NATIONAL WATER RESEARCH INSTITUTE

INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

ECOSYSTEM INTERLABORATORY QA PROGRAM
STUDY FP 74 - RAIN AND SOFT WATERS
(MARCH AND APRIL, 1999)

H. Alkema

NWRI Technical Report QA-99-01

National Water Research Institute
867 Lakeshore Road
Burlington, Ontario
L7R 4A6

June 15, 1999

To: Participants of the NWRI Ecosystem Interlaboratory Quality Assurance Program

Re: Final Report for NWRI Study FP 74 - Rain and Soft Waters Portion

Dear Participant:

We would like to thank you for your co-operation and prompt responses during this study. In return, it is the aim of the quality assurance group to give prompt evaluations, reports, and effective remedial assistance to all of the participants.

The Institute is pleased to distribute this final report to the FP participant laboratories. This report includes results and evaluations for a unique series of samples: Rain and Soft Waters. The evaluation of results includes an evaluation for systematic bias and precision. The flagging criteria, used to assess precision, are open to change. In order to improve our data assessments and the quality of your data, you may find that these criteria change from study to study. This would be evident in Table 3 - Summary of Study-to-Study Performance. A complete listing of all laboratory results is included so that each laboratory can compare its results and evaluations with other laboratories. For details concerning these evaluations please refer to the attached appendix, Glossary of Terms, or to the Research & Applications Branch QA Manual.

In the data summary tables you will find the tabulation of the degree of bias. It has been difficult to quantify and determine its significance at low values. *In this report we have calculated bias in two components which relate directly to the chemical measurement.* Laboratory heads are encouraged to discuss the attached report openly with those who manage their programs and those who use their laboratory data.

The laboratories listed in this report submitted their data with a confidential laboratory code. This confidentiality is fully respected by our staff. Access to these codes is possible through the relevant laboratories or program authorities.

Should you have any questions or comments regarding this study, please do not hesitate to contact us.

Yours truly,

Harry A.

Harry Alkema
QA Specialist
NLET/NWRI

Interlaboratory QA Studies & CRMs
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Attachment: Individual Laboratory Appraisal

National Water Research Institute
National Laboratory for Environmental Testing

Report no. NWRI-QA-99-01

Ecosystem Interlaboratory Quality Assurance Program
Study FP 74 - Final Report

March and April, 1999

An Interlaboratory Quality Assurance Study for Rain and Soft Waters*

by

H. Alkema

Environmental Standards and Reference Materials
Project Information & Quality Management
National Laboratory for Environmental Testing
National Water Research Institute
Burlington, Ontario

June 1999

* companion studies: Major Ions/Total P; Report NWRI-QA-99-02, and Trace Elements; Report NWRI-QA-99-03

NWRI Interlaboratory Quality Assurance Studies for Acid Rain and Surface Waters

Major Ions and Nutrients, Trace Metals, Total Phosphorus, and Mercury

The Institute's interlaboratory quality assurance (QA) studies support a core group of government labs and their QA requirements of various environmental programs. These programs include: acid rain research, Great Lakes trans-boundary issues, and issues involving provincial watershed/ecosystem research, monitoring, and jurisdiction. The QA program also addresses health issues, such as, toxic metal (lead, manganese, and mercury) contamination of drinking water.

The QA studies are executed twice a year and accommodate environmental programs in both Canada and the United States of America. The US Environmental Protection Agency, US Geological Survey, and numerous university acid rain programs show a continued interest in this program. More than 200 laboratories are invited to participate on a voluntary basis in each study. Currently, some 60 of these labs participate in the various study matrixes. One study consists of five (5) series of ten (10) samples each and includes numerous parameters for analysis. The primary feature of these studies is to report the quality of data produced by the participating laboratories. Laboratory performance is ranked in terms of the number of biased parameters (systematic bias) and flagged results (precision measurement). The reports produced from the client data provide a powerful tool for the diagnosis of problematic analysis. Environmental programs and data users are therefore encouraged to have their labs participate as a means of quantifying laboratory performance and data quality.

As the NWRI studies run on a voluntary and cost recovery basis, laboratories and program managers express an ongoing interest in study design and sample requirements. The program is open to international participation and contractually specialized studies are available.

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Table 1 List of participating[†] laboratories in the acid rain and soft waters portion of interlaboratory study FP 74 (March & April, 1999).

Adirondack Lakes Survey Corporation
Chemex Environmental Services
CRD Water Department Laboratory
Entech Laboratories (Ontario)
Environment Canada - AES, CAPMoN Laboratory
Environment Canada - AES, Remote Regions Atmospheric Laboratory
Environment Canada - CWS, ECB, Environmental Quality Section
Environment Canada - ETC, AAQD
Environment Canada - ETC, AMD
Environment Canada - ETC, Atlantic Region
Environment Canada - NHRI, WQL
Environment Canada - NWRI, NLET
Environment Canada - Pacific Environmental Science Centre
Environnement Canada - CSL, Laboratoire régional - Québec
Enviro-Test Laboratories
Fisheries and Oceans Canada - Freshwater Institute
Harvard School of Public Health
Illinois State Water Survey - Analytical Chemistry Unit
Laboratoire de Santé Publique du Québec
Lakehead University Centre
Maxxam Analytics Inc.
M.B. Laboratories
Ministère de l'Environnement et de la Faune du Québec - Laval
Ministère de l'Environnement et de la Faune du Québec - Sainte-Foy
Ministère de Ressources Naturelles du Québec - Sainte-Foy
Monroe County Environmental Health Laboratory
Natural Resources Canada - CFS, Atlantic Region
Natural Resources Canada - CFS, Ontario Region
New Brunswick Department of the Environment - ASL
Norwest Labs Edmonton
Ontario Hydro Technologies
Ontario Ministry of Environment and Energy - Dorset
Ontario Ministry of Environment and Energy - Etobicoke
Ontario Ministry of Northern Development and Mines - Geosciences Laboratory
Pennsylvania State University - ERRI
Philip Analytical Services Corporation
Regional Municipality of Ottawa, Ontario
State of Vermont - Department of Environmental Conservation Laboratory
TAIGA Environmental Laboratory
University of Maine - Water Research Institute
US Environmental Protection Agency, Corvallis
US Geological Survey, Troy, NY

[†] Laboratories select their routine parameters for this study.

Table 2 Laboratory Performance Scores - Study 0074

Rain & Soft Waters

	SYSTEMATIC BIAS			FLAGGED RESULTS			
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF BIAS & FLAGGED DATA % SCORE
F053	10	0	0.00	96	1	1.04	0.52
F007	15	0	0.00	132	2	1.52	0.76
F068	7	0	0.00	59	1	1.69	0.85
F004	5	0	0.00	45	1	2.22	1.11
F122	4	0	0.00	37	1	2.70	1.35
F003	17	0	0.00	155	5	3.23	1.61
F042	14	0	0.00	129	5	3.88	1.94
F009	8	0	0.00	78	4	5.13	2.56
F036	13	0	0.00	128	8	6.25	3.12
F026	17	1	5.88	170	8	4.71	5.29
F113	15	1	6.67	150	8	5.33	6.00
F109	12	1	8.33	120	7	5.83	7.08
F112	15	1	6.67	145	11	7.59	7.13
F025	10	0	0.00	95	16	16.84	8.42
F017	9	1	11.11	81	5	6.17	8.64
F118	4	0	0.00	39	7	17.95	8.97
F032	19	1	5.26	173	22	12.72	8.99
F002	13	1	7.69	110	12	10.91	9.30
F110	11	1	9.09	109	11	10.09	9.59
F110a	11	1	9.09	106	12	11.32	10.21
F014	18	0	0.00	144	36	25.00	12.50
F074	16	2	12.50	153	24	15.69	14.09
F071	15	1	6.67	144	36	25.00	15.83
F133	12	2	16.67	116	18	15.52	16.09
F020	15	2	13.33	135	26	19.26	16.30
F015	16	2	12.50	133	29	21.80	17.15
F010	19	4	21.05	174	28	16.09	18.57
F060	20	3	15.00	180	40	22.22	18.61
F022	18	4	22.22	172	32	18.60	20.41
F037	13	3	23.08	120	31	25.83	24.46
F139	9	2	22.22	72	20	27.78	25.00
F011	12	2	16.67	98	35	35.71	26.19
F072	17	4	23.53	145	49	33.79	28.66
F094	19	5	26.32	170	54	31.76	29.04
F107	14	5	35.71	125	28	22.40	29.06
F145	19	4	21.05	166	70	42.17	31.61
F147	16	6	37.50	136	47	34.56	36.03

Laboratory parameters are selected from:

Colour	Sp Cond	pH	DOC	Alk Gran	DIC
NO3	Na	Mg	SO4-IC	Cl-IC	K
Ca	Alk Infl	NO3 /2	NH4	TKN	Si
SO4	Cl	Alk E.Pt	Al	Gran Acid	Acid-8.3

