058	93.	13.50	18.	15.00	36.	17.00	31.	22.00	37.	8.50	23.	14.00
L059	110. VH	34.00	370. VH	35.00	62. VH	34.00	56. VH	35.00	60. VH	34.00	45. VH	34.00
L060	76. VL	2.00	16.	4.00	30. VL	2.50	26. VL	2.00	31. VL	3.00	20. L	2.00
L061		0.00	18.0	15.00		0.00	29.0	5.00		0.00		0.00
L062	91.	7.00	18.	15.00	35.	8.50	30.	11.00	37.	8.50	23.	14.00
L063	96.9	30.00	18.2	18.50	37.8	33.00	32.0	31.00	40.0	32.50	24.4	29.50
L064	94.	19.50	19.	29.50	37.	28.00	31.	22.00	39.	25.50	24.	25.00
L066	95.	24.00	19.	29.50	37.	28.00	31.	22.00	39.	25.50	23.	14.00
MEDIAN CONC.	93.950		18.200		36.000		30.800		38.000		23.100	

85/04/25

PARAMETER: 00392 SPECIFIC CONDUCTANCE UMHO/CM

SAMPLE LAB NO	7 REPORTED VALUE	RANK	8 REPORTED VALUE	RANK	9 REPORTED VALUE	RANK	10 REPORTED VALUE	RANK
L002	32.9	29.50	8.0	14.50	174.7	25.00	451.6	30.00
L003	32.	25.00	7.9	8.00	173.	22.50	444.	25.00
L004	30.8	16.00	8.4	29.00	169.	14.50	437.	18.50
L006	29.4	11.00	7.5	4.00	159.0	4.00	394.0 L	3.00
L007	29.1	10.00	6.6	1.00	169.	14.50	450.	27.50
L009	30.2	14.00	8.1	22.50	166.	8.50	429.	7.50
L010	31.5	22.50	8.3	27.50	178.	30.00	455.	31.00
L011	27.9 L	4.00	8.00	14.50	175.0	26.50	435.0	14.50
L013	31.5	22.50	8.0	14.50	172.	20.00	440.	21.50
L014	29.	8.50	8.	14.50	164.	6.00	432.	12.50
L019	32.5	27.50	9.9	33.00	173.	22.50	448.	26.00
L021	32.5	27.50	8.0	14.50	175.0	26.50	450.0	27.50
L022	32.	25.00	9.	32.00	171.	18.00	436.	16.50
L023	32.9	29.50	8.04	21.00	174.	24.00	222. VL	1.00
L024	30.7	15.00	8.2	24.00	176.	28.50	435.	14.50
L025	33.2	33.00	8.3	27.50	>100.	0.00	>100.	0.00
L027	30.	12.50	7.84	7.00	170.	16.50	436.	16.50
L029	28.8	7.00	7.80	5.50	167.	10.50	440.	21.50
L030	28.3 L	5.00	8.28	26.00	165.	7.00	432.	12.50
L031	31.4	20.50	7.4	3.00	172.	20.00	437.	18.50
L032	31.2	18.50	8.0	14.50	172.	20.00	430.	10.00
L040	27.7 L	3.00	6.8	2.00	144.9 VL	3.00	375. VL	2.00
L043	28.6	6.00	7.8	5.50	161.7	5.00	425.	6.00
L045	31.2	18.50	8.22	25.00	166.	8.50	442.	24.00
L046	26. VL	1.50	12.W	0.00	140. VL	1.00	400. L	5.00
L049	23.	8.50	8.	14.50	180.	32.00	460.	33.00
L057	30.	12.50	8.0	14.50	170.	16.50	430.	10.00
L058	41. VH	34.00	8.0	14.50	168.	12.50	438.	20.00
L059	55. VH	35.00	35. VH	34.00	190. VH	33.00	430.	10.00
L060	26. VL	1.50	8.	14.50	142. VL	2.00	398. L	4.00
L061	31.1	17.00	8.0	14.50		0.00		0.00
L062	32.	25.00	8.0	14.50	168.	12.50	429.	7.50
L063	31.4	20.50	8.60	30.00	176.	28.50	451.	29.00
L064	33.	31.50	8.9	31.00	167.	10.50	441.	23.00
L066	33.	31.50	8.1	22.50	179.	31.00	458.	32.00
MEDIAN CONC.	31.200		8.000		170.000		436.000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	257.00	25.700	10			COND-METER
L003	179.50	17.950	10			02041
L004	221.50	22.150	10			02041L
L006	46.00	4.600	10	LL	BIASED LOW	METER
L007	109.00	10.900	10			RADIOMETER
L009	111.00	11.100	10			
L010	291.50	29.150	10	VH	BIASED HIGH	POTENTIOMETRIC
L011	218.00	21.800	10	L		
L013	205.00	20.500	10			
L014	157.00	15.700	10			RADIOMETER
L019	249.50	24.950	10			CONDUCTIVIMETRIE
L021	255.50	25.550	10			COND. METER
L022	247.00	24.700	10			METER
L023	208.00	20.800	10	VL		ELECTROMETRIC
L024	189.50	18.950	10			
L025	223.00	27.875	8		BIASED HIGH	RADIOMETER
L027	150.00	15.000	10			DIGITAL/25C
L029	146.00	14.600	10	H		RADIOMETER
L030	138.50	13.850	10	L		CONDUCT-METER
L031	123.00	12.300	10			
L032	153.50	15.350	10			RADIOMETER COM
L040	22.50	2.250	10	VLL VL VL VLLLVLVL	BIASED LOW	YSI.CONDUCT.METER
L043	88.00	8.800	10	H		
L045	168.50	16.850	10			HACH METER
L046	17.00	1.889	9	VLL VL VL VL VL VL VL L	BIASED LOW	BRIDGE
L049	156.50	15.650	10	HL		METER
L057	164.00	16.400	10			POTENT.
L058	171.00	17.100	10	VH		CONDUCTIVIMETRY
L059	318.00	31.800	10	VHVHVHVHVHVHVHVHVHVH	BIASED HIGH	205
L060	37.50	3.750	10	VLVLVLVLLVLVLL	BIASED LOW	METER
L061	51.50	12.875	4		INSUFFICIENT DATA	BRIDGE/CELL
L062	123.50	12.350	10			
L063	282.50	28.250	10		BIASED HIGH	AUTO
L064	245.50	24.550	10			COND.CELL
L066	260.00	26.000	10			DIP CELL

OVERALL AVERAGE RANK IS 17.557

SPECIFIC CONDUCTANCE

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L046	17.00	1.889	9	VLLVLVLVLVLVLVLL	BIASED LOW	BRIDGE
L040	22.50	2.250	10	VLLVLVLVLLLVLVL	BIASED LOW	VSI.CONDUCT.METER
L060	37.50	3.750	10	VLVLVLVLLVLVLL	BIASED LOW	METER
L006	48.00	4.800	10	LL	BIASED LOW	METER
L043	88.00	8.800	10	H		RADIOMETER
L007	109.00	10.900	10			
L009	111.00	11.100	10			
L031	123.00	12.300	10			
L062	123.50	12.350	10			
L061	51.50	12.875	4		INSUFFICIENT DATA	BRIDGE/CELL
L030	138.50	13.850	10	L		CONDUCT-METER
L029	146.00	14.600	10	H		RADIOMETER
L027	150.00	15.000	10			DIGITAL/25C
L032	153.50	15.350	10			RADIOMETER COM
L049	156.50	15.650	10	HL		METER
L014	157.00	15.700	10			RADIOMETER
L057	164.00	16.400	10			POTENT.
L045	168.50	16.850	10			MACH METER
L058	171.00	17.100	10	VH		CONDUCTIVIMETRY
L003	179.50	17.950	10			02041
L024	189.50	18.950	10			
L013	205.00	20.500	10			
L023	208.00	20.800	10	VL		ELECTROMETRIC
L011	218.00	21.800	10	L		
L004	221.50	22.150	10			02041L
L064	245.50	24.550	10			COND.CELL
L022	247.00	24.700	10			METER
L019	249.50	24.950	10			CONDUCTIVIMETRIE
L021	255.50	25.550	10			COND. METER
L002	257.00	25.700	10			COND-METER
L066	260.00	26.000	10			DIP CELL
L025	223.00	27.875	8		BIASED HIGH	RADIOMETER
L063	282.50	28.250	10		BIASED HIGH	AUTO
L010	291.50	29.150	10	VH	BIASED HIGH	POTENTIOMETRIC
L059	318.00	31.800	10	VHVHVHVHVHVHVHVHVH	BIASED HIGH	205

OVERALL AVERAGE RANK IS 17.557

SPECIFIC CONDUCTANCE

85/04/25

PARAMETER: 00292 COLOUR HAZEN UNIT

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 5.00 BASIC ACCEPTABLE ERROR= 3.00 CONCENTRATION ERROR INCREMENT= .20
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	<5.	0.00	<5.	0.00	>100.	0.00	<5.	0.00	<5. VL	1.00	50. VL	2.50
L003	L5.	0.00	L5.	0.00	140.	8.50	<5.	0.00	5. VL	3.00	100. H	15.50
L004	2.	2.50	2.	6.00	159.	13.00	5.	8.50	16.	13.00	89.	13.00
L011	<5.	0.00	<5.	0.00	120.0	3.50	>5.	0.00	5. VL	3.00	90.	14.00
L022	2.	2.50	.9T	3.00	90. VL	1.00	1.T	3.50	13.	11.00	49. VL	1.00
L023	5.W	0.00	5.W	0.00	>50.	0.00	5.W	0.00	10.	5.50	>50.	0.00
L027	3.0	8.00	.5W	1.50	157.	12.00	.5W	1.50	16.5	14.00	80.5	11.00
L030	2.5	6.00	.5W	1.50	146.	11.00	.5W	1.50	15.0	12.00	71.5	7.00
L031	2.	2.50	1.W	0.00	102. L	2.00	1.	3.50	11.	7.50	50. VL	2.50
L045	2.5	6.00	2.5	7.00	125.	6.00	<2.5	0.00	12.5	9.50	70.	5.50
L049	5.	10.00	5. H	8.00	140.	8.50	5.	8.50	10.	5.50	100. H	15.50
L051	2.50	6.00	<2.50	0.00	125.	6.00	<2.50	0.00	12.50	9.50	65.00	4.00
L054	5.W	0.00	5.W	0.00	160.	14.00	5.	8.50	5. VL	3.00	80.	9.50
L057	5.	10.00	5.W	0.00	145.	10.00	5.W	0.00	17.	15.00	85.	12.00
L058	5.W	0.00	5.W	0.00	120.	3.50	5.	8.50	18. H	16.00	70.	5.50
L062	5.	10.00	1.	4.50	170.	15.00	3.	6.00	22. VH	17.00	75.	8.00
L063	2.	2.50	1.	4.50	125.	6.00	2.	5.00	11.	7.50	80.	9.50
MEDIAN CONC.	2.500		1.000		140.000		2.500		12.500		77.500	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
L003	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
L004	5.	9.00	2.	6.00	1.	1.00	0.	1.00
L011	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
L022	5.	9.00	.9T	3.00	4.	8.50	.9T	2.00
L023	5.W	0.00	5.W	0.00		0.00	5.W	0.00
L027	5.0	9.00	.5W	1.50	4.0	8.50	.5W	0.00
L030	4.5	6.00	.5W	1.50	3.5	7.00	.5W	0.00
L031	4.	4.50	1.W	0.00	2.	2.00	1.W	0.00
L045	2.5	1.50	<2.5	0.00	2.5	3.50	2.5	4.00
L049	5.	9.00	5. H	7.00	5.	10.50	5.	5.00
L051	2.50	1.50	<2.5	0.00	2.50	3.50	<2.5	0.00
L054	10. VH	13.00	5.W	0.00	5.W	0.00	5.W	0.00
L057	7.	12.00	5.W	0.00	5.	10.50	5.W	0.00
L058	5.	9.00	5.W	0.00	5.W	0.00	5.W	0.00
L062	4.	4.50	1.	4.50	3.	5.50	2.	3.00
L063	3.	3.00	1.	4.50	3.	5.50	1.W	0.00
MEDIAN CONC.	5.000		1.000		3.000		2.000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	3.50	1.750	2	VLVL	INSUFFICIENT DATA	COLOR-COMP
L003	27.00	9.000	3	VLH	INSUFFICIENT DATA	02011
L004	73.00	7.300	10			APPARENT
L011	20.50	6.833	3	VL	INSUFFICIENT DATA	
L022	44.50	4.450	10	VLVL	BIASED LOW	COLORIMETRIC-PT-CO
L023	5.50	5.500	1		INSUFFICIENT DATA	VISUAL
L027	67.00	7.444	9			AUTO TRUE COLOUR
L030	53.50	5.944	9			COLORIMETRIC
L031	24.50	3.500	7	LVL	BIASED LOW	TECHNICON 400
L045	43.00	5.375	8			VISUAL COMP
L049	87.50	8.750	10	HHH		DISC
L051	30.50	5.083	6			
L054	48.00	9.600	5	VLVH		VISUAL COMP.
L057	69.50	11.583	6		BIASED HIGH	VISUAL
L058	42.50	8.500	5	H		VISUAL COMP.
L062	78.00	7.800	10	VH		
L063	48.00	5.333	9			HELLIGE

OVERALL AVERAGE RANK IS 6.779

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	3.50	1.750	2	VLVL	INSUFFICIENT DATA	COLOR-COMP
L031	24.50	3.500	7	LVL	BIASED LOW	TECHNICON 400
L022	44.50	4.450	10	VLVL	BIASED LOW	COLORIMETRIC-PT-CO
L051	30.50	5.083	6			
L063	48.00	5.333	9			HELLIGE
L045	43.00	5.375	8			VISUAL COMP
L023	5.50	5.500	1		INSUFFICIENT DATA	VISUAL
L030	53.50	5.944	9			COLORIMETRIC
L011	20.50	6.833	3	VL	INSUFFICIENT DATA	
L004	73.00	7.300	10			APPARENT
L027	67.00	7.444	9			AUTO TRUE COLOUR
L062	78.00	7.800	10	VH		
L058	42.50	8.500	5	H		VISUAL COMP.
L049	87.50	8.750	10	HHH		DISC
L003	27.00	9.000	3	VLH	INSUFFICIENT DATA	02011
L054	48.00	9.600	5	VLVH		VISUAL COMP.
L057	69.50	11.583	6		BIASED HIGH	VISUAL

OVERALL AVERAGE RANK IS 6.779

COLOUR

85/04/25

PARAMETER: 14092 REACTIVE SILICA MG SI/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .10 BASIC ACCEPTABLE ERROR= .05 CONCENTRATION ERROR INCREMENT= .08
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	1.05	5.00	.19 VH	5.00	1.06	3.00	.257	10.00	2.29	3.00	.075	13.00
L003	1.2	14.50	L.10	0.00	1.26 H	18.00	.32 H	17.00	2.66 H	18.00	.047	5.00
L006	1.10	7.50		0.00	1.12	10.00	.218	6.00	2.48	14.00	.036	2.50
L010	1.3 H	18.00	.1W	0.00	1.2	16.50	.3	15.50	2.6	17.00	.3 VH	17.00
L014	1.13	13.00	<.01	0.00	1.17	14.50	.26	11.50	2.46	13.00	.05	7.50
L020	1.1	7.50	.05W	0.00	1.1	6.50	.2	3.50	2.4	9.50	.05W	0.00
L022	.7 VL	1.00	.01T	2.50	.7 VL	1.00	.19T L	1.00	1.5 VL	1.00	.17T VH	16.00
L023	1.0	2.50	.1W	0.00	1.1	6.50	.2	3.50	2.3	4.50	.1W	0.00
L024	1.0	2.50	.01W	0.00	1.1	6.50	.2	3.50	2.2	2.00	.04T	4.00
L027	1.04	4.00	.01T	2.50	.99	2.00	.27	13.50	2.36	7.00	.06T	10.00
L029	2.52 VH	19.00	.002W	0.00	2.54 VH	19.00	.57 VH	18.00	5.43 VH	19.00	.13 VH	15.00
L031	1.12	11.50	.02W	0.00	1.17	14.50	.26	11.50	2.62	16.00	.07	11.50
L032	1.21	16.00	-.08T VL	1.00	1.12	10.00	.22T	7.00	2.43	11.50	-.02T L	1.00
L045	1.1	7.50	0.0W	0.00	1.1	6.50	.3	15.50	2.3	4.50	.1T	14.00
L046	1.10	7.50	.01W	0.00	1.12	10.00	.25	8.00	2.40	9.50	.05	7.50
L048	1.12	11.50	.01W	0.00	1.14	13.00	.27	13.50	2.43	11.50	.05	7.50
L060	1.22	17.00	.05W	0.00	1.08	4.00	.20	3.50	2.38	8.00	.07	11.50
L062	1.2	14.50	.05T	4.00	1.2	16.50	1.2 VH	19.00	2.5	15.00	.05T	7.50
L063	1.106	10.00	.004W	0.00	1.128	12.00	.251	9.00	2.335	6.00	.036	2.50
MEDIAN CONC.	1.106		.010		1.120		.257		2.400		.050	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.103	15.00	.061	14.00	.537	8.00	.019	4.00
L003	.093	12.00	.047	8.00	.607	17.00	L.10	0.00
L006	.067	6.00	.030	4.00	.508	6.00	.0014	2.00
L010	.1W	0.00	.1W	0.00	.7 VH	18.00	.1W	0.00
L014	.10	13.50	.05	11.00	.57	13.50	<.01	0.00
L020	.05T	2.50	.05T	11.00	.5	4.00	.05W	0.00
L022	.06T	4.50	.02T	2.50	.3 VL	1.00	.01T	3.00
L023	.1W	0.00	.1W	0.00	.5	4.00	.1W	0.00
L024	.06T	4.50	.02T	2.50	.5	4.00	.01W	0.00
L027	.09	9.50	.04T	5.50	.49	2.00	.01W	0.00
L029	.20 VH	17.00	.09	16.00	1.28 VH	19.00	.002W	0.00
L031	.09	9.50	.05	11.00	.56	11.00	.02	5.00
L032	-.02T VL	1.00	-.05T VL	1.00	.51	7.00	-.08T VL	1.00
L045	.1T	13.50	.05T	11.00	.6	15.50	0.0W	0.00
L046	.09	9.50	.04	5.50	.55	9.00	.01W	0.00
L048	.09	9.50	.07	15.00	.57	13.50	.01W	0.00
L060	.11	16.00	.05W	0.00	.56	11.00	.05W	0.00
L062	.05T	2.50	.05T	11.00	.6	15.50	.05T	6.00
L063	.084	7.00	.041	7.00	.560	11.00	.001W	0.00
MEDIAN CONC.	.090		.049		.560		.015	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	80.00	8.000	10	VH		COLORAMM.MOLY
L003	109.50	13.688	8	HHH		14102
L006	58.00	6.444	9			AUTOANALYZER
L010	102.00	17.000	6	HVHVH	BIASED HIGH	ICAP
L014	97.50	12.188	8			AUTOANALYZER
L020	44.50	6.357	7			AUTO-COL-METR-BLUE
L022	33.50	3.350	10	VLVLLVLVHVL	BIASED LOW	COLORIMETRIC
L023	21.00	4.200	5			MOLYBDOSILICATE
L024	23.50	3.688	8		BIASED LOW	
L027	56.00	6.222	9			METEROPOLY BLUE
L029	142.00	17.750	8	VHVHVHVHVHVHVH	BIASED HIGH	AUTOMATED ASCORBIC
L031	101.50	11.278	9			COLOURMETRIC
L032	56.50	5.650	10	VLLVLVLVL		TECHNICON AAII
L045	88.00	11.000	8			AUTOMATED ASBORBIC
L046	66.50	8.313	8			TECHNICON
L048	95.00	11.875	8			TECHNICON
L060	71.00	10.143	7			COLOURIMETRIC
L062	111.50	11.150	10	VH		TECHNICON
L063	64.50	8.063	8			AUTO M004