Table 3 Summary of Study-to Study Performance

Rain & Soft Waters

LAB CODE	% BIASED PARAMETERS & FLAGGED RESULTS ON STUDIES 0065	0066	0067	0068	0069	0070	0071	0072	0073	0074	MEDIAN SCORE	COMMENTS
F002	11.9	11.8	20.6	14.1	3.2	10.4	2.7	6.4	7.1	9.3	9.9	SATISFACTORY
F003	6.9	14.6	8.9	4.3	7.1	2.6	13.5	7.5	9.4	1.6	7.3	SATISFACTORY
F004	7.1	1.0	19.7	-	3.5	4.1	18.1	15.2	0.0	1.1	4.1	GOOD
F007	23.3	13.9	13.8	12.3	11.8	9.2	0.0	9.5	2.0	0.8	10.7	SATISFACTORY
F009	21.5	6.5	-	14.0	16.0	2.9	21.7	5.9	2.4	2.6	6.5	SATISFACTORY
F010	17.8	4.8	6.5	1.6	-	7.3	7.2	15.6	10.4	18.6	7.3	SATISFACTORY
F011	-	-	-	12.3	33.6	17.4	12.5	-	-	26.2	17.4	MODERATE
F014	16.2	5.3	10.5	8.7	18.1	6.0	21.7	23.2	20.1	11.7	14.0	MODERATE
F015	3.3	9.8	4.4	7.1	12.4	14.4	25.3	17.4	20.5	17.2	13.4	MODERATE
F017	1.3	1.8	0.0	9.3	1.3	1.2	0.7	0.6	0.0	8.6	1.3	GOOD
F020	15.1	16.5	19.1	-	23.9	23.7	20.3	19.0	22.5	16.3	19.1	MODERATE
F022	14.2	-	-	-	-	-	-	14.8	-	20.4	14.8	MODERATE
F024	-	34.4	-	-	-	-	-	-	-	-	-	-
F025	-	-	-	-	-	22.9	27.9	8.9	24.7	8.4	22.9	MODERATE
F026	7.4	7.5	4.1	5.6	6.2	15.0	3.0	4.7	10.3	5.3	5.9	SATISFACTORY
F032	-	13.0	6.8	16.1	13.7	17.3	10.3	6.0	11.4	8.7	11.4	SATISFACTORY
F036	9.1	8.8	-	11.8	4.0	3.1	5.1	1.1	0.4	3.1	4.0	GOOD
F037	11.5	18.8	20.7	35.7	18.8	37.7	47.8	31.9	25.5	24.5	25.0	MODERATE
F042	4.4	10.1	14.1	7.7	-	7.3	23.0	6.5	16.7	1.9	7.7	SATISFACTORY
F053	1.0	1.5	6.1	9.7	31.3	9.2	1.1	0.5	2.7	0.5	2.1	GOOD
F060	-	-	-	33.2	-	17.0	24.5	22.0	16.3	18.6	20.3	MODERATE
F068	0.8	0.0	1.2	14.1	0.0	1.6	16.1	4.8	0.0	0.8	1.0	GOOD
F071	16.2	36.9	24.9	11.4	18.7	-	27.9	37.3	11.2	15.8	18.7	MODERATE
F072	-	35.2	-	-	-	35.5	29.1	21.9	35.9	28.7	32.2	POOR
F074	13.8	-	-	15.3	-	-	13.4	26.8	13.5	14.1	13.9	MODERATE
F094	-	-	-	-	-	-	35.0	20.6	20.5	29.0	24.8	MODERATE
F107	17.8	18.8	21.4	-	7.0	27.1	13.9	19.4	17.5	29.1	18.8	MODERATE
F109	19.8	25.0	2.2	10.8	16.2	3.6	12.9	1.2	21.0	7.1	11.9	SATISFACTORY
F110	2.8	5.6	9.7	-	-	8.2	5.8	4.2	8.4	9.6	7.0	SATISFACTORY
F110a	-	-	-	-	-	-	-	-	-	10.2	-	-
F112	20.2	9.7	23.2	-	11.7	12.6	6.4	10.3	17.2	7.1	11.7	SATISFACTORY
F113	-	-	-	-	-	-	18.5	6.5	2.0	6.0	6.3	SATISFACTORY
F118	52.8	5.7	4.1	3.8	42.0	87.2	5.2	1.3	5.0	9.0	5.4	SATISFACTORY
F122	0.0	2.8	1.4	2.6	3.9	4.2	6.1	37.3	1.4	1.4	2.7	GOOD
F133	-	-	-	-	-	6.2	5.8	14.4	8.5	16.1	8.5	SATISFACTORY
F139	-	-	-	-	-	-	-	55.3	77.9	25.0	55.3	POOR
F145	-	-	-	-	-	-	-	-	33.0	31.6	32.3	POOR
F147	-	-	-	-	-	-	-	-	-	36.0	-	-
INTERLAB MEDIAN	11.9	9.8	9.7	11.4	12.4	9.2	13.5	10.3	11.2	9.6		

STUDY DATES: 0065(20-SEP-1994), 0066(15-JAN-1995), 0067(05-SEP-1995), 0068(01-MAR-1996), 0069(01-SEP-1996), 0070(03-MAR-1997), 0071(02-SEP-1997), 0072(02-MAR-1998), 0073(01-SEP-1998), 0074(01-MAR-1999)

Table 4 Sample design for the acid rain samples and soft waters

Sample Number	Sample Name	Source (Province/State)	Expected Conductance (µS/cm, 25°C)
FP74 SW-1	Miram-97	Miramichi R. NB	43.
FP74 SW-2	Beaupre-95	St. Anne R. QC	32.
FP74 SW-3	Raingr-17	Grimsby Rain, 1996	11.
FP74 SW-4	AES-04	CapMon Rainwater	12.
FP74 SW-5	Mersey-01	Mersey R. NS	26.
FP74 SW-6	GRM-07	rainwater, Grimsby, Ontario	30.
FP74 SW-7	Dorset-95	a soft water lake near Dorset ON	26.
FP74 SW-8	Trois-94	Trois Riviere QC	32.
FP74 SW-9	Plastic-94	Plastic Lake, Dorset ON	22.
FP74 SW-10	AES-03	CapMon Rainwater	15.

Table 5

Summary of Interlaboratory Median Values for Acid Rain & Soft Waters - Study 0074

PARAMETER		SAMPLE NUMBER					
		MIRAM-97 SAMPLE 1	BEAUPRE-95 SAMPLE 2	RAINGR-17 SAMPLE 3	AES-04 SAMPLE 4	MERSEY-01 SAMPLE 5	GRM-07 SAMPLE 6
Acidity to pH 8.3	mg/L CaCO3	2.9000	3.0500	2.1500	2.9000	3.7800	2.3500
Alkalinity Gran Titn	mg/L CaCO3	6.2300	8.5500	-0.1508	-0.7895	0.3295	6.1400
Alkalinity Gran Infl Extrap	mg/L	6.1000	8.2900	0.1025	-0.6900	0.2000	6.0500
Alkalinity Fixed End Pt pH 4.5	mg/L	7.0600	9.4700	1.6950	0.9500	2.0000	7.5000
Aluminum	mg/L	0.0690	0.0500	0.0080	0.0050	0.1010	0.0590
Ammonia	mg/L N	0.0150	0.0050	0.1740	0.2250	0.0070	0.3740
Calcium	mg/L	2.9170	3.2700	0.7060	0.2800	0.8000	2.6300
Chloride Colour	mg/L	6.3000	1.6500	0.1480	0.1670	4.6340	0.5120
Chloride IC	mg/L	6.1470	1.6000	0.1300	0.1450	4.6020	0.4930
Colour	Hazen Unit	67.000	20.450	1.0000	2.0000	39.000	5.0000
Diss Inorg Carbon	mg/L C	1.5100	2.2650	0.3600	0.3850	0.4000	1.7000
Diss Organic Carbon	mg/L C	6.7655	3.3000	0.2000	0.3650	3.9815	0.9920
Magnesium	mg/L	0.6780	0.7300	0.1600	0.0700	0.3900	1.0270
Nitrate + Nitrite	mg/L N	0.1320	0.0805	0.2619	0.2380	0.0385	0.5730
Nitrate-IC	mg/L N	0.1300	0.0800	0.2630	0.2370	0.0400	0.5700
Potassium	mg/L	0.3930	0.2200	0.0165	0.0290	0.2900	0.1600
Reactive Silica	mg/L Si	1.0900	3.4191	0.0190	0.0140	1.0685	0.0859
Sodium	mg/L	4.0000	1.6000	0.0500	0.0700	2.9600	0.2890
Specific Conductance	uS/cm	42.500	32.150	10.610	11.800	26.300	30.000
Sulfate Colour	mg/L	2.5500	3.2500	2.1000	1.5585	2.7000	4.0000
Sulfate IC	mg/L	2.0140	2.9900	2.1510	1.6350	2.2600	3.8250
Total Kjeldahl N	mg/L N	0.2620	0.0880	0.2000	0.2460	0.1000	0.4480
pH	pH Units	6.7600	6.9250	5.3400	4.8200	5.4600	6.8950

		DORSET-95 SAMPLE 7	TROIS-94 SAMPLE 8	PLASTIC-94 SAMPLE 9	AES-03 SAMPLE 10
Acidity to pH 8.3	mg/L CaCO3	3.8200	2.0000	2.0000	3.0000
Alkalinity Gran Titn	mg/L CaCO3	0.2450	5.0700	1.1175	-1.3600
Alkalinity Gran Infl Extrap	mg/L	0.2000	4.9200	1.2400	-1.2000
Alkalinity Fixed End Pt pH 4.5	mg/L	1.9000	6.1000	2.8800	0.7790
Aluminum	mg/L	0.1520	0.0710	0.0140	0.0060
Ammonia	mg/L N	0.0100	0.0285	0.0330	0.1280
Calcium	mg/L	2.1560	2.4500	1.9900	0.1235
Chloride Colour	mg/L	0.7830	1.9170	0.5420	0.3220
Chloride IC	mg/L	0.7400	1.7000	0.5300	0.3040
Colour	Hazen Unit	17.000	37.100	1.6500	2.0000
Diss Inorg Carbon	mg/L C	0.3400	1.2800	0.5150	0.3000
Diss Organic Carbon	mg/L C	4.2250	5.4870	2.3175	0.2515
Magnesium	mg/L	0.5500	0.6130	0.4900	0.0400
Nitrate + Nitrite	mg/L N	0.0480	0.0700	0.0100	0.2500
Nitrate-IC	mg/L N	0.0500	0.0700	0.0040	0.2500
Potassium	mg/L	0.2000	0.5100	0.2400	0.0300
Reactive Silica	mg/L Si	2.0731	1.9600	0.3575	0.0095
Sodium	mg/L	0.7740	2.2100	0.6300	0.1635
Specific Conductance	uS/cm	25.750	31.605	22.400	14.580
Sulfate Colour	mg/L	7.3630	5.1000	6.3700	1.2735
Sulfate IC	mg/L	6.9050	4.6900	6.1900	1.3150
Total Kjeldahl N	mg/L N	0.1370	0.2400	0.1570	0.1500
pH	pH Units	5.4190	6.7400	6.2200	4.5900

Appendix A

Glossary of Terms
Quantifying Bias in NWRI QA Studies

The following three terms define the acceptable differences from the median of results (**target value**) that is allowed without a result being flagged either low or high:

- **LLBAE:** Lower Limit for Use of Basic Acceptable Error,
- **BAE:** Basic Acceptable Error, and
- **CEI:** Concentration Error Increment.

In general, for the NWRI QA studies, the values chosen for the **basic acceptable error** and the **concentration error increment** are selected so that good precision may be inferred. Historically, for the Federal-Provincial QA Program, for moderate ranges, this has been achieved with the 10% Deviation Rule.

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 the basic acceptable error** has been set as 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. The **BAE** would define the acceptable result within the 0-10 μg/L range.

For results above the **lower limit for use of basic acceptable error**, an allowance is made for the increased variability due to concentration. For almost all substances it appears that the variability of results increases with concentration. The allowance is added to the **basic acceptable error**. It is calculated by multiplying the **concentration error increment** (as a percentage) by the difference between the **target value** and the **lower limit for use of basic acceptable error**.

> For example: A **target value** for a sample may be 21 μg/L, the **BAE** is 1.0, the **LLBAE** is 10 μg/L and the **CEI** 0.1. The acceptable difference is calculated by the equation: (**Target - LLBAE**) x **CEI** + **BAE**. For the figures mentioned the answer would be (21 - 10) x 0.10 + 1.0 = 2.1. Thus the range 18.9 to 23.1 μg/L would be considered acceptable and would not be flagged.

The calculated acceptable difference is termed **1 criteria** or **crit**. This value and the value of three standard deviations (**3SD**) are both action criteria in the determination of flags. When the **reported value** is subtracted from the **target value**, the difference is then divided by the **1 criteria** value. This produces the number of **1 crit** deviations. The assigned flag depends upon what range this number falls into.

GLOSSARY OF TERMS

Used for the Evaluation of Interlaboratory Results

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

Bias: Results for a parameter are assessed to be biased by the procedure of Youden when they are consistently ranked to be either higher or lower than the median result. In these interlaboratory studies, for most parameters, a bias of greater than 5% is considered to be excessive. Biases of less than 5% are noted for caution and investigation.

Bias Blank: In the graph for bias % slope, the y-intercept for the laboratory results indicates a systematic blank of analysis. This is the second component of bias.

Bias % Slope: When laboratory results for a parameter are plotted against the target values, the slope as compared to the ideal results (no bias) is considered to be the major component of the degree of bias. For an explanation of Bias % Slope see the following explanation in "Quantifying Bias in NWRI QA Studies".

Erratic: Results for a parameter are evaluated as erratic when both high and low flags are assigned.

Flagged Result: A result is flagged when its value is beyond that of the median (target value) plus or minus the acceptable difference.

Isolated Outlier: A parameter analysis which performs satisfactorily but produces an extreme result. (formerly, 'out of control')

Satisfactory: Fully acceptable, 'good results'.

'W' or 'T' Code: A 'W' or 'T' code may be used with a reported result as described in ASTM. However, in the NWRI QA studies, these codes may result in flagging discrepancies. "Less than" values or negative results are also legitimate when reporting the results. Laboratories should use their usual data reporting protocols insofar as they are compatible with the other laboratories.

1 Criteria Deviations	Assigned Flag
1 - 1.5	L or H
1.5 - 3SD	VL or VH
> 3SD	EL or EH

In cases where the **3SD** value is lower than that of **1 crit**, only extreme flags (EL or EH) are assigned. A minimum of 6 results are needed for the calculation of **3SD**, otherwise, 2 criteria deviations are used.

References:

1. ASTM, 1983, Volume 11.01, Water 1, Section II, pp. D4210-83.
2. Ranking Laboratories by Round-Robin Tests, W.J. Youden, Precision Measurement and Calibration, H.H. Ku, Editor, NBS Special Publication 300-Volume 1, U.S. Government Printing Office, Washington, D.C., 1969.

June 1996

Quantifying Bias in NWRI QA Studies

Introduction

Systematic bias as part of the QA data assessment is a major element in quantifying data quality. It is important in qualifying the accuracy of data in a general sense, when the entire set of analysis data may be affected by factors such as calibration, instrument setup, chemical reagent efficiency and purity of blank solutions. The absence of bias is not only very important when assessing data accuracy, but also when merging data sets from different times or locations.

Degree of Bias

In the NWRI QA studies with 10 sample series, systematic bias[1] is assessed non-parametrically by the procedure of Youden. The degree of bias is important in these interlaboratory studies for two reasons. When the degree of bias is small, it should not fault a laboratory's performance. On the other hand, when the degree is higher, it should be quanitified and remedial action undertaken. The degree of bias may be parametrically quantified by two parameters taken from the parameter performance chart, as in figure 1. When bias is indicated by the procedure of Youden, the slope and intercept, give the degree of bias. Incidentally, a complication arises from the high precision of methodologies and instrumentation like ICPMS. A very high precision of analysis may lead to an assessment of very low bias, e.g. 2 or 3%.

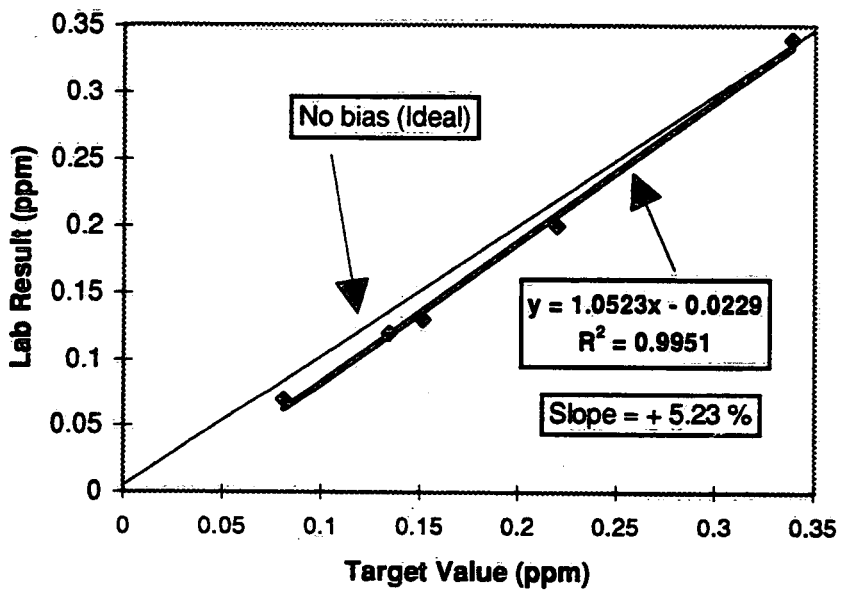
[1] Systematic bias is often identified with the comparison of data to a certified standard.

Parameter Performance Graph and Bias

The parameter performance graph, Figure 1, charts the laboratory results against the target values for a parameter. The ideal results, showing no bias and no deviating data, would fall on the 45° line labeled 'no bias (ideal)'. In this figure, the laboratory results have a very high degree of precision as indicated by the the correlation coefficient (R^2) of 0.9999. The slope of the regression line, as indicated by the equation was 0.9637 and as a percentage calculates to be -3.63%. This slope is one factor in evaluating the degree of bias.

The second contribution of bias, as indicated by the parameter performance graph, is the analysis blank. This blank value is given by the y-intercept, and in this case is indicated to be 0.0005 ppm. These two factors, slope and blank are considered to be the two important considerations in quantifying bias. Preliminary investigation indicates that the slope value is the most important factor and needs to be followed most closely. However, the blank may be contaminated (alternatively the standards) and become the larger factor of the two. The example in Figure 2 is a case in point.

Figure 2 **Parameter Performance**



In this parameter performance graph, we have a worst case situation. The Youden bias for this parameter is indicated as 'biased low'. However, the graph for this parameter and laboratory indicates a positive slope of 5.23%. Upon examining the graph, the regression line indicates a considerably large negative intercept or blank value. In this case it is the blank value that needs to be investigated.

Conclusion

Systematic bias as indicated in the NWRI interlaboratory study by the procedure of Youden has two distinct components. The regression equation as given in the performance graph can quantify these two important factors. Whereas the slope factor may be the most significant of the two, the blank bias factor should also be indicated for the cases where it may be the larger and more meaningful of the two.

June 1996

NWRI Ecosystem Interlaboratory QA Program

Bias Critical Values
Rain and Soft Waters

Parameter	%
Conductance	3
Colour	25
Acidity (to pH 8.3)	5
pH	5
DOC	5
DIC	5
Alkalinity (fixed end point)	3
Alkalinity (gran. inflec.)	3
Alkalinity (gran. titration)	3
Nitrate + Nitrite	5
Nitrate	5
Ammonia	7.5
TKN	10
Sodium	5
Magnesium	5
Silica	5
Sulfate (IC)	5
Sulfate (non-IC)	5
Chloride (IC)	5
Chloride (non-IC)	5
Potassium	5
Calcium	5
Aluminum	5

June 1996

Appendix B

Data & Evaluation Summary

PARAMETER: 00392 Specific Conductance uS/cm

NATIONAL WATER RESEARCH INSTITUTE
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BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 1.2500 CONCENTRATION ERROR INCREMENT= 0.0300