OVERALL AVERAGE RANK IS 9.154

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L022	33.50	3.350	10	VLVLLVLVHVL	BIASED LOW	COLORIMETRIC
L024	23.50	3.688	8		BIASED LOW	
L023	21.00	4.200	5			MOLYBDOSILICATE
L032	56.50	5.650	10	VLLVLVLVL		TECHNICON AAII
L027	56.00	6.222	9			METEROPOLY BLUE
L020	44.50	6.357	7			AUTO-COL-METR-BLUE
L006	58.00	6.444	9			AUTOANALYZER
L002	80.00	8.000	10	VH		COLORAMM.MOLY
L063	64.50	8.063	8			AUTO M004
L046	66.50	8.313	8			TECHNICON
L060	71.00	10.143	7			COLOURIMETRIC
L045	88.00	11.000	8			AUTOMATED ASBORBIC
L062	111.50	11.150	10	VH		TECHNICON
L031	101.50	11.278	9			COLOURMETRIC
L048	95.00	11.875	8			TECHNICON
L014	97.50	12.188	8			AUTOANALYZER
L003	109.50	13.688	8	HHH		14102
L010	102.00	17.000	6	HVHVH	BIASED HIGH	ICAP
L029	142.00	17.750	8	VHVHVHVHVHVHVH	BIASED HIGH	AUTOMATED ASCORBIC

OVERALL AVERAGE RANK IS 9.154

85/04/25

PARAMETER: 07092 NITRATE + NITRITE MG N/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .50 BASIC ACCEPTABLE ERROR= .05 CONCENTRATION ERROR INCREMENT= .20
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L002	.385	19.50	.102	13.00	.020	17.00	1.01	14.50	.086	27.00	.106	24.00
L002B	.390	22.50	.110	23.00		0.00	1.03	21.50	.08	22.00	.110	27.00
L003	.40	27.00	.11	23.00	.005T	1.00	1.0	11.50	.08	22.00	.07	5.50
L004	.38	17.00	.10	9.00	.02	17.00	1.01	14.50	.07	10.00	.08	12.50
L006	.405	30.00	.119	29.00	.0219	24.00	1.11	34.00	.0967	32.00	.115	30.00
L007	.45 H	33.00	.07	1.00	.01	2.50	1.04	23.00	.05	1.00	.08	12.50
L009	.37	10.50	.10	9.00	.02	17.00	1.02	18.00	.08	22.00	.09	18.00
L010	.41	31.00	.13	34.50	.02	17.00	1.1	31.50	.08	22.00	.08	12.50
L011	.48 VH	35.00	.11	23.00	.05H	0.00	1.27 VH	36.00	.06	3.00	.05	1.50
L013	.36	6.50	.11	23.00	.02	17.00	1.02	18.00	.07	10.00	.08	12.50
L014	.375	14.50	.101	12.00	.018	8.00	.990	8.00	.072	15.00	.100	22.00
L019	.39	22.50	.12	31.50	.02	17.00	1.10	31.50	.08	22.00	.13	33.00
L020	.40	27.00	.12	31.50	.02	17.00		0.00		0.00		0.00
L021	.39	22.50	.12	31.50	.02	17.00	1.06	26.50	.08	22.00	.11	27.00
L022	.30 VL	2.00	.11	23.00	.02	17.00	.81 L	1.00	.06	3.00	.09	18.00
L023	.40	27.00	.11	23.00	.02	17.00	1.10	31.50	.08	22.00	.12	31.50
L024	.39	22.50	.11	23.00	.03	26.50	1.1	31.50	.09	29.50	.11	27.00
L027	.380	17.00	.100	9.00	.015	4.50	1.030	21.50	.060	3.00	.080	12.50
L029	.374	13.00	.104	15.00	.019	10.00	.992	9.00	.076	16.00	.089	16.00
L030	.375	14.50	.110	23.00	.020	17.00	1.061	28.00	.080	22.00	.074	7.50
L031	.360	6.50	.095	5.00	.015	4.50	1.00	11.50	.070	10.00	.090	18.00
L031B		0.00		0.00		0.00	1.09	29.00		0.00		0.00
L032	.40	27.00	.11	23.00	.02	17.00	1.00	11.50	.08	22.00	.07	5.50
L045	.37	10.50	.10	9.00	.02	17.00	.90	3.00	.07	10.00	.06	3.50
L046	.35	4.00	.104	15.00	.018	8.00	.84 L	2.00	.067	6.00	.076	9.00
L048	.37	10.50	.097	6.00	.018	8.00	.95	5.00	.071	14.00	.060	3.50
L049	.29 VL	1.00	.09	3.00	.03	26.50	.96	6.00	.07	10.00	.11	27.00
L050	.452 H	34.00		0.00		0.00	1.14	35.00		0.00		0.00
L051	.37	10.50	.10	9.00	<.05	0.00	1.02	18.00	.09	29.50	.08	12.50
L053	.364	8.00	.104	15.00	.026	25.00	1.05	24.50	.070	10.00	.074	7.50
L058	.40	27.00	.13	34.50	.05H	0.00	1.02	18.00	.09T	29.50	.10	22.00
L059	2.3 VH	36.00	2.1 VH	36.00	.1H	0.00	6.2 VH	37.00	1.7 VH	34.00	.1H	0.00
L060	.38	17.00	.11	23.00	.05H	0.00	1.05	24.50	.09	29.50	.12	31.50
L061		0.00	.11	23.00		0.00	1.02	18.00		0.00		0.00
L062	.35	4.00	.09	3.00	.01T	2.50	.94	4.00	.07	10.00	.10	22.00
L063	.35	4.00	.09	3.00	.01H	0.00	.97	7.00	.061	5.00	.05	1.50
L064	.42	32.00	.12	31.50	.23 VH	28.00	1.0	11.50	.10	33.00	.11	27.00
L066	.385	19.50	.106	17.00	.016	6.00	1.06	26.50	.077	17.00	.092	20.00
MEDIAN CONC.	.383		.110		.020		1.020		.079		.090	

PARAMETER: 07092 NITRATE + NITRITE MG N/L

85/04/25

SAMPLE LAB NO	7 REPORTED VALUE	7 RANK	8 REPORTED VALUE	8 RANK	9 REPORTED VALUE	9 RANK	10 REPORTED VALUE	10 RANK
L002	.245	13.00	.014	23.00	.053	15.00	.030	12.00
L002B	.236	5.00	<.01	0.00		0.00		0.00
L003	.26	27.00	.02	27.00	.06	24.00	.05	26.50
L004	.25	17.00		0.00	.05	9.00	.03	12.00
L006	.272	34.00	.0144	24.00	.0619	28.00	.0376	23.00
L007	.25	17.00	.01	11.00	.02	1.50	.02	4.50
L009	.24	8.50	.01	11.00		0.00		0.00
L010	.26	27.00	.01	11.00	.06	24.00	.03	12.00
L011	.25	17.00	.05W	0.00	.05W	0.00	.05W	0.00
L013	.24	8.50	.01	11.00	.06	24.00	.03	12.00
L014	.252	21.00	.009	2.50	.055	18.50	.072	28.00
L019	.27	32.50	.01	11.00	.06	24.00	.02	4.50
L020		0.00		0.00		0.00		0.00
L021	.26	27.00	.009	2.50	.06	24.00	.03	12.00
L022	.26	27.00	.01	11.00	.05	9.00	.02	4.50
L023	.25	17.00	.01	11.00	.05	9.00	.03	12.00
L024	.25	17.00	.02	27.00	.06	24.00	.04	24.50
L027	.220	2.00	.005W	1.00	.020	1.50	.005W	1.00
L029	.241	12.00	.012	21.50	.054	16.50	.032	19.50
L030	.266	31.00	.010	11.00	.054	16.50	.030	12.00
L031	.235	4.00	.010	11.00	.045	4.00	.030	12.00
L031B		0.00		0.00		0.00		0.00
L032	.25	17.00	.01	11.00	.05	9.00	.04	24.50
L045	.24	8.50	.01	11.00	.05	9.00	.03	12.00
L046	.24	8.50	.011	19.50	.051	14.00	.031	18.00
L048	.23	3.00	.010	11.00	.050	9.00	.030	12.00
L049	.24	8.50	.01	11.00	.05	9.00	.02	4.50
L050	.3116 H	35.00		0.00		0.00		0.00
L051	.24	8.50	<.05	0.00	.06	24.00	<.05	0.00
L053	.253	22.00	.011	19.50	.055	18.50	.034	21.00
L058	.26	27.00	.05	29.00	.05	9.00	.05	26.50
L059	1.4 VH	36.00	.6 VH	30.00	2.2 VH	30.00	1.9 VH	29.00
L060	.26	27.00	.05W	0.00	.05W	0.00	.05W	0.00
L061	.26	27.00	.02	27.00		0.00		0.00
L062	.21	1.00	.01T	11.00	.05	9.00	.01T	2.00
L063	.25	17.00	.01	11.00	.04	3.00	.03	12.00
L064	.27	32.50	.015	25.00	.08	29.00	.032	19.50
L066	.254	23.00	.012	21.50	.058	20.00	.035	22.00
MEDIAN CONC.	.250		.010		.054		.030	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L002	178.00	17.800	10			COLORI-CD RED
L002B	121.00	20.167	6			DIONEX-IC
L003	194.50	19.450	10			07110
L004	118.00	13.111	9			07112L
L006	288.00	28.800	10		BIASED HIGH	AUTOANALYZER
L007	107.00	10.700	10	H		IC
L009	114.00	14.250	8			IC
L010	222.50	22.250	10			TECHNICON
L011	115.50	19.250	6	VHVH		
L013	142.50	14.250	10			IC
L014	149.50	14.950	10			AUTOANALYZER
L019	229.50	22.950	10			IC
L020	75.50	25.167	3		INSUFFICIENT DATA	IC
L021	212.00	21.200	10			IC
L022	115.50	11.550	10	VLL		AUTO CD-RED
L023	201.00	20.100	10			CADMIUM REDUCTION
L024	252.50	25.250	10			
L027	73.00	7.300	10		BIASED LOW	HYDRAZINE/AZO DYE
L029	148.50	14.850	10			CD. REDUCTION
L030	182.50	18.250	10			COLORIMETRIC
L031	86.50	8.650	10		BIASED LOW	COLOURMETRIC
L031B	29.00	29.000	1		INSUFFICIENT DATA	ION EXCHANGE
L032	167.50	16.750	10			TECHNICON AAII
L045	93.50	9.350	10			AUTOMATED CD REDUC
L046	104.00	10.400	10	L		TECHNICON
L048	82.00	8.200	10		BIASED LOW	TECHNICON
L049	106.50	10.650	10	VL		AA HYDRAZINE/CUSO4
L050	104.00	34.667	3	HH	INSUFFICIENT DATA	IC
L051	112.00	16.000	7			
L053	171.00	17.100	10			CD REDUCTION
L058	222.50	24.722	9			IC
L059	268.00	33.500	8	VHVHVHVHVHVHVHVH	BIASED HIGH	418-A
L060	152.50	25.417	6			IC
L061	95.00	23.750	4		INSUFFICIENT DATA	AAII
L062	68.50	6.850	10		BIASED LOW	HYDRAZINE REDUCT
L063	63.50	7.056	9		BIASED LOW	AUTO-CD-RED
L064	269.00	26.900	10	VH	BIASED HIGH	IC
L066	192.50	19.250	10			IC