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	41.6	9.50	31.1	7.00	11.1	24.50	12.7	28.50	26.2	16.00	28.6	6.50
F003	42.4	15.00	32.2	18.00	11.1	24.50	12.6	27.00	26.5	20.00	30.3	21.50
F004	43.1	22.00	32.7	21.00	11.3	28.00	12.8	30.00	26.7	21.00	30.7	26.50
F007	42.	13.50	32.1	15.50	10.9	18.00	12.2	22.00	26.4	18.00	30.	15.50
F009	44.	24.50	33.	25.00	10.	7.50	11.	11.00	27.	26.00	30.	15.50
F010	42.5	16.50	32.2	18.00	10.6	14.50	12.	19.00	26.4	18.00	30.2	19.00
F011	45.7 H	31.00	34.4 H	31.00	11.6	31.00	13.8 H	32.00	28.7 H	31.00	32.5 H	31.00
F014	43.2	23.00	32.2	18.00	10.6	14.50	11.7	14.00	26.4	18.00	30.2	19.00
F015	40. L	4.00	30.	4.00	10.	7.50	10. L	3.00	25.	6.00	28.	4.00
F020	43.04	21.00	32.07	14.00	10.59	12.00	12.03	21.00	27.02	27.00	30.57	25.00
F022	44.	24.50	33.	25.00	11.	20.50	11.	11.00	12. EL	1.00	30.	15.50
F026	44.6	27.00	33.8	28.00	11.2	27.00	12.7	28.50	27.9	28.00	31.8	28.00
F032	40.4	6.00	30.4	5.00	9.4	2.00	10.8	9.00	25.8	10.00	28.6	6.50
F036	40.8	7.00	32.8	22.00	9.8	3.00	10.6	8.00	24. L	3.00	27.6 L	2.00
F037	42.5	16.50	33.	25.00	10.93	19.00	12.48	24.00	26.9	24.50	30.3	21.50
F042	41.2	8.00	31.5	10.00	10.5	11.00	11.8	17.00	25.7	9.00	29.4	12.00
F053	42.7	18.50	32.4	20.00	11.1	24.50	12.5	25.00	26.8	22.50	30.4	23.50
F060	43.	20.00	32.	12.50	11.	20.50	11.	11.00	26.	13.00	30.	15.50
F071	41.6	9.50	31.3	8.00	11.05	22.00	12.02	20.00	25.9	11.00	29.1	11.00
F072	38.4 VL	3.00	28.3 VL	2.00	9.9	4.00	10.2 L	5.50	24.3	4.00	28.6	6.50
F074	42.	13.50	32.	12.50	10.	7.50	9. VL	1.00	26.	13.00	29.	9.00
F094	46.6 VH	32.00	37. EH	32.00	12.3 H	32.00	13.5 H	31.00	30.7 EH	32.00	33.3 VH	32.00
F107	40.1	5.00	30.7	6.00	10.0	7.50	11.1	13.00	25.4	7.50	28.6	6.50
F109	38.0 VL	2.00	28.8 VL	3.00	9.94	5.00	11.76	15.00	24.7	5.00	27.8 L	3.00
F110	45.0 H	28.50	34.3	29.50	11.5	29.50	10.0 L	3.00	28.0	29.50	32.1	29.50
F110a	45.0 H	28.50	34.3	29.50	11.5	29.50	10.0 L	3.00	28.0	29.50	32.1	29.50
F112	42.7	18.50	32.1	15.50	11.1	24.50	12.3	23.00	26.9	24.50	30.4	23.50
F113	41.88	12.00	31.46	9.00	10.62	17.00	12.57	26.00	25.40	7.50	29.07	10.00
F122	41.7	11.00	31.8	11.00	10.2	10.00	11.8	17.00	26.1	15.00	29.8	13.00
F133	44.3	26.00	33.1	27.00	10.6	14.50	11.8	17.00	26.8	22.50	30.2	19.00
F145	45.2 H	30.00	32.9	23.00	10.6	14.50	10.2 L	5.50	26.	13.00	30.7	26.50
F147	37.7 VL	1.00	28.1 VL	1.00	8.9 EL	1.00	10.3	7.00	23. VL	2.00	26.4 VL	1.00
MEDIAN	42.5000		32.1500		10.6100		11.8000		26.3000		30.0000	
1CRIT	2.4950		2.1845		1.5383		1.5740		2.0090		2.1200	
N	30		30		30		30		30		30	
MEAN	42.4207		32.0643		10.6577		11.5820		26.1973		29.8880	
3STDEV	5.6037		4.2415		1.7065		2.9379		3.6074		3.6895	

PARAMETER: 00392 Specific Conductance uS/cm

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	25.6	14.50	30.8	10.00	22.	12.50	14.8	20.50
F003	25.6	14.50	31.8	21.50	22.4	17.00	15.7	30.00
F004	26.1	26.50	32.4	27.00	22.5	19.00	15.6	29.00
F007	25.6	14.50	31.5	15.00	22.9	24.50	14.8	20.50
F009	26.	22.00	32.	25.50	22.	12.50	13.	7.00
F010	25.6	14.50	31.7	18.50	22.8	22.50	14.3	11.50
F011	27.5	31.00	34. H	31.00	24.1	31.00	16.7 H	32.00
F014	26.0	22.00	31.8	21.50	22.4	17.00	15.1	25.00
F015	24.	5.00	30.	6.00	21.	4.00	12. VL	4.00
F020	24.95	10.00	31.61	17.00	21.52	8.00	14.59	17.00
F022	26.	22.00	32.	25.50	23.	26.50	15.	23.50
F026	27.0	28.00	33.2	28.00	23.6	28.00	15.2	26.00
F032	24.8	8.00	30.8	10.00	21.4	5.00	13.2	8.00
F036	23.2 L	2.00	30.8	10.00	20.4 L	2.00	12.8 L	5.00
F037	26.	22.00	31.6	16.00	22.9	24.50	14.73	18.00
F042	24.9	9.00	30.7	8.00	21.5	6.50	14.3	11.50
F053	26.1	26.50	31.7	18.50	22.4	17.00	14.8	20.50
F060	26.	22.00	31.	12.50	22.	12.50	14.	10.00
F071	25.1	11.00	31.0	12.50	21.7	10.00	14.51	15.00
F072	23.8	3.50	29.8	4.00	21.5	6.50	11.7 VL	3.00
F074	26.	22.00	29. L	2.00	23.	26.50	11. VL	1.00
F094	30.6 EH	32.00	38.4 EH	32.00	28. EH	32.00	16.	31.00
F107	24.6	6.00	29.9	5.00	21.6	9.00	13.9	9.00
F109	23.8	3.50	29.2 L	3.00	20.7	3.00	14.57	16.00
F110	27.2	29.50	33.8 H	29.50	23.8	29.50	15.5	27.50
F110a	27.2	29.50	33.8 H	29.50	23.8	29.50	15.5	27.50
F112	25.9	17.50	31.9	24.00	22.6	20.00	15.0	23.50
F113	24.69	7.00	30.43	7.00	22.07	15.00	14.49	14.00
F122	25.2	12.00	31.1	14.00	22.0	12.50	14.8	20.50
F133	25.9	17.50	31.8	21.50	22.8	22.50	14.4	13.00
F145	26.	22.00	31.8	21.50	22.7	21.00	11.4 VL	2.00
F147	22. EL	1.00	27.6 EL	1.00	19.3 EL	1.00	12.9 L	6.00
MEDIAN	25.7500		31.6050		22.4000		14.5800	
1CRIT	1.9925		2.1681		1.8920		1.6574	
N	30		30		30		30	
MEAN	25.5447		31.4313		22.3030		14.2863	
3STDEV	3.0490		3.6605		2.6705		3.5113	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	149.50	14.950	10					Dip Cell
F003	209.00	20.900	10					Cond. probe
F004	250.00	25.000	10					02041
F007	177.00	17.700	10					
F009	176.50	17.650	10					meter
F010	172.00	17.200	10					meter
F011	312.00	31.200	10	H H H H H H H	BIASED HIGH	4.61	0.9892	
F014	192.00	19.200	10					
F015	47.50	4.750	10	L L VL	BIASED LOW*	-2.57	-1.1333	Meter
F020	172.00	17.200	10					Radiometer
F022	195.00	19.500	10	EL				Electrometry
F026	276.50	27.650	10		BIASED HIGH	4.78	0.1457	Wat.Anal.Sys. cell
F032	69.50	6.950	10		BIASED LOW*	-1.96	-0.7235	meter
F036	64.00	6.400	10	L L L L L	BIASED LOW*	0.05	-1.5026	meter
F037	211.00	21.100	10					V.W.R.
F042	102.00	10.200	10					Cond. Meter
F053	216.50	21.650	10					bridge and cell
F060	149.50	14.950	10					meter
F071	130.00	13.000	10					meter
F072	42.00	4.200	10	VLVL L VL	BIASED LOW	-6.87	-0.4190	
F074	108.00	10.800	10	VL L VL				Auto flow thu
F094	318.00	31.800	10	VHEHH H EHVHEHEHEH	BIASED HIGH	11.90	0.9237	Meter
F107	74.50	7.450	10		BIASED LOW	-5.21	0.1120	Electro.
F109	58.50	5.850	10	VLVL L L	BIASED LOW	-13.27	1.4449	Cond. Meter
F110	265.50	26.550	10	H L H	BIASED HIGH	9.55	-1.0145	YSI meter 25C
F110a	265.50	26.550	10	H L H	BIASED HIGH	9.55	-1.0145	YSI meter 25C
F112	214.50	21.450	10					YSI METER
F113	124.50	12.450	10					meter YSI3200
F122	136.00	13.600	10					Radiom. CDM83
F133	200.50	20.050	10					COND. METER
F145	179.00	17.900	10	H L VL				Conductivity meter
F147	22.00	2.200	10	VLVLEL VLVLELELELL	BIASED LOW	-11.01	-0.4217	meter

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 3.00

OVERALL AVERAGE
RANK IS 16.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F147	22.00	2.200	10	VLVLELVLVLELELELL	BIASED LOW	-11.01	-0.4217	meter
F072	42.00	4.200	10	VLVLLVL	BIASED LOW	-6.87	-0.4190	
F015	47.50	4.750	10	LLVL	BIASED LOW*	-2.57	-1.1333	Meter
F109	58.50	5.850	10	VLVLLL	BIASED LOW	-13.27	1.4449	Cond. Meter
F036	64.00	6.400	10	LLLLL	BIASED LOW*	0.05	-1.5026	meter
F032	69.50	6.950	10		BIASED LOW*	-1.96	-0.7235	meter
F107	74.50	7.450	10		BIASED LOW	-5.21	0.1120	Electro.
F042	102.00	10.200	10					Cond. Meter
F074	108.00	10.800	10	VLLVL				Auto flow thu
F113	124.50	12.450	10					meter YSI3200
F071	130.00	13.000	10					meter
F122	136.00	13.600	10					Radiom. CDM83
F060	149.50	14.950	10					meter
F002	149.50	14.950	10					Dip Cell
F010	172.00	17.200	10					meter
F020	172.00	17.200	10					Radiometer
F009	176.50	17.650	10					meter
F007	177.00	17.700	10					
F145	179.00	17.900	10	HLVL				Conductivity meter
F014	192.00	19.200	10					
F022	195.00	19.500	10	EL				Electrometry
F133	200.50	20.050	10					COND. METER
F003	209.00	20.900	10					Cond. probe
F037	211.00	21.100	10					V.W.R.
F112	214.50	21.450	10					YSI METER
F053	216.50	21.650	10					bridge and cell
F004	250.00	25.000	10					02041
F110	265.50	26.550	10	HLH	BIASED HIGH	9.55	-1.0145	YSI meter 25C
F110a	265.50	26.550	10	HLH	BIASED HIGH	9.55	-1.0145	YSI meter 25C
F026	276.50	27.650	10		BIASED HIGH	4.78	0.1457	Wat.Anal.Sys. cell
F011	312.00	31.200	10	HHHHHHH	BIASED HIGH	4.61	0.9892	
F094	318.00	31.800	10	VHEHHHEHVHEHEHEH	BIASED HIGH	11.90	0.9237	Meter