OVERALL AVERAGE RANK IS 17.106

NITRATE + NITRITE

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L062	68.50	6.850	10		BIASED LOW	HYDRAZINE REDUCT
L063	63.50	7.056	9		BIASED LOW	AUTO-CD-RED
L027	73.00	7.300	10		BIASED LOW	HYDRAZINE/AZO DYE
L048	82.00	8.200	10		BIASED LOW	TECHNICON
L031	86.50	8.650	10		BIASED LOW	COLOURMETRIC
L045	93.50	9.350	10			AUTOMATED CD REDUC
L046	104.00	10.400	10	L		TECHNICON
L049	106.50	10.650	10	VL		AA HYDRAZINE/CUSO4
L007	107.00	10.700	10	H		IC
L022	115.50	11.550	10	VLL		AUTO CD-RED
L004	118.00	13.111	9			07112L
L013	142.50	14.250	10			IC
L009	114.00	14.250	8			IC
L029	148.50	14.850	10			CD. REDUCTION
L014	149.50	14.950	10			AUTOANALYZER
L051	112.00	16.000	7			
L032	167.50	16.750	10			TECHNICON AAII
L053	171.00	17.100	10			CD REDUCTION
L002	178.00	17.800	10			COLORI-CD RED
L030	182.50	18.250	10			COLORIMETRIC
L011	115.50	19.250	6	VHVH		
L066	192.50	19.250	10			IC
L003	194.50	19.450	10			07110
L023	201.00	20.100	10			CADMIUM REDUCTION
L002B	121.00	20.167	6			DIONEX-IC
L021	212.00	21.200	10			IC
L010	222.50	22.250	10			TECHNICON
L019	229.50	22.950	10			IC
L061	95.00	23.750	4		INSUFFICIENT DATA	AAII
L058	222.50	24.722	9			IC
L020	75.50	25.167	3		INSUFFICIENT DATA	IC
L024	252.50	25.250	10			
L060	152.50	25.417	6			IC
L064	269.00	26.900	10	VH	BIASED HIGH	IC
L006	288.00	28.800	10		BIASED HIGH	AUTOANALYZER
L031B	29.00	29.000	1		INSUFFICIENT DATA	ION EXCHANGE
L059	268.00	33.500	8	VHVHVHVHVHVHVHVH	BIASED HIGH	418-A
L050	104.00	34.667	3	HH	INSUFFICIENT DATA	IC

OVERALL AVERAGE RANK IS 17.106

85/04/25

PARAMETER: D9092 FLUORIDE MG/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .50 BASIC ACCEPTABLE ERROR= .10 CONCENTRATION ERROR INCREMENT= .10
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L003	.03W	0.00	.14	5.50	.04W	0.00	.11	5.00	.05	5.50	.03W	1.00
L010	.05T	6.00	.11	2.50	.05T	6.50	.09	1.50	.05T	5.50	.05T	7.50
L020	.06	7.00	.15	11.00	.05	6.50	.12	9.50	.06	8.50	.05	7.50
L022	.15	11.00	.22	15.00	.10	11.00	.15	14.00	.10	12.00	.08	11.00
L023	.1W	0.00	.13	4.00	.1W	0.00	.10	3.00	.1W	0.00	.1W	0.00
L024	.1W	0.00	.15	11.00	.1W	0.00	.11	5.00	.1W	0.00	.1W	0.00
L029	.16	12.00	.15	11.00	.11	12.00	.20	15.00	.07	10.50	.14	12.00
L031	.04	5.00	.14	5.50	.06	8.50	.12	9.50	.04	3.00	.05	7.50
L032	.083T	9.00	.147	8.00	.060T	8.50	.110	5.00	.057T	7.00	.049T	5.00
L042	.76 VH	14.00	.67 VH	17.00	.31 VH	14.00	.41 VH	17.00	.31 VH	15.00	.3W	0.00
L043	.26 VH	13.00	.38 VH	16.00	.28 VH	13.00	.35 VH	16.00	.30 VH	14.00	.28 VH	14.00
L045	.02T	2.00	.11	2.50	.02T	2.00	.09	1.50	.04	3.00	.04	4.00
L049	.01W	1.00	.18	14.00	.01	1.00	.14	12.50	.06	8.50	.05	7.50
L058	.03	3.00	.15	11.00	.03	3.50	.12	9.50	.04	3.00	.03	2.00
L060	.08	8.00	.05	1.00	.08	10.00	.14	12.50	.16	13.00	.26 VH	13.00
L062	.09	10.00	.15	11.00	.04	5.00	.12	9.50	.07	10.50	.06	10.00
L063	.032	4.00	.141	7.00	.030	3.50	.111	7.00	.039	1.00	.039	3.00
MEDIAN CONC.	.070		.150		.055		.120		.060		.050	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L003	.03W	0.00	.02W	0.00	.06	2.50	.03W	0.00
L010	.05T	6.50	.05T	6.00	.05T	1.00	.05T	4.00
L020	.04W	0.00	.04W	0.00	.08	7.50	.04W	0.00
L022	.05	6.50	.04	4.50	.08	7.50	.04	3.00
L023	.1W	0.00	.1W	0.00	.1W	0.00	.1W	0.00
L024	.1W	0.00	.1W	0.00	.1W	0.00	.1W	0.00
L029	.03	4.00	.04	4.50	.17	11.00	.14	6.50
L031	.04W	0.00	.04W	0.00	.13	10.00	.07	5.00
L032	.031T	5.00	.024T	3.00	.070T	5.50	.026T	2.00
L042	.3W	0.00	.3W	0.00	.3W	0.00	.3W	0.00
L043	.23 VH	9.00	.25 VH	8.00	.30 VH	12.00	.22 H	8.00
L045	0.00W	0.00	0.00W	0.00	.07	5.50	0.00W	0.00
L049	.07	8.00	.01W	0.00	.09	9.00	.01W	0.00
L058	.02T	3.00	.01W	0.00	.06	2.50	.01W	0.00
L060	.28 VH	10.00	.20 VH	7.00	.87 VH	14.00	.14	6.50
L062	.01	2.00	.01T	2.00	.42 VH	13.00	7.2 VH	9.00
L063	.009	1.00	.004	1.00	.068	4.00	.004	1.00
MEDIAN CONC.	.041		.040		.080		.070	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L003	19.50	3.900	5		INSUFFICIENT DATA	09105
L010	47.00	4.700	10			SPECIFIC ION ELECT
L020	57.50	8.214	7			SPEC. ION
L022	95.50	9.550	10			ISE
L023	7.00	3.500	2		INSUFFICIENT DATA	ELECTRODE
L024	16.00	8.000	2		INSUFFICIENT DATA	
L029	98.50	9.850	10			IC
L031	54.00	6.750	8			TECHNICON
L032	58.00	5.800	10			SPEC.ION.ELECTR.
L042	77.00	15.400	5	VHVHVHVHVH	BIASED HIGH	
L043	123.00	12.300	10	VHVHVHVHVHVHVHVHVHH	BIASED HIGH	
L045	20.50	2.929	7		BIASED LOW	SPANDS
L049	61.50	7.688	8			S.I. ELECTRODE
L058	37.50	4.688	8			SELECTIVE ELECTROD
L060	95.00	9.500	10	VHVHVHVH		IC
L062	82.00	8.200	10	VHVH		
L063	32.50	3.250	10		BIASED LOW	ISE

OVERALL AVERAGE RANK IS 7.439

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L045	20.50	2.929	7		BIASED LOW	SPANDS
L063	32.50	3.250	10		BIASED LOW	ISE
L023	7.00	3.500	2		INSUFFICIENT DATA	ELECTRODE
L003	19.50	3.900	5		INSUFFICIENT DATA	09105
L058	37.50	4.688	8			SELECTIVE ELECTROD
L010	47.00	4.700	10			SPECIFIC ION ELECT
L032	58.00	5.800	10			SPEC.ION.ELECTR.
L031	54.00	6.750	8			TECHNICON
L049	61.50	7.688	8			S.I. ELECTRODE
L024	16.00	8.000	2		INSUFFICIENT DATA	
L062	82.00	8.200	10	VHVH		
L020	57.50	8.214	7			SPEC. ION
L060	95.00	9.500	10	VHVHVHVH		IC
L022	95.50	9.550	10			ISE
L029	98.50	9.850	10			IC
L043	123.00	12.300	10	VHVHVHVHVHVHVHVHVHH	BIASED HIGH	
L042	77.00	15.400	5	VHVHVHVHVH	BIASED HIGH	