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 3.00

OVERALL AVERAGE
RANK IS 16.500

PARAMETER: 00292 Colour Hazen Unit

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 3.0000 BASIC ACCEPTABLE ERROR= 3.0000 CONCENTRATION ERROR INCREMENT= 0.1500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	69.	8.00	23.	10.00	<5.0	0.00	<5.0	0.00	38.	6.50	5.	7.50
F003	61.4	6.00	18.9	7.00	1.0	3.00	0.60	2.00	34.5	4.00	4.0	5.00
F004	65.	7.00	15.	4.50	5.W	0.00	5.W	0.00	35.	5.00	5.W	0.00
F007	78.	12.50	25.	13.00	<4.	0.00	<4.	0.00	41.	11.50	5.	7.50
F010	46. VL	1.00	14. L	3.00	<1.	0.00	<1.	0.00	25. VL	2.00	2.	2.00
F011	60.	4.50	10. VL	2.00	<5.	0.00	<5.	0.00	40.	9.00	5.	7.50
F014	50. L	2.50	5. EL	1.00	<5.	0.00	<5.	0.00	20. EL	1.00	<5.	0.00
F032	73.2	11.00	22.2	9.00	0.2W	1.00	0.2W	1.00	38.	6.50	3.	3.50
F042	78.	12.50	24.	11.50	1.	3.00	2.	3.00	41.	11.50	6.	10.00
F060	92. VH	14.00	26.	14.00	1.	3.00	3.	5.00	45.	13.00	3.	3.50
F072	70.	9.00	24.	11.50	<5.	0.00	<5.	0.00	40.	9.00	8.	12.00
F094	60.	4.50	17.5	6.00	2.5	5.00	2.5	4.00	50. H	14.00	7.5	11.00
F122	72.	10.00	22.	8.00	0.5W	0.00	0.5W	0.00	40.	9.00	1.8	1.00
F145	50. L	2.50	15.	4.50	<2.5	0.00	<2.5	0.00	30. L	3.00	5.	7.50
MEDIAN	67.0000		20.4500		1.0000		2.0000		39.0000		5.0000	
1CRIT	12.6000		5.6175		3.0000		3.0000		8.4000		3.3000	
N	12		12		3		3		12		10	
MEAN	65.5500		19.2167		1.0000		1.7000		37.2917		4.5500	
3STDEV	27.4486		13.9894		-		-		15.6659		4.5719	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	17.	7.00	37.	7.00	<5.0	0.00	<5.0	0.00
F003	18.3	11.00	33.2	4.00	2.1	5.00	<0.5	0.00
F004	10. L	2.00	35.	5.50	5.W	0.00	5.W	0.00
F007	17.	7.00	39.	10.50	<4.	0.00	<4.	0.00
F010	13.	4.00	25. L	2.00	1.	2.50	<1.	0.00
F011	10. L	2.00	40.	12.00	<5.	0.00	<5.	0.00
F014	10. L	2.00	20. EL	1.00	<5.	0.00	<5.	0.00
F032	19.	12.00	37.2	8.00	1.2	4.00	0.2W	1.00
F042	18.	10.00	41.	13.00	3.	6.00	2.	2.50
F060	22.	13.00	46. H	14.00	1.	2.50	2.	2.50
F072	24. H	14.00	38.	9.00	5. H	7.50	<5.	0.00
F094	17.5	9.00	35.	5.50	5. H	7.50	2.5	4.00
F122	17.	7.00	39.	10.50	0.5W	1.00	0.5W	0.00
F145	15.	5.00	30.	3.00	<2.5	0.00	<2.5	0.00
MEDIAN	17.0000		37.1000		1.6500		2.0000	
1CRIT	5.1000		8.1150		3.0000		3.0000	
N	13		12		5		2	
MEAN	15.6769		35.7833		1.6600		2.0000	
3STDEV	11.0441		13.1829		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	46.00	7.667	6					Automated AAII
F003	47.00	5.222	9					Spectro.
F004	24.00	4.800	5	L				02021
F007	62.00	10.333	6		BIASED HIGH*	15.84	-1.6566	
F010	16.50	2.357	7	VLL VL L	BIASED LOW	-31.50	-0.3191	Colorimetry
F011	37.00	6.167	6	VL L				
F014	7.50	1.500	5	L EL EL L EL	BIASED LOW*	-14.06	-10.0340	
F032	57.00	5.700	10					TCU
F042	83.00	8.300	10					Colorimetric
F060	84.50	8.450	10	VH H				Vis. Comparison
F072	72.00	10.286	7	H H	BIASED HIGH*	-3.13	3.9512	vis. comparison
F094	70.50	7.050	10	H H				Nephelometric
F122	46.50	6.643	7					455nm, Spectro.
F145	25.50	4.250	6	L L				Visual Comparison

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 25.00

OVERALL AVERAGE
RANK IS 6.529

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	7.50	1.500	5	LELELLEL	BIASED LOW*	-14.06	-10.0340	
F010	16.50	2.357	7	VLLVLL	BIASED LOW	-31.50	-0.3191	Colorimetry
F145	25.50	4.250	6	LL				Visual Comparison
F004	24.00	4.800	5	L				02021
F003	47.00	5.222	9					Spectro.
F032	57.00	5.700	10					TCU
F011	37.00	6.167	6	VLL				
F122	46.50	6.643	7					455nm, Spectro.
F094	70.50	7.050	10	HH				Nephelometric
F002	46.00	7.667	6					Automated AAII
F042	83.00	8.300	10					Colorimetric
F060	84.50	8.450	10	VHH				Vis. Comparison
F072	72.00	10.286	7	HH	BIASED HIGH*	-3.13	3.9512	vis. comparison
F007	62.00	10.333	6		BIASED HIGH*	15.84	-1.6566	

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 25.00

OVERALL AVERAGE
RANK IS 6.529

Colour

PARAMETER: 01092 pH pH Units

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 5.5000 BASIC ACCEPTABLE ERROR= 0.2000 CONCENTRATION ERROR INCREMENT= 0.0000

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	6.77	19.00	6.96	22.50	5.19	5.00	4.67	2.50	5.43	9.00	6.96	22.00
F003	6.66	7.00	6.72 L	6.00	5.34	17.00	4.79	11.50	5.50	22.50	6.74	8.00
F007	6.84	23.00	7.04	28.00	5.35	19.00	4.82	18.00	5.49	20.50	7.04	26.00
F009	6.63	6.00	6.75	7.00	5.26	10.00	4.82	18.00	5.44	11.00	6.86	13.50
F010	6.72	10.50	6.87	13.00	5.2	6.50	4.76	6.00	5.39	6.00	6.91	18.00
F011	6.83	21.50	6.96	22.50	5.06 L	2.00	4.68	4.00	5.26	3.00	6.87	15.00
F014	6.72	10.50	7.05	29.00	5.35	19.00	4.85	25.00	5.545	27.00	7.12 H	29.50
F015	6.85	24.00	6.95	20.50	5.58 H	32.00	5.09 H	32.00	5.66	32.00	7.00	25.00
F017		0.00		0.00	5.37	21.00	4.84	22.00	5.53	24.00		0.00
F020	6.76	17.00	6.85	11.50	5.46	26.50	4.85	25.00	5.59	30.00	7.12 H	29.50
F022	6.97 H	29.00	6.92	16.00	5.39	22.00	4.94	30.00	5.54	25.50	6.61 L	6.00
F025	6.45 VL	4.00	6.64 L	5.00	5.02 VL	1.00	4.55 EL	1.00	5.12 EL	1.00	6.62 L	7.00
F026	6.87	25.00	6.95	20.50	5.48	28.00	4.82	18.00	5.56	28.00	6.96	22.00
F032	6.9	27.00	6.93	17.50	5.43	23.00	4.84	22.00	5.57	29.00	7.16 H	31.00
F036	6.74	14.00	6.83	10.00	5.31	16.00	4.8	14.50	5.5	22.50	6.99	24.00
F037	6.71	9.00	6.79	8.00	5.35	19.00	4.83	20.00	5.48	19.00	6.95	20.00
F042	6.79	20.00	6.82	9.00	5.45	24.50	4.93	29.00	5.46	17.00	6.96	22.00
F053	6.95	28.00	7.23 VH	30.00	5.28	12.00	4.78	8.00	5.49	20.50	7.08	28.00
F060	6.89	26.00	6.98	24.00	5.52	29.50	5.05 H	31.00	5.43	9.00	6.92	19.00
F071	6.98 H	30.00	6.93	17.50	5.52	29.50	4.79	11.50	5.43	9.00	6.79	9.00
F072	7.55 EH	32.00	7.85 EH	32.00	5.23	8.50	4.92	28.00	5.45	13.00	5.83 EL	1.00
F074	7.19 VH	31.00	7.42 VH	31.00	5.73 EH	33.00	5.1 EH	33.00	5.74 H	33.00	7.33 VH	32.00
F094	6.5 L	5.00	6.6 VL	4.00	5.1 L	3.00	4.8	14.50	5.2 L	2.00	6.4 VL	3.00
F107	6.76	17.00	7.02	27.00	5.23	8.50	4.67	2.50	5.40	7.00	6.90	17.00
F109	6.722	12.00	6.912	15.00	5.282	13.00	4.786	10.00	5.455	15.00	7.051	27.00
F110	6.40 VL	2.50	6.58 VL	2.50	5.30	14.50	4.80	14.50	5.45	13.00	6.55 VL	4.50
F110a	6.40 VL	2.50	6.58 VL	2.50	5.30	14.50	4.80	14.50	5.45	13.00	6.55 VL	4.50
F112	6.736	13.00	6.892	14.00	5.273	11.00	4.783	9.00	5.458	16.00	6.838	12.00
F113	6.83	21.50	7.00	25.00	5.46	26.50	4.84	22.00	5.47	18.00	6.89	16.00
F122	6.67	8.00	7.01	26.00	5.53	31.00	4.90	27.00	5.61	31.00	6.80	10.00
F133	6.75	15.00	6.85	11.50	5.45	24.50	4.85	25.00	5.54	25.50	6.86	13.50
F145	6.76	17.00	6.94	19.00	5.2	6.50	4.77	7.00	5.38	5.00	6.82	11.00
F147	5.98 EL	1.00	6.03 EL	1.00	5.18	4.00	4.75	5.00	5.3	4.00	5.99 EL	2.00
MEDIAN	6.7600		6.9250		5.3400		4.8200		5.4600		6.8950	
1CRIT	0.2000		0.2000		0.2000		0.2000		0.2000		0.2000	
N	30		30		31		31		31		30	
MEAN	6.7583		6.8991		5.3363		4.8264		5.4664		6.8436	
3STDEV	0.5061		0.5275		0.3856		0.2719		0.2862		0.7190	

PARAMETER: 01092 pH pH Units

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	5.31	6.00	6.84	25.00	6.26	21.00	4.44	2.00
F003	5.42	18.50	6.74	16.00	6.19	10.50	4.58	12.50
F007	5.46	23.50	6.92	30.00	6.38	29.50	4.59	16.00
F009	5.35	10.00	6.74	16.00	6.19	10.50	4.52	5.50
F010	5.31	6.00	6.74	16.00	6.14	8.00	4.53	7.00
F011	5.24	2.00	6.8	21.00	6.22	16.50	4.52	5.50
F014	5.42	18.50	6.88	27.00	6.25	19.50	4.63	24.00
F015	5.62 H	32.50	6.89	28.00	6.36	28.00	4.76	32.00
F017	5.43	20.00		0.00		0.00	4.61	20.50
F020	5.54	30.50	6.97 H	31.00	6.21	13.00	4.71	30.00
F022	5.44	21.00	6.44 L	4.00	6.22	16.50	4.68	27.50
F025	5.11 EL	1.00	6.45 L	5.00	5.88 VL	3.00	4.38 EL	1.00
F026	5.46	23.50	6.80	21.00	6.31	24.00	4.61	20.50
F032	5.49	27.50	6.82	23.00	6.35	27.00	4.61	20.50
F036	5.4	15.50	6.83	24.00	6.25	19.50	4.59	16.00
F037	5.35	10.00	6.72	12.50	6.21	13.00	4.61	20.50
F042	5.37	13.00	6.70	8.00	6.23	18.00	4.60	18.00
F053	5.40	15.50	6.91	29.00	6.32	25.00	4.59	16.00
F060	5.46	23.50	6.76	18.00	6.18	9.00	4.68	27.50
F071	5.49	27.50	6.72	12.50	6.38	29.50	4.65	26.00
F072	5.35	10.00	5.94 EL	1.00	5.57 EL	1.00	4.58	12.50
F074	5.62 H	32.50	7.12 VH	32.00	6.54 VH	32.00	4.88 EH	33.00
F094	5.5	29.00	6.4 VL	3.00	6. L	4.00	4.5	4.00
F107	5.31	6.00	6.71	11.00	6.21	13.00	4.47	3.00
F109	5.375	14.00	6.877	26.00	6.299	22.00	4.579	11.00
F110	5.35	10.00	6.70	8.00	6.03	5.50	4.57	9.50
F110a	5.35	10.00	6.70	8.00	6.03	5.50	4.57	9.50
F112	5.419	17.00	6.733	14.00	6.218	15.00	4.585	14.00
F113	5.46	23.50	6.80	21.00	6.33	26.00	4.73	31.00
F122	5.54	30.50	6.70	8.00	6.42 H	31.00	4.69	29.00
F133	5.47	26.00	6.77	19.00	6.30	23.00	4.64	25.00
F145	5.28	4.00	6.7	8.00	6.05	7.00	4.62	23.00
F147	5.25	3.00	6. EL	2.00	5.75 EL	2.00	4.54	8.00
MEDIAN	5.4190		6.7400		6.2200		4.5900	
1CRIT	0.2000		0.2000		0.2000		0.2000	
N	30		30		30		31	
MEAN	5.3998		6.7253		6.2056		4.5995	
3STDEV	0.2382		0.5617		0.4462		0.2146	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	134.00	13.400	10					pH Meter
F003	129.50	12.950	10	L				pH electrode
F007	233.50	23.350	10					
F009	107.50	10.750	10					Stirred
F010	97.00	9.700	10					Stirred
F011	113.00	11.300	10	L				
F014	229.00	22.900	10	H				
F015	286.00	28.600	10	H H H	BIASED HIGH	-6.69	0.5548	Meter
F017	107.50	21.500	5					Electrometric
F020	244.00	24.400	10	H H				
F022	197.50	19.750	10	H L L				Electrometry
F025	29.00	2.900	10	VLL VLELELL ELL VLEL	BIASED LOW*	-1.26	-0.2204	Mettler Auto
F026	230.50	23.050	10					Wat.Anal.Sys. el.
F032	247.50	24.750	10	H				Unstirred
F036	176.00	17.600	10					Unstirred
F037	151.00	15.100	10					Accumet
F042	178.50	17.850	10					Unstirred
F053	212.00	21.200	10	VH				unstirred
F060	216.50	21.650	10	H				meter
F071	202.00	20.200	10	H				Ionanalyzer
F072	139.00	13.900	10	EHEH EL ELEL				stirred
F074	322.50	32.250	10	VHVHEHEHH VHH VHVHEH	BIASED HIGH	7.66	-0.1030	Stirred
F094	71.50	7.150	10	L VLL L VL VLL	BIASED LOW	-14.14	0.6199	Meter
F107	112.00	11.200	10					Electro.
F109	165.00	16.500	10					unstirred auto
F110	84.50	8.450	10	VLVL VL				stirred 25C
F110a	84.50	8.450	10	VLVL VL				stirred 25C
F112	135.00	13.500	10					STIRRED
F113	230.50	23.050	10					unstirred, Phi 310
F122	231.50	23.150	10	H				Hach Combination
F133	208.00	20.800	10					ELECTRODE
F145	107.50	10.750	10					Electrometric
F147	32.00	3.200	10	ELEL EL ELEL	BIASED LOW	-38.91	1.8623	potentiometry

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.754

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F025	29.00	2.900	10	VLLVLELELLELLVLEL	BIASED LOW*	-1.26	-0.2204	Mettler Auto
F147	32.00	3.200	10	ELELELELEL	BIASED LOW	-38.91	1.8623	potentiometry
F094	71.50	7.150	10	LVLLLVLVLL	BIASED LOW	-14.14	0.6199	Meter
F110	84.50	8.450	10	VLVLVL				stirred 25C
F110a	84.50	8.450	10	VLVLVL				stirred 25C
F010	97.00	9.700	10					Stirred
F009	107.50	10.750	10					Stirred
F145	107.50	10.750	10					Electrometric
F107	112.00	11.200	10					Electro.
F011	113.00	11.300	10	L				
F003	129.50	12.950	10	L				pH electrode
F002	134.00	13.400	10					pH Meter
F112	135.00	13.500	10					STIRRED
F072	139.00	13.900	10	EHEHELELEL				stirred
F037	151.00	15.100	10					Accumet
F109	165.00	16.500	10					unstirred auto
F036	176.00	17.600	10					Unstirred
F042	178.50	17.850	10					Unstirred
F022	197.50	19.750	10	HLL				Electrometry
F071	202.00	20.200	10	H				Ionanalyzer
F133	208.00	20.800	10					ELECTRODE
F053	212.00	21.200	10	VH				unstirred
F017	107.50	21.500	5					Electrometric
F060	216.50	21.650	10	H				meter
F014	229.00	22.900	10	H				
F026	230.50	23.050	10					Wat.Anal.Sys. el.
F113	230.50	23.050	10					unstirred, Phi 310
F122	231.50	23.150	10	H				Hach Combination
F007	233.50	23.350	10					
F020	244.00	24.400	10	HH				
F032	247.50	24.750	10	H				Unstirred
F015	286.00	28.600	10	HHH	BIASED HIGH	-6.69	0.5548	Meter
F074	322.50	32.250	10	VHVHEHEHHVHHVHVHEH	BIASED HIGH	7.66	-0.1030	Stirred

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.754

pH

PARAMETER: 01090 Acidity to pH 8.3 mg/L CaCO3

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.6000 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F014	1.19 VL	1.00	1.12 VL	1.00	1.00 VL	1.00	1.58 VL	1.00	1.65 VL	1.00	0.797 VL	1.00
F015	3.	5.00	3.	4.00	2.	3.50	4. H	7.00	5. H	6.00	3.	7.00
F020	4.26 VH	7.00	5.34 VH	8.00	2.65	6.00	3.58	6.00	4.16	5.00	2.62	6.00
F022	2.8	4.00	3.1	5.00	2.3	5.00	2.9	5.00	3.4	4.00	2.4	5.00
F032	1.95 L	2.00	2.15 L	3.00	1.65	2.00	2.3	4.00	2.6 L	2.00	1.15 VL	2.00
F072	4.2 VH	6.00	4.0 H	6.00	4.2 VH	7.00	4.4 VH	8.00	5.1 VH	7.00	4.4 EH	8.00
F107		0.00		0.00		0.00	2.21	3.00		0.00		0.00
F133	2.5	3.00	2.0 L	2.00	2.0	3.50	2.0 L	2.00	3.0	3.00	2.0	3.00
F145	4.55 VH	8.00	4.55 VH	7.00	9.1 EH	8.00	13.65 EH	9.00	9.1 EH	8.00	2.3	4.00
MEDIAN	2.9000		3.0500		2.1500		2.9000		3.7800		2.3500	
1CRIT	0.7900		0.8050		0.7150		0.7900		0.8780		0.7350	
N	6		6		6		7		6		6	
MEAN	3.1183		3.1333		2.4667		3.0557		3.8767		2.2450	
3STDEV	2.5503		2.7464		2.5005		2.6346		2.8629		1.7306	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F014	1.99 VL	1.00	0.966 L	1.00	0.725 VL	1.00	1.94 L	1.00
F015	5. H	6.00	2.	4.50	2.	4.00	3.	4.50
F020	4.14	5.00	1.94	3.00	2.67	7.00	4.14 H	7.00
F022	3.5	4.00	2.4	7.00	2.	4.00	3.3	6.00
F032	2.95	2.00	1.25 L	2.00	0.95 L	2.00	2.25	2.00
F072	5.5 VH	7.00	4.8 EH	8.00	4.6 EH	8.00	5.1 VH	8.00
F107		0.00		0.00		0.00	2.69	3.00
F133	3.0	3.00	2.0	4.50	2.0	4.00	3.0	4.50
F145	11.38 EH	8.00	2.3	6.00	2.3	6.00	13.75 EH	9.00
MEDIAN	3.8200		2.0000		2.0000		3.0000	
1CRIT	0.8820		0.7000		0.7000		0.8000	
N	6		6		6		7	
MEAN	4.0150		1.9817		1.9867		3.3543	
3STDEV	2.9036		1.1050		1.5686		2.6784	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	10.00	1.000	10	VLVLVLVLVLVLVLL VLL				
F015	51.50	5.150	10	H H H				Titrn
F020	60.00	6.000	10	VHVH H				Gran Electron
F022	49.00	4.900	10					Electrometry
F032	23.00	2.300	10	L L L VL L L				Titrn
F072	73.00	7.300	10	VHH VHVHVHEHVHEHEHVH				NaOH Titration
F107	6.00	3.000	2					Electro.
F133	32.50	3.250	10	L L				TITRIMETRIC
F145	73.00	7.300	10	VHVHEHEHEH EH EH				Titrimetric