OVERALL AVERAGE RANK IS 7.439

85/04/25

PARAMETER: 06002 DISOLVED ORG CARBON MG C/L

QUALITY ASSURANCE AND METHODS SECTION
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

LRTAP INTERLAB STUDY NO.8--MAJOR IONS IN WATER

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 3.00 BASIC ACCEPTABLE ERROR= .75 CONCENTRATION ERROR INCREMENT= .20
LABORATORIES YET TO REPORT: L005,L017,L033,L052 AND L055
LABORATORY RESULTS OMITTED ARE NONE

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L014	1.32	5.00	1.68	4.00	11.88	9.00	.60	5.00	5.04	10.00	9.72	7.00
L020	1.0W	0.00	2.0	8.00	13.0	13.00	2.0 H	15.00	2.4 VL	2.00	10.	10.00
L022	6. VH	14.00	1.T L	2.00	10.	3.00	0.W	0.00	5.	8.50	8.	2.00
L023	2.5 H	11.00	2.0	8.00	14.0	14.00	1.0	10.00	8.5 VH	16.00	11.5	14.00
L027	.380 VL	1.00	.100 VL	1.00	.015 VL	1.00	1.030	12.00	.060 VL	1.00	.080 VL	1.00
L029	5.5 VH	13.00	3.7 VH	16.00	15.5 H	16.00	1.6	13.00	7.4 VH	15.00	14.7 VH	16.00
L031	1.0	2.00	1.6	3.00	10.8	4.50	.4	2.00	4.8	5.50	9.4	5.00
L032	5.41 VH	12.00	3.07 H	13.00	12.6	12.00	.66	7.00	5.99	13.00	10.4	12.00
L043	2.00	10.00	3.17 VH	14.00	12.17	11.00	1.67 H	14.00	6.00	14.00	10.67	13.00
L045	1.2	4.00	2.0	8.00	11.1	7.00	1.0	10.00	5.0	8.50	9.2	4.00
L048	1.8	9.00	2.1	11.00	10.8	4.50	.6	5.00	4.4	3.00	9.5	6.00
L049	1.1	3.00	1.8	5.50	9.9	2.00	.3	1.00	4.6	4.00	8.6	3.00
L051	1.60	7.50	3.50 VH	15.00	12.00	10.00	.60	5.00	4.80	5.50	10.00	10.00
L058	1.W	0.00	1.8	5.50	15.3 H	15.00	1.0	10.00	5.6	12.00	12.2 H	15.00
L062	1.6	7.50	2.2	12.00	11.	6.00	.9	8.00	5.3	11.00	10.	10.00
L063	1.371	6.00	2.011	10.00	11.85	8.00	.572	3.00	4.872	7.00	9.939	8.00
MEDIAN CONC.	1.600		2.000		11.865		.900		5.000		9.970	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
L014	1.232	5.00	<.12	0.00	1.44	5.00	<.12	0.00
L020	2.0	13.50	1.0	8.50	1.0	2.00	1.0	8.00
L022	-1.T VL	1.00	-2.T VL	1.00	3. VH	12.50	-2.T VL	1.00
L023	2.0	13.50	1.5 H	11.00	3.5 VH	15.00	1.0W	0.00
L027	.220 VL	2.00	.005W	0.00	.020 VL	1.00	.005W	0.00
L029	2.4 H	16.00	1.0	8.50	3.7 VH	16.00	1.0	8.00
L031	1.0	4.00	.1W	0.00	1.4	3.50	.1W	0.00
L032	1.54	9.00	.18T	3.00	2.02	10.00	.38T	4.00
L043	1.65	11.00	.67	7.00	3.33 VH	14.00	1.33	10.00
L045	1.5	8.00	.6	6.00	1.8	9.00	.6	6.00
L048	1.3	6.00	1.1	10.00	1.4	3.50	1.0	8.00
L049	.9	3.00	.07T	2.00	1.5	6.50	.1	2.00
L051	2.20	15.00	<.5	0.00	3.00 VH	12.50	1.50 H	11.00
L058	1.8	12.00	1.W	0.00	1.5	6.50	1.W	0.00
L062	1.6	10.00	.5	5.00	2.1	11.00	.3	3.00
L063	1.405	7.00	.434	4.00	1.666	8.00	.403	5.00
MEDIAN CONC.	1.520		.600		1.733		.600	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L014	50.00	6.250	8			T.O.C.A
L020	80.00	8.889	9	HVL		CO2-IR COMBUST
L022	45.00	5.000	9	VHLVLVLVHVL		CARBON ANALYZER
L023	112.50	12.500	9	HVHHVH	BIASED HIGH	UV/PHENOLPHTHALEIN
L027	20.00	2.500	8	VLVLVLVLVLVLVL	BIASED LOW	COMBUSTION I.R.
L029	137.50	13.750	10	VHVHHVHVHHVH	BIASED HIGH	CONDUCTIVIMETRIC
L031	29.50	3.688	8		BIASED LOW	UV PERSULFATE IR
L032	95.00	9.500	10	VHH		
L043	118.00	11.800	10	VHHVH		
L045	70.50	7.050	10			AUTOMATED-UV
L048	66.00	6.600	10			AA-PERSULPHATE
L049	32.00	3.200	10		BIASED LOW	TOC
L051	91.50	10.167	9	VHVHH		COMBUSTION + IR
L058	76.00	10.857	7	HH		
L062	83.50	8.350	10			UV-PER-OXIDE
L063	66.00	6.600	10			

OVERALL AVERAGE RANK IS 7.980

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.OF SAMPLES RANKED	SUMMARY OF FLAGGING		METHOD CODING
L027	20.00	2.500	8	VLVLVLVLVLVLVL	BIASED LOW	UV/PHENOLPHTHALEIN
L049	32.00	3.200	10		BIASED LOW	AA-PERSULPHATE
L031	29.50	3.688	8		BIASED LOW	CONDUCTIVIMETRIC
L022	45.00	5.000	9	VHLVLVLVHVL		CO2-IR COMBUST
L014	50.00	6.250	8			
L048	66.00	6.600	10			AUTOMATED-UV
L063	66.00	6.600	10			UV-PER-OXIDE
L045	70.50	7.050	10			
L062	83.50	8.350	10			
L020	80.00	8.889	9	HVL		T.O.C.A
L032	95.00	9.500	10	VHH		UV PERSULFATE IR
L051	91.50	10.167	9	VHVHH		TOC
L058	76.00	10.857	7	HH		COMBUSTION + IR
L043	118.00	11.800	10	VHHVH		
L023	112.50	12.500	9	HVHHVH	BIASED HIGH	CARBON ANALYZER
L029	137.50	13.750	10	VHVHHVHVHHVH	BIASED HIGH	COMBUSTION I.R.

OVERALL AVERAGE RANK IS 7.980

APPENDIX II: LABORATORY APPRAISALS

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L002

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	flagged low on sample 3 and 5, very low on sample 4 and high on sample 1
SODIUM	satisfactory
POTASSIUM	flagged high on sample 3 and very high on sample 4 ranking indicates results are biased high
CHLORIDE I.C	although no results are flagged ranking indicates results are biased high
CHLORIDE NON I.C	satisfactory
SULFATE I.C.	satisfactory
SULFATE NON I.C	flagged very high on sample 3
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	one of the two results reported is flagged low
TOTAL ALKALINITY	flagged low on sample 6
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	flagged very low on samples 5 and 6 insufficient data to assess bias
REACTIVE SILICA	flagged very high on sample 2
NITRATE + NITRITE	satisfactory, well done for both methods reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

L002

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L003

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	satisfactory
SODIUM	satisfactory
POTASSIUM	flagged high on sample 4
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	satisfactory except for low result on sample 1
SULFATE I.C.	satisfactory
SULFATE NON I.C	flagged low on sample 3
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	although no results are flagged ranking indicates results are biased low
GRAN ALKALINITY	Satisfactory, well done
PH	flagged high on sample 2
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	flagged very low on sample 5 and high on sample 6
REACTIVE SILICA	flagged high on sample 3, 4 and 5
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	satisfactory
DISSOLVED ORGANIC CARBON	no results reported

L003

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L004

PARAMETER	COMMENTS
CALCIUM	8 out of the 10 results reported are flagged low or very low, ranking indicates results are biased low
MAGNESIUM	satisfactory
SODIUM	satisfactory
POTASSIUM	flagged low on sample 4
CHLORIDE I.C	flagged high on sample 10 and very high on sample 8
CHLORIDE NON I.C	satisfactory, well done
SULFATE I.C.	satisfactory
SULFATE NON I.C	flagged very high on sample 3
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged low on sample 8 and very low on sample 6 ranking indicates results are biased low
GRAN ALKALINITY	flagged high on sample 7 and very high on sample 6
PH	flagged low on sample 9
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	satisfactory, well done
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L006

PARAMETER	COMMENTS
CALCIUM	flagged low on sample 4 and 5 and very low on sample 10
MAGNESIUM	Flagged very low on samples 1, 5, 9, and 10
SODIUM	flagged low on sample 9 and 10
POTASSIUM	satisfactory
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	satisfactory, well done
SULFATE I.C.	satisfactory
SULFATE NON I.C	flagged low on sample 1 and very high on sample 3
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged low on samples 2 and 3 and very low on sample 6
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	flagged low on sample 1 and 10 ranking indicates results are biased low
COLOUR	no results reported
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	although no results are flagged ranking indicats results are biased high
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L007

PARAMETER	COMMENTS
CALCIUM	flagged low on sample 4 and 5, very low on sample 6 and high on sample 9
MAGNESIUM	satisfactory
SODIUM	flagged low on sample 9 ranking indicates results are biased low
POTASSIUM	satisfactory
CHLORIDE I.C	satisfactory except for high result for sample 8
CHLORIDE NON I.C	no results reported
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	flagged high on sample 1
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L009