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 4.610

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	10.00	1.000	10	VLVLVLVLVLVLVLLVLL				
F032	23.00	2.300	10	LLLVLLL				Titrn
F107	6.00	3.000	2					Electro.
F133	32.50	3.250	10	LL				TITRIMETRIC
F022	49.00	4.900	10					Electrometry
F015	51.50	5.150	10	HHH				Titrn
F020	60.00	6.000	10	VHVHH				Gran Electron
F072	73.00	7.300	10	VHHVHVHVHEHVHEHEHVH				NaOH Titration
F145	73.00	7.300	10	VHVHEHEHEHEHEH				Titrimetric

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 4.610

Acidity to pH 8.3

PARAMETER: 06193 Alkalinity Fixed End mg/L

NATIONAL WATER RESEARCH INSTITUTE
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NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F007	7.6	9.00	9.9	9.00	1.5	1.50	0.8	2.50	1.9	2.00	7.8	9.00
F011	6. L	5.00	8.4 L	5.00	<0.3 EL	0.00	<0.3 EL	0.00	<0.3 EL	0.00	6.2 VL	2.00
F014	8.98 VH	12.00	9.68	8.00	2.06	7.00	1.09	7.00	2.17	8.00	7.75	8.00
F022	5.3 VL	1.00	7.6 VL	1.00	<0.4 EL	0.00	<0.4 EL	0.00	<0.4 EL	0.00	6.61 L	5.00
F025	7.06	7.00	9.47	7.00	1.79	5.00	0.75	1.00	1.92	3.00	7.31	6.00
F032	7.5	8.00	10.	11.00	1.5	1.50	1.	5.50	2.	5.00	7.5	7.00
F036	7.7	10.00	10.1	13.00	1.6	3.50	0.9	4.00	2.05	7.00	7.85	10.00
F060	9. VH	13.00	10.	11.00	3. EH	8.00	3. EH	8.00	4. EH	9.00	9. VH	12.00
F072	7.8	11.00	8.4 L	5.00	1.6	3.50	0.8	2.50	2.0	5.00	8.	11.00
F094	5.8 VL	2.00	8.4 L	5.00	<0.5 EL	0.00	<0.5 EL	0.00	0.7 EL	1.00	6.1 VL	1.00
F107	5.90 L	3.00	8.36 L	3.00		0.00		0.00		0.00	6.40 L	3.50
F145	6. L	5.00	10.	11.00	2.	6.00	1.	5.50	2.	5.00	10. EH	13.00
F147	6. L	5.00	8.2 L	2.00	<1.0 L	0.00	<1.0	0.00	<1.0 EL	0.00	6.4 L	3.50
MEDIAN	7.0600		9.4700		1.6950		0.9500		2.0000		7.5000	
1CRIT	0.7780		0.8985		0.5098		0.5000		0.5250		0.8000	
N	11		11		5		6		7		11	
MEAN	6.9400		9.1645		1.8100		0.9317		2.0057		7.3473	
3STDEV	3.0372		2.2748		-		0.3242		0.2473		2.4700	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F007	1.9	5.00	6.5	8.00	2.7	6.00	0.3	1.00
F011	<0.3 EL	0.00	4.9 VL	3.50	1. VL	1.00	0.6	3.00
F014	2.39	9.00	6.83	11.00	3.70 H	12.00	0.779	4.00
F022	0.66 VL	1.00	4.8 VL	1.50	1.65 VL	5.00	<0.4	0.00
F025	1.93	7.00	6.10	7.00	2.88	7.00	<0.5	0.00
F032	1.5	3.00	6.	6.00	3.	9.50	0.5W	0.00
F036	1.9	5.00	6.65	9.00	2.9	8.00	0.35	2.00
F060	4. EH	10.00	8. VH	13.00	4. VH	13.00	2. EH	7.00
F072	1.9	5.00	6.8	10.00	3.2	11.00	0.8	5.00
F094	0.7 VL	2.00	4.9 VL	3.50	1.2 VL	3.00	<0.5	0.00
F107		0.00	5.11 L	5.00	1.32 VL	4.00		0.00
F145	2.	8.00	7. H	12.00	3.	9.50	1.	6.00
F147	<1.0 VL	0.00	4.8 VL	1.50	1.1 VL	2.00	<1.0	0.00
MEDIAN	1.9000		6.1000		2.8800		0.7790	
1CRIT	0.5200		0.7300		0.5690		0.5000	
N	8		10		11		5	
MEAN	1.7775		6.0790		2.4227		0.7058	
3STDEV	1.3955		2.3548		2.6331		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F007	53.00	5.300	10					
F011	19.50	3.250	6	L L ELELELVLELVLVL				
F014	86.00	8.600	10	VH H				
F022	14.50	2.417	6	VLVLELELELL VLVLVL	BIASED LOW	-5.76	-1.0468	Electrometry
F025	50.00	5.556	9					Mettler Auto
F032	56.50	6.278	9					Titrn
F036	71.50	7.150	10					Titrn
F060	104.00	10.400	10	VH EHEHEHVHEHVHVHEH	BIASED HIGH	-5.86	1.8028	Titration
F072	69.00	6.900	10	L				pH 4.5, H2SO4 Tit.
F094	17.50	2.500	7	VLL ELELELVLVLVLVL	BIASED LOW*	2.71	-1.4441	Autotitrator
F107	18.50	3.700	5	L L L L VL				Electro.
F145	81.00	8.100	10	L EH H				Titrimetric
F147	14.00	2.800	5	L L L ELL VLVLVL	BIASED LOW	9.26	-1.9134	titration

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 3.00

OVERALL AVERAGE
RANK IS 6.121

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F022	14.50	2.417	6	VLVLELELELLVLVLVL	BIASED LOW	-5.76	-1.0468	Electrometry
F094	17.50	2.500	7	VLLELELELVLVLVLVL	BIASED LOW*	2.71	-1.4441	Autotitrator
F147	14.00	2.800	5	LLLELLVLVLVL	BIASED LOW	9.26	-1.9134	titration
F011	19.50	3.250	6	LLELELELVLELVLVL				
F107	18.50	3.700	5	LLLLVL				Electro.
F007	53.00	5.300	10					
F025	50.00	5.556	9					Mettler Auto
F032	56.50	6.278	9					Titrn
F072	69.00	6.900	10	L				pH 4.5, H2SO4 Tit.
F036	71.50	7.150	10					Titrn
F145	81.00	8.100	10	LEHH				Titrimetric
F014	86.00	8.600	10	VHH				
F060	104.00	10.400	10	VHEHEHEHVHEHVHVHEH	BIASED HIGH	-5.86	1.8028	Titration

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 3.00

OVERALL AVERAGE
RANK IS 6.121

PARAMETER: 06194 Alkalinity Gran Infl mg/L

NATIONAL WATER RESEARCH INSTITUTE
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BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 0.3500 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	6.1	4.00	7.8	1.00		0.00		0.00		0.00	6.0	3.00
F007	12.49 EH	7.00	8.81	7.00	-0.12	1.00	-0.83	1.00	0.19	2.00	6.05	4.00
F010	6.5	6.00	8.7	6.00	0.2	3.00	<0.1	0.00	0.2	3.00	6.7 H	6.50
F015	6.4	5.00	8.6	5.00	<0.5	0.00	<0.5	0.00	0.6 H	5.00	6.7 H	6.50
F020	5.63	2.00	8.24	3.00	<1.	0.00	<1.	0.00	<1.	0.00	5.87	1.00
F026	5.180 VL	1.00	7.8750	2.00	0.250T	4.00	0.900T EH	3.00	0.130	1.00	5.9050	2.00
F122	5.87	3.00	8.29	4.00	0.005	2.00	-0.69	2.00	0.279	4.00	6.25	5.00
MEDIAN	6.1000		8.2900		0.1025		-0.6900		0.2000		6.0500	
1CRIT	0.5800		0.6895		0.3500		0.3500		0.3500		0.5775	
N	5		5		2		1		3		4	
MEAN	6.1000		8.3410		0.1025		-0.6900		0.2230		6.0513	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003		0.00	4.5	3.00	1.3	5.00		0.00
F007	0.08	1.50	5.05	6.00	1.24	4.00	-1.35	1.00
F010	0.2	3.00	5.	5.00	1.4	6.00	<0.1	0.00
F015	0.6 H	5.00	5.3	7.00	1.6 H	7.00	<0.5	0.00
F020	<1.	0.00	4.37 L	2.00	1.05	2.00	<1.	0.00
F026	0.080	1.50	4.1350 VL	1.00	1.0350	1.00	1.5150T EH	3.00
F122	0.243	4.00	4.92	4.00	1.16	3.00	-1.20	2.00
MEDIAN	0.2000		4.9200		1.2400		-1.2000	
1CRIT	0.3500		0.5210		0.3500		0.3500	
N	2		5		5		1	
MEAN	0.2215		4.7680		1.2300		-1.2000	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	16.00	3.200	5					Pot. titration
F007	34.50	3.450	10	EH				
F010	38.50	4.812	8	H				titrn Cond.
F015	40.50	5.786	7	H H H H				Titrn
F020	10.00	2.000	5	L				Gran Electron
F026	19.50	1.950	10	VL EH VL EH				Titroprocessor
F122	33.00	3.300	10					pH 4.5 4.2

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 3.491

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F026	19.50	1.950	10	VLEHVLEH				Titroprocessor
F020	10.00	2.000	5	L				Gran Electron
F003	16.00	3.200	5					Pot. titration
F122	33.00	3.300	10					pH 4.5 4.2
F007	34.50	3.450	10	EH				
F010	38.50	4.812	8	H				titrn Cond.
F015	40.50	5.786	7	HHHH				Titrn