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	satisfactory
SODIUM	satisfactory, well done
POTASSIUM	satisfactory
CHLORIDE I.C	satisfactory
CHLORIDE NON I.C	satisfactory on the two results ranked
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged high on samples 4, 8, and 10 and very high on sample 3 ranking indicates results are biased high
GRAN ALKALINITY	no results reported
PH	flagged high on sample 9
SPECIFIC CONDUCTIVITY	satisfactory
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, will done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L010

PARAMETER	COMMENTS
CALCIUM	flagged high on sample 1 and 9 flagged very high on samples 2 and 10
MAGNESIUM	flagged high on samples 1, 7, 9 and 10 flagged very high on sample 5
SODIUM	flagged very high on sample 2
POTASSIUM	satisfactory, well done
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very high on sample 2
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	flagged very high on sample 9
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	no results reported
PH	9 out of 10 results are flagged ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	flagged very high on sample 2 ranking indicates results are biased high
COLOUR	no results reported
REACTIVE SILICA	flagged high on sample 1 and very high on samples 6 and 9 ranking indicates results are biased high
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	satisfactory, well done
DISSOLVED ORGANIC CARBON	no results reported

L010

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L011

PARAMETER	COMMENTS
CALCIUM	flagged low on 1, 3, 9, and 10 ranking indicates results are biased low
MAGNESIUM	flagged low on sample 2 and very low on sample 5 ranking indicates results are biased low
SODIUM	satisfactory
POTASSIUM	flagged very high on samples 3, 9, and 10 ranking indicates results are biased high
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	flagged very high on sample 10
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	no results reported
PH	although no results are flagged, ranking indicates results are biased high
SPECIFIC CONDUCTIVITY	flagged low on sample 7
COLOUR	flagged very low on sample 5 insufficient data to assess bias
REACTIVE SILICA	no results reported
NITRATE + NITRITE	flagged very high on sample 1 and4
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L013

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory, well done
POTASSIUM	flagged high on sample 3
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L014

PARAMETER	COMMENTS
CALCIUM	flagged very high on sample 1
MAGNESIUM	satisfactory
SODIUM	although no results are flagged ranking indicates results are biasded low
POTASSIUM	although no results are flagged ranking indicates results are biased low
CHLORIDE I.C	flagged very low on sample 10 May be a reporting error.
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged low on sample 6 and very low on samples 2 and 7
GRAN ALKALINITY	reults reported appear to be in wrong units
PH	flagged low on sample 6
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	satisfactory

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L016

PARAMETER	COMMENTS
CALCIUM	flagged very low on sample 10 (may be a reporting error)
MAGNESIUM	flagged very high on sample 1 and high on sample 9
SODIUM	flagged high on sample 10
POTASSIUM	satisfactory, well done
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very low on samples 2 and 5, low on sample 4 and very high on sample 3
SULFATE I.C.	no results reported
SULFATE NON I.C	flagged low on sample 3 and very low on sample 10 ranking indicates results are biased low
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	satisfactory, well done
TOTAL ALKALINITY	flagged low on samples 2 and 6 ranking indicates results are biased low
GRAN ALKALINITY	no results reported
PH	satisfactory
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

L016

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L019

PARAMETER	COMMENTS
CALCIUM	flagged very low on sample 4, low on sample 7 high on sample 5 and very high on samples 1 and 9 data appear arratic
MAGNESIUM	flagged very high on sample 2 and high on samples3
SODIUM	satisfactory, well done
POTASSIUM	satisfactory, well done
CHLORIDE I.C	flagged very high on sample 7
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

L019

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L020

PARAMETER	COMMENTS
CALCIUM	satisfactory except for low results on sample 4
MAGNESIUM	flagged high on sample 3 and 6 flagged very high on samples 2, 4, and 5 ranking indicates results are biased high
SODIUM	IC method: flagged high on sample 9 and low on sample 3 Flame method: Satisfactory, well done
POTASSIUM	both methods are satisfactory except for high results on sample 1 by IC
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	satisfactory, well done
SULFATE I.C.	flagged very high on samples 5 and 6
SULFATE NON I.C	no results reported
GRAN ACIDITY	five results flagged very high and 1 flagged high ranking indicates results biased high
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	flagged low on sample 5 and high on sample 1
PH	flagged very low on sample 6
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	satisfactory on the three results ranked
FLUORIDE	satisfactory, well done
DISSOLVED ORGANIC CARBON	flagged high on sample 4 flagged very low on sample 5

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L021

PARAMETER	COMMENTS
CALCIUM	flagged high on samples 5, 6, and 7 flagged very high on samples 3, 9, and 10
MAGNESIUM	flagged low on sample 5 and very low on sample 2 and 4
SODIUM	flagged high on samples 9 and 10
POTASSIUM	satisfactory, well done
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	satisfactory
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L022

PARAMETER	COMMENTS
CALCIUM	flagged high on sample 1 and very high on samples 2, 3, 4, 6, and 7 ranking indicates results are biased high
MAGNESIUM	flagged very high on samples 3 and 5 flagged high on sample 1,2,4,7, and 9 ranking indicates results are biased high
SODIUM	satisfactory
POTASSIUM	9 of the 10 results reported are flagged very low ranking indicates results are biased low
CHLORIDE I.C	flagged low on samples 2, 5, and 6
CHLORIDE NON I.C	no results reported
SULFATE I.C.	flagged very high on samples 1 and 9 ranking indicates results are biased high
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	flagged very high on samples 1 and5
TOTAL ALKALINITY	satisfactory except for low results on sample 3
GRAN ALKALINITY	no results reported
PH	flagged very low on samples 3 and 8 flagged low on sample 6 ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	flagged very low on sample 3 and 6 ranking indicates results are biased low
REACTIVE SILICA	flagged very high on sample 6, low on sample 4 and very low on sample 1,3,5, and 9 ranking indicate results are biased low
NITRATE + NITRITE	flagged very low on sample 1 and low on sample4
FLUORIDE	satisfactory, well done
DISSOLVED ORGANIC CARBON	flagged low on sample 2 and very low on samples 7, 8 and 10 flagged very high on sample 1 and 9

L022

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L023

PARAMETER	COMMENTS
CALCIUM	flagged very high in samples 1,3 and 9 flagged high on samples 5, 10
MAGNESIUM	7 results are flagged very high ranking indicates results are biased high
SODIUM	flagged very high on sample 3
POTASSIUM	satisfactory
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very high on sample 8
SULFATE I.C.	no results reported
SULFATE NON I.C	satisfactory
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	satisfactory, well done
TOTAL ALKALINITY	flagged high on samples 2 and 3
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	flagged very low on sample 10, the results reported is ½ expected value and maybe a calcultion error
COLOUR	insufficient data to assess bias
REACTIVE SILICA	satisfactory on the five results ranked
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	satisfactory, on two results ranked
DISSOLVED ORGANIC CARBON	flagged high on sample 1 and 8 flagged very high on samples 5 and9

L023

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L024

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	flagged low on sample 7
SODIUM	satisfactory
POTASSIUM	although no results are flagged ranking indicates results are biased high
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very low on sample 6
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	satisfactory except for high result on sample 3
GRAN ALKALINITY	satisfactory, well done
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	no results reported
REACTIVE SILICA	although no results are flagged ranking indicates results are biased low
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	satisfactory
DISSOLVED ORGANIC CARBON	no results reported

L024

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L025

PARAMETER	COMMENTS
CALCIUM	flagged very low on samples 4 and 5
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory
POTASSIUM	satisfactory, well done
CHLORIDE I.C	flagged very low on sample3
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	satisfactory
ACIDITY TO PH 8.3	satisfactory, well done
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	although no results are flagged ranking indicates results are biased high
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

L025

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L027

PARAMETER	COMMENTS
CALCIUM	flagged low on samples 1,9, and 10 and very high on sample 2
MAGNESIUM	flagged low on sample 5
SODIUM	satisfactory
POTASSIUM	satisfactory, well done
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very low on sample 6
SULFATE I.C.	flagged low on sampe 3 ranking indicates results are biased low
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged high on sample 3 and 9
GRAN ALKALINITY	satisfactory, well done
PH	flagged very low on sample 8
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	satisfactory, well done
REACTIVE SILICA	satisfactory
NITRATE + NITRITE	although no results are flagged ranking indicates results are biased low
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	7 of 8 results are flagged very low ranking indicates results are biased low

L027

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L028

PARAMETER	COMMENTS
CALCIUM	no results reported
MAGNESIUM	no results reported
SODIUM	no results reported
POTASSIUM	no results reported
CHLORIDE I.C	flagged very low on sample 10 ranking indicates results are biased low
CHLORIDE NON I.C	no results reported
SULFATE I.C.	flagged high on samples 2 and 3
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	no results reported
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L029

PARAMETER	COMMENTS
CALCIUM	satisfactory except for high result on sample 6
MAGNESIUM	flagged high on sample 6
SODIUM	satisfactory
POTASSIUM	flagged very high on sample 9 this may be a reporting error
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	no results reporting
SULFATE I.C.	flagged very high on sample 6
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	satisfactory except high flag on sample 1
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	no results reported
PH	flagged high on sample 6
SPECIFIC CONDUCTIVITY	flagged high on sample 6
COLOUR	no results reported
REACTIVE SILICA	7 of the 8 results reported are slagged very high, ranking indicates results are biased high
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	satisfactory
DISSOLVED ORGANIC CARBON	7 of 10 results reported are flagged high or very high.

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L030

PARAMETER	COMMENTS
CALCIUM	no results reported
MAGNESIUM	no results reported
SODIUM	no results reported
POTASSIUM	no results reported
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	no results reported
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	satisfactory
ACIDITY TO PH 8.3	satisfactory, well done
TOTAL ALKALINITY	satisfactory except for high result on sample 3
GRAN ALKALINITY	satisfactory, well done
PH	satisfactory,except for low results on sample 4
SPECIFIC CONDUCTIVITY	flagged low on sample 7
COLOUR	satisfactory, well done
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L031

PARAMETER	COMMENTS
CALCIUM	flagged high on sample 2
MAGNESIUM	satisfactory, well done
SODIUM	although no results are flagged ranking indicates results are biased low
POTASSIUM	satisfactory
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very low on sample 6
SULFATE I.C.	no results reported
SULFATE NON I.C	satisfactory except for low result in sample 3
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged low on sample 2 and 8
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	flagged low on sample 3 and very low on sample 6 ranking indicates results are biased low
REACTIVE SILICA	satisfactory, will done
NITRATE + NITRITE	although no results are flagged ranking indicates results are biased low
FLUORIDE	satisfactory, well done
DISSOLVED ORGANIC CARBON	although no results are flagged ranking indicates results are slightly biased low

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L031 B

PARAMETER	COMMENTS
CALCIUM	no results reported
MAGNESIUM	no results reported
SODIUM	no results reported
POTASSIUM	no results reported
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	the one result reported is flagged high
SULFATE I.C.	no results reported
SULFATE NON I.C	satisfactory on the one result reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	satisfactory on the only result reported
GRAN ALKALINITY	no results reported
PH	no results reported
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	the one result reported is slightly high
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L032

PARAMETER	COMMENTS
CALCIUM	flagged very low on sample 3 and low on sample 1 and 7 flagged high on sample 5 and very high on sample 6
MAGNESIUM	flagged high on sample 2 and very high on sample 3 and 6
SODIUM	satisfactory
POTASSIUM	satisfactory
CHLORIDE I.C	although no results are flagged ranking indicates results are biased high
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	although no results are flagged ranking indicates results are biased low
ACIDITY TO PH 8.3	although no results are flagged ranking indicates results are biased low
TOTAL ALKALINITY	flagged high on sample 8 and very high on samples 2,3,4, and 9 ranking indicates results are biased high
GRAN ALKALINITY	flagged high on sample 3 and very high on samples 2 and 4
PH	flagged high on sample 3 and very high on samples 2,4,and 8 ranking indicates results are biased high
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	no results reported
REACTIVE SILICA	flagged low on samples 6 and very low on samples 2,7,8, and 10
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	satisfactory, well done
DISSOLVED ORGANIC CARBON	flagged high on sample 2 and very high on sample 1

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L040

PARAMETER	COMMENTS
CALCIUM	flagged very high on sample 3 and very low on sample 5
MAGNESIUM	flagged high on sample 3
SODIUM	satisfactory, well done
POTASSIUM	although no results are flagged ranking indicates results are biased high
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	8 of 10 results reported are flagged very low or low fanking indicates results are biased low
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	6 results flagged very low, 3 results flagged low ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	6 results flagged very low, 3 results flagged low ranking indicates results are biased low
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L042

PARAMETER	COMMENTS
CALCIUM	flagged high on sample 10 and very high on sample 9
MAGNESIUM	flagged low on sample 4 and 6 and very low on 5 ranking indicates results are biased low
SODIUM	satisfactory
POTASSIUM	flagged very low on sample 10
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged very low on sample 3 and low on samples 7, high on samples 5 and 8 and very high on sample 1
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	all results are flagged very high, ranking indicates results are biased high
TOTAL ALKALINITY	9 out of 10 results are flagged very high ranking indicates a severe high bias
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	all 5 of the results ranked are flagged very high ranking indicates results are biased high
DISSOLVED ORGANIC CARBON	no results reported

L042

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L043

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory, well done
POTASSIUM	satisfactory, well done
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	all 10 results reported are flagged very high ranking indicates results are biased high
SULFATE I.C.	no results reported
SULFATE NON I.C	flagged low on sample 2, high on sample 3 and very high on samples 5,6 and 10
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	flagged very high on sample 9
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	no results reported
PH	2 results flagged very low 2 resultss high and 1 result flagged very high These results are erratic
SPECIFIC CONDUCTIVITY	flagged high on sample 1
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	All results reported are flagged very high ranking indicates results are biased high
DISSOLVED ORGANIC CARBON	flagged high on sample 1 and very high on samples 2 and 9

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L045

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	satisfactory
SODIUM	satisfactory
POTASSIUM	satisfactory
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	satisfactory, well done
SULFATE I.C.	no results reported
SULFATE NON I.C	satisfactory
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	no results reported
PH	flagged very high on sample 4
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	satisfactory, well done
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	although no results are flagged ranking indicates results are biased low
DISSOLVED ORGANIC CARBON	satisfactory, well done

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L046

PARAMETER	COMMENTS
CALCIUM	flagged high on sample 3 very low on samples 1, 5, 9, and 10
MAGNESIUM	flagged very high on samples 2, 3, 4, and 5
SODIUM	8 results are flagged very high ranking indicates results are biased high
POTASSIUM	flagged high on samples 2,3, and 5 ranking indicates results are biased high
CHLORIDE I.C	flagged very low on samples 1 and 5 ranking indicates results are biased low
CHLORIDE NON I.C	satisfactory, well done
SULFATE I.C.	flagged low on sample 3
SULFATE NON I.C	flagged very low on samples 9 and10 ranking indicates results are biased low
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	flagged very high on sample 10
TOTAL ALKALINITY	flagged low on samples 6 and 8 and very high on sample 5
GRAN ALKALINITY	no results reported
PH	satisfactory except for high results on sample 5
SPECIFIC CONDUCTIVITY	7 results flagged very low 2 results flagged low ranking indicats results are biased low
COLOUR	no results reported
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	flagged low on sample 4
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

L046

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L048

PARAMETER	COMMENTS
CALCIUM	satisfactory, except for low results on sample 6
MAGNESIUM	satisfactory, well done
SODIUM	flagged very low on sample 9 (This may be a printing error)
POTASSIUM	satisfactory, well done
CHLORIDE I.C	flagged low on sample 9
CHLORIDE NON I.C	5 of the 10 results reported are flagged low ~~ranking indicates results are~~ biased ~~low~~
SULFATE I.C.	satisfactory
SULFATE NON I.C	flagged very high on sample 3
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	satisfactory except for high result on sample 3
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	although no results are flagged ranking indicates results are biased low
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	satisfactory, well done

L048

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L049

PARAMETER	COMMENTS
CALCIUM	satisfactory except for low result on sample 6
MAGNESIUM	flagged very low on sample 9, high on sample 7, very high on samples 2 and 4
SODIUM	flagged low on sample 8
POTASSIUM	flagged very low on sample 8, high on sample 1 and very high on sample 6
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	5 of the 6 results reported are flagged low or very low ranking indicates results are biased low
SULFATE I.C.	no results reported
SULFATE NON I.C	flagged very low on sample 3, high on sample 2 and 5 and very high on sample 7
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	satisfactory on the one results reported
TOTAL ALKALINITY	flagged very high on samples 1 and 2 flagged low on sample 3
GRAN ALKALINITY	no results reported
PH	all results are flagged very low or low ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	flagged high on sample 1 flagged low on sample 2
COLOUR	flagged high on samples 2, 6, and 8
REACTIVE SILICA	no results reported
NITRATE + NITRITE	flagged very low on sample 1
FLUORIDE	satisfactory, well done
DISSOLVED ORGANIC CARBON	although no results are flagged, ranking indicates results are biased low

L049

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L050

PARAMETER	COMMENTS
CALCIUM	no results reported
MAGNESIUM	no results reported
SODIUM	no results reported
POTASSIUM	no results reported
CHLORIDE I.C	flagged high on sample 3
CHLORIDE NON I.C	no results reported
SULFATE I.C.	flagged low on samples 1 and 7 and high on sample 9
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	4 results are flagged low and 3 very low ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	two of the three results reported are flagged high namely samples 1 and 5
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L051

PARAMETER	COMMENTS
CALCIUM	flagged high on sample 2
MAGNESIUM	flagged low on samples 2 and 8
SODIUM	satisfactory
POTASSIUM	satisfactory, well done
CHLORIDE I.C	flagged very high on samples 5 and 6
CHLORIDE NON I.C	no results reported
SULFATE I.C.	flagged low on sample 1 and 4 and high on sample3
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	flagged high on sample 4
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	satisfactory
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	flagged high on sample 10 and very high on samples 3 and 9

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L053

PARAMETER	COMMENTS
CALCIUM	satisfactory except for high results on sample 6
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory, well done
POTASSIUM	satisfactory, well done
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged high on samples 2 and 5
SULFATE I.C.	no results reported
SULFATE NON I.C	satisfactory
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	satisfactory except for high result on sample 3
GRAN ALKALINITY	satisfactory, well done
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	no resultsreported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

L053

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L054

PARAMETER	COMMENTS
CALCIUM	7 of the 10 results reported are flagged very high ranking indicats results are biased high
MAGNESIUM	6 results flagged very high ranking indicats results are biased high
SODIUM	7 results are flagged very high ranking indicates results are biased high
POTASSIUM	flagged high on samples 5, 6, 9, and 10 ranking indicates results are biased high
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	flagged high on sample 5 and very high on samples 2 and 3
SULFATE I.C.	no results reported
SULFATE NON I.C	9 of the 10 results reported are flagged very high ranking indicated results are biased very high
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	flagged high on sampl 3 and very high on samples 2, 8, and 10 ranking indicates results are biased high
TOTAL ALKALINITY	3 of the 5 results ranked on is flagged low 2 high and 1 very high
GRAN ALKALINITY	no results reported
PH	7 results are flagged very low ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	no results reported
COLOUR	flagged very low on sample 5 and very high on sample 7
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L057

PARAMETER	COMMENTS
CALCIUM	satisfactory except for low results on sample 6
MAGNESIUM	flagged low on samples 1 and 9, very low on samples 5 ranking indicates results are biased low
SODIUM	8 results are flagged very high ranking indicates results are biased high
POTASSIUM	satisfactory, well done
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	no results reported
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	flagged high on samples 8, 9, and 10 and very high on sample 3. Ranking indicates results are biased high
GRAN ALKALINITY	no results reported
PH	satisfactory well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	although no results are flagged, ranking indicates results are biased high
REACTIVE SILICA	no results reported
NITRATE + NITRITE	no results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L058

PARAMETER	COMMENTS
CALCIUM	flagged very low on sample 1 and 7 flagged low on samples 4,5,6, and 9
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory
POTASSIUM	satisfactory, well done
CHLORIDE I.C	flagged very high on samples 3 and7
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	flagged very on sample 7
PH	satisfactory except for low results on sample 7
SPECIFIC CONDUCTIVITY	flagged very high on sample 7
COLOUR	flagged high on sample 5
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory
FLUORIDE	satisfactory
DISSOLVED ORGANIC CARBON	flagged high on samples 3 and 6

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L059

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	flagged low on samples 2, 4, and 10 flagged very low on sample 5 ranking indicates results are biased low
SODIUM	although no results are flagged, ranking indicates results are biased low
POTASSIUM	no results reported
CHLORIDE I.C	no results reported
CHLORIDE NON I.C	no results reported
SULFATE I.C.	no results reported
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	8 results are flagged very low and 1 results is flagged low, ranking indicates results are biased low
SPECIFIC CONDUCTIVITY	9 results flagged very high ranking indicates results are biased high
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	all of the eight results ranked are flagged high, fanking indicates results are biased high
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L060

PARAMETER	COMMENTS
CALCIUM	satisfactory, well done
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory
POTASSIUM	satisfactory, well done
CHLORIDE I.C	satisfactory
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	6 results flagged very low 2 results flagged low ranking indicates results are biased low
COLOUR	no results reported
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	satisfactory
FLUORIDE	flagged very high on samples 6,7,8, and 9
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L061

PARAMETER	COMMENTS
CALCIUM	satisfactory on the 4 results reported
MAGNESIUM	satisfactory on the 4 results reported
SODIUM	" " " " " " " " " "
POTASSIUM	" " " " " " " " " "
CHLORIDE I.C	" " " " " " " " " "
CHLORIDE NON I.C	" " " " " " " " "
SULFATE I.C.	" " " " " "
SULFATE NON I.C	" " " " " "
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory on the 4 results reported
SPECIFIC CONDUCTIVITY	satisfactory on the 4 results reported
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory on the 4 results reported
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L062

PARAMETER	COMMENTS
CALCIUM	satisfactory,
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory
POTASSIUM	satisfactory
CHLORIDE I.C	flagged high on sample 9
CHLORIDE NON I.C	flagged high on sample 5
SULFATE I.C.	satisfactory
SULFATE NON I.C	satisfactory
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	all results are flagged low or very low ranking indicates results are biased low
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	flagged very high on sample 10
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	flagged very high sample 5
REACTIVE SILICA	flagged very high on sample 4
NITRATE + NITRITE	although no results are flagged ranking indicates results are biased low
FLUORIDE	flagged very high on samples 9and 10
DISSOLVED ORGANIC CARBON	satisfactory, well done

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L063

PARAMETER	COMMENTS
CALCIUM	8 of 10 results reported are flagged high or very high , ranking indicates results are biased high
MAGNESIUM	8 results flagged very high ranking indicates results are biased high
SODIUM	flagged high on samples 3 and 7
POTASSIUM	flagged high on sample 10
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	satisfactory, well done
SULFATE I.C.	satisfactory
SULFATE NON I.C	satisfactory
GRAN ACIDITY	flagged very low on sample 2, flagged low on samples 3,6,8,10. flagged high on sample 1 ranking indicates results are biased low
ACIDITY TO PH 8.3	6 results are flagged low ranking indicates results are biased low
TOTAL ALKALINITY	satisfactory, well done
GRAN ALKALINITY	flagged low on samples 3,7, and 9 ranking indicates results are biased low
PH	4 results flagged very high and 2 result flagged high. ranking indicates results are biased high
SPECIFIC CONDUCTIVITY	although no results are flagged ranking indicates results are biased slightly high
COLOUR	satisfactory, well done
REACTIVE SILICA	satisfactory, well done
NITRATE + NITRITE	although no results are flagged ranking indicates results are biased low
FLUORIDE	although no results are flagged ranking indicates results are biased low
DISSOLVED ORGANIC CARBON	satisfactory, well done

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L064

PARAMETER	COMMENTS
CALCIUM	flagged low on sample 1 and very low on samples 9 and 10
MAGNESIUM	flagged high on samples 3 and 4
SODIUM	flagged very high on sample 9 and high on samples 2 and 10. Ranking indicates results are biased high
POTASSIUM	satisfactory, well done
CHLORIDE I.C	flagged very high on sample 9 and 10 ranking indicates results are biased high
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	no results reported
ACIDITY TO PH 8.3	no results reported
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	no results reported
PH	satisfactory, well done
SPECIFIC CONDUCTIVITY	satisfactory, well done
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	flagged very high on sample 3 - This may be a reporting error, ranking indicates results are biased high
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APRIL 29, 1985

LAB APPRAISAL FOR LRTAP STUDY NO. 8

YOUR LABORATORY NO. IS: L066

PARAMETER	COMMENTS
CALCIUM	flagged very high on sample 7
MAGNESIUM	satisfactory, well done
SODIUM	satisfactory, well done
POTASSIUM	satisfactory, well done
CHLORIDE I.C	satisfactory, well done
CHLORIDE NON I.C	no results reported
SULFATE I.C.	satisfactory
SULFATE NON I.C	no results reported
GRAN ACIDITY	insufficient data
ACIDITY TO PH 8.3	flagged low on sample 1 flagged highon sample 5
TOTAL ALKALINITY	no results reported
GRAN ALKALINITY	6 results are reported, sample 1 and 9 are flagged high samples 3,4,5, and 6 are flagged very high ranking indicates results are biased high
PH	satisfactory except for high result on sample 8
SPECIFIC CONDUCTIVITY	satisfactory
COLOUR	no results reported
REACTIVE SILICA	no results reported
NITRATE + NITRITE	satisfactory, well done
FLUORIDE	no results reported
DISSOLVED ORGANIC CARBON	no results reported

APPENDIX III: GLOSSARY OF TERMS

Reference: 1983 ASTM Volume 11.01 water 1, Section II, pg D4210-83

GLOSSARY OF TERMS USED IN THE EVALUATION OF INTERLABORATORY RESULTS

Satisfactory: Quite acceptable, "good results".

Erratic: A set of results for a given characteristic is deemed erratic when both high and low flags are assigned.

Out of Control: An analytical system is said to be out of control when it has demonstrated the ability to perform adequately and produces an extreme result or results. For an example, consider this set of results obtained by laboratory #3 on total phosphorus for Study #24.

Sample No.	Reported Value	Median	Difference
1	9	9.5	-.5
2	5	4.5	.5
3	2T	3	-1
4	8	8	0
5	2T	2.5	-.5
6	9	8	1
7	28	28	0
8	18	17	1
9	23	23.7	-.7
10	16	15	1
11	35	35.8	-.8
12	75	78.7	-3.8
13	58	59	-1
14	110	90	20

Given the excellent results obtained on samples 1 through 13, the result on sample 14 indicates that the analytical system was out of control.

Bias: A set of results is said to be biased when the set exhibits a tendency to be either higher or lower than some standard - the standard which has been used in the analysis of our studies thus far has been the performance of all other participating laboratories. The ranking procedure employed in testing for bias is described in W.J. Youden's paper, "Ranking Laboratories by Round-Robin Tests from Precision Measurement and Calibration, H.H. Ku, Editor, NBS Special Publication 300 - Volume 1, U.S. Government Printing Office, Washington, D.C., 1969. In this paper, Youden establishes the rationale for evaluating laboratories' performance by ranking results. In our use of the procedure there is about 1 chance in 20 of deeming a set of results biased when in fact it is not, that is, $\alpha = 0.05$.

W: A "W" code is used with a reported result when no measurement was possible due to no response of the instrument to the sample. The "W" is preceded by the smallest determinative division that can be used in the units used in reporting.

T: The "T" code is used with values between the Criterion of Detection and the "W" value. The Criterion of Detection is commonly thought of by many as the limit of detection.

Lower limit for Use of Basic Assceptable Error, Basic AcceptableError; and Concentration Error Increment:

These terms define the acceptable difference from the median of results (target value) that is allowed without a result being

flagged either low or high. For a sample whose target value is at or below the lower limit for use of basic acceptable error the basic acceptable error is used to determine the range of acceptable deviations.

For example: Suppose that the lower limit for use of basic acceptable error has been set at 10 µg/L and the basic acceptable error is 1.0 µg/L, if a target (median) value for a sample is 5 µg/L, then any reported result within the range 5 ± 1.0 or 4.0 to 6.0 µg/L would be considered acceptable.

Since for almost all substances it appears that the variability of results increases in concentration, an allowance is made for the increased variability for those samples whose target values are above the lower limit for use of basic acceptable error. The allowance is added to the basic acceptable error, and it is calculated by multiplying the concentration error increment by the difference between he target value and the lower limit for use of basic acceptable error.

For example: If a target value for a sample is 21 µg/L, and the lower limit for use of basic acceptable error is 10 µg/L, the difference between them is 21 - 10 = 11 µg/L. Multiplying the difference by the concentration increment, 11 µg/L x 0.10, gives 1.1 µg/L to determine the acceptable difference 21.0 ± 2.1 or 18.9 to 23.1 µg/L would be considered acceptable and would not be flagged.

In general, the values chosen for the basic acceptable error and the concentration error increment are selected so that several of the participating laboratories will have demonstrated the ability to do the analyses satisfactorily. In a sense the values represent state of the art for analysis of the round robin samples.

Flag: A result is flagged high H when its value is greater than the median (target) value plus the acceptable difference but not greater than the median plus 1.5 times; a result greater than 1.5 times the acceptable difference is flagged with VH. Similarly, a result less than the median minus 1.5 times the acceptable difference is flagged L a lower result is flagged VL.

Acceptable Difference or Acceptable Deviation:

The absolute values of the maximum difference between a result and the target value which will not be flagged.

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