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 3.491

Alkalinity Gran Infl Extrap

PARAMETER: 06282 Alkalinity Gran Titn mg/L CaCO3

NATIONAL WATER RESEARCH INSTITUTE
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BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.3500 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	6.31	9.00	8.3	3.00	-0.33	1.00	-1.04	3.00	0.3	5.50	5.91	2.00
F003		0.00		0.00	-0.16	5.00	-0.72	10.50	0.37	10.00		0.00
F014	5.73 EL	1.00	7.80 EL	1.00	-0.090	10.00	-0.636	12.00	0.285	4.00	5.95	3.00
F036	5.97	3.00	8.34	4.00	-0.18	4.00	-0.87	4.00	0.14 EL	1.00	5.98	4.00
F042	6.23	6.00	8.55	6.00	-0.23	3.00	-1.11	1.00	0.20	2.00	6.09	5.00
F071	6.44	10.00	8.65	11.00	0.207 EH	12.00	-0.779	7.00	0.359	7.00	6.47	11.00
F074	6.71 EH	11.00	8.56	7.00	-0.15	7.00	-0.80	6.00	0.30	5.50	6.31	8.00
F109	5.966	2.00	8.118	2.00	-0.320	2.00	-1.07	2.00	0.255	3.00	5.794	1.00
F110	6.30	7.50	8.64	9.50	-0.11	8.50	-0.74	8.50	0.36	8.50	6.33	9.50
F110a	6.30	7.50	8.64	9.50	-0.11	8.50	-0.74	8.50	0.36	8.50	6.33	9.50
F112	6.18	5.00	8.38	5.00	-0.02	11.00	-0.72	10.50	0.50 EH	12.00	6.14	6.00
F113	6.1005	4.00	8.637	8.00	-0.1515	6.00	-0.867	5.00	0.408	11.00	6.196	7.00
MEDIAN	6.2300		8.5500		-0.1508		-0.7895		0.3295		6.1400	
1CRIT	0.6115		0.7275		0.3500		0.3500		0.3500		0.6070	
N	9		9		10		10		10		9	
MEAN	6.1996		8.4628		-0.1522		-0.8346		0.3197		6.1373	
3STDEV	0.4567		0.5268		0.2323		0.3654		0.1790		0.4704	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.22	6.00	4.86	3.00	0.99	3.00	-1.63	2.50
F003	0.28	9.00		0.00		0.00	-1.33	8.00
F014	0.030	2.00	4.41 EL	1.00	0.988	2.00	-1.15	11.00
F036	0.18	5.00	4.91	4.00	1.09	5.00	-1.43	4.00
F042	0.00	1.00	5.12	7.00	1.29	9.50	-1.63	2.50
F071	0.404	12.00	5.23	11.00	1.077	4.00	1.40 EH	12.00
F074	0.15	4.00	5.21	10.00	1.35	11.00	-1.35	7.00
F109	0.128	3.00	4.956	5.00	0.874	1.00	-1.743 L	1.00
F110	0.27	7.50	5.15	8.50	1.24	7.50	-1.37	5.50
F110a	0.27	7.50	5.15	8.50	1.24	7.50	-1.37	5.50
F112	0.38	10.00	5.07	6.00	1.29	9.50	-1.25	9.00
F113	0.3935	11.00	4.757	2.00	1.1175	6.00	-1.155	10.00
MEDIAN	0.2450		5.0700		1.1175		-1.3600	
1CRIT	0.3500		0.5535		0.3559		0.3500	
N	10		9		9		10	
MEAN	0.2302		5.0203		1.1469		-1.3665	
3STDEV	0.3208		0.4397		0.3423		0.4741	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	38.00	3.800	10					H2SO4 titration
F003	42.50	8.500	5					
F014	47.00	4.700	10	ELEL EL				
F036	38.00	3.800	10	EL				Titrn
F042	43.00	4.300	10					ANC Gran Plot
F071	97.00	9.700	10	EH EH	BIASED HIGH	-7.98	0.6101	Titrator
F074	76.50	7.650	10	EH				Auto Gran
F109	22.00	2.200	10	L	BIASED LOW*	-1.26	-0.2104	Radiometer
F110	81.00	8.100	10					End point 3.5 3.6
F110a	81.00	8.100	10					End point 3.5 3.6
F112	84.00	8.400	10	EH				TITRATION
F113	70.00	7.000	10					Gran

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 3.00

OVERALL AVERAGE
RANK IS 6.261

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F109	22.00	2.200	10	L	BIASED LOW*	-1.26	-0.2104	Radiometer
F036	38.00	3.800	10	EL				Titrn
F002	38.00	3.800	10					H2SO4 titration
F042	43.00	4.300	10					ANC Gran Plot
F014	47.00	4.700	10	ELELEL				
F113	70.00	7.000	10					Gran
F074	76.50	7.650	10	EH				Auto Gran
F110	81.00	8.100	10					End point 3.5 3.6
F110a	81.00	8.100	10					End point 3.5 3.6
F112	84.00	8.400	10	EH				TITRATION
F003	42.50	8.500	5					
F071	97.00	9.700	10	EHEH	BIASED HIGH	-7.98	0.6101	Titrator

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 3.00

OVERALL AVERAGE
RANK IS 6.261

PARAMETER: 06002 Diss Organic Carbon mg/L C

NATIONAL WATER RESEARCH INSTITUTE
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BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0750

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	6.5	6.00	3.0	1.50	<0.5	0.00	<0.5	0.00	3.6	4.50	3.6 EH	22.00
F003	6.1	3.00	3.2	8.00	0.2	6.00	0.2	2.00	3.6	4.50	0.9	5.00
F004	6.56	7.00	3.22	9.00	0.233	9.00	0.326	7.00	3.90	8.50	0.984	11.00
F007	6.68	10.00	3.31	13.00	<0.30	0.00	0.33	8.00	3.93	10.00	0.96	10.00
F010	6.2	5.00	3.1	4.50	<0.1	0.00	0.1	1.00	3.8	7.00	0.8	2.00
F014	7.0	16.00	3.5	18.50	<1.0	0.00	<1.0	0.00	4.3	18.50	1.2	18.00
F015	7.4	18.00	3.3	11.50	<0.5	0.00	0.7	16.00	4.7	22.00	1.5 H	19.00
F022	7.72 H	21.50	3.43	17.00	0.44	12.50	0.58	14.50	4.31	20.00	1.56 H	20.00
F026	6.761	11.00	3.230	10.00	0.112	3.00	0.251	5.00	3.943	11.00	0.903	7.00
F032	6.6	9.00	3.1	4.50	0.2T	6.00	0.4T	9.00	3.9	8.50	0.9	5.00
F037	7.4739	19.00	3.395	15.00	0.1876	4.00	0.4007	10.00	4.2993	17.00	1.0503	14.00
F042	7.6	20.00	3.5	18.50	0.2	6.00	0.5	13.00	4.4	21.00	1.1	15.00
F060	6.9	13.00	3.6	21.00	<0.5	0.00	<0.5	0.00	4.3	18.50	1.0	12.00
F071	6.58	8.00	3.05	3.00	0.066	1.00	0.223	4.00	3.782	6.00	0.861	3.00
F072	7.72 H	21.50	5.26 EH	22.00	<0.4	0.00	<0.4	0.00	4.10	15.00	2.39 EH	21.00
F074	7.2	17.00	3.36	14.00	0.36	10.00	0.48	12.00	4.2	16.00	1.14	16.00
F094	5. EL	1.00	3.	1.50	<0.5	0.00	<0.5	0.00	3.3	2.00	0.9	5.00
F109	6.91	14.00	3.40	16.00	0.44T	12.50	0.58	14.50	4.09	13.50	1.175	17.00
F112	6.96	15.00	3.30	11.50	0.11	2.00	0.22	3.00	4.09	13.50	1.03	13.00
F113	6.77	12.00	3.17	6.00	0.23	8.00	0.31	6.00	4.02	12.00	0.93	8.00
F145	6.15	4.00	3.52	20.00	0.4	11.00	0.46	11.00	3.23 L	1.00	0.95	9.00
F147	5.95	2.00	3.18	7.00	<0.50	0.00	<0.50	0.00	3.42	3.00	0.78	1.00
MEDIAN	6.7655		3.3000		0.2000		0.3650		3.9815		0.9920	
1CRIT	0.9324		0.6725		0.5000		0.5000		0.7236		0.5000	
N	19		19		10		14		20		20	
MEAN	6.7524		3.3087		0.2233		0.3758		3.9642		1.1117	
3STDEV	1.3603		0.4625		0.2653		0.3769		0.9072		1.0517	

PARAMETER: 06002 Diss Organic Carbon mg/L C

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	3.9	4.50	5.4	9.00	2.3	10.50	<0.5	0.00
F003	3.9	4.50	5.3	6.50	2.2	5.50	0.4	12.50
F004	4.20	11.00	5.56	13.00	2.34	13.00	0.263	8.00
F007	4.18	10.00	5.41	10.00	2.22	7.50	<0.30	0.00
F010	4.	6.00	5.2	5.00	2.1	3.00	0.2	4.50
F014	4.5	18.50	6.0	19.00	2.6	19.00	<1.0	0.00
F015	4.7	21.00	6.0	19.00	2.9	21.00	<0.5	0.00
F022	4.53	20.00	6.46 H	21.00	2.96 H	22.00	0.31	10.00
F026	4.116	9.00	5.474	11.00	2.335	12.00	0.295	9.00
F032	4.1	8.00	5.3	6.50	2.2	5.50	0.2T	4.50
F037	4.3478	16.00	5.9102	17.00	2.4904	17.00	0.2337	6.00
F042	4.5	18.50	6.0	19.00	2.4	14.50	0.4	12.50
F060	4.8	22.00	5.5	12.00	2.4	14.50	<0.5	0.00
F071	3.82	3.00	5.17	4.00	2.14	4.00	0.085	3.00
F072	4.32	15.00	6.72 EH	22.00	2.65	20.00	<0.4	0.00
F074	4.44	17.00	5.76	16.00	2.52	18.00	0.36	11.00
F094	3.7	2.00	4.7	1.00	2.3	10.50	<0.5	0.00
F109	4.29	14.00	5.67	15.00	2.49	16.00	0.48T	14.00
F112	4.25	12.00	5.63	14.00	2.22	7.50	0.04	1.00
F113	4.06	7.00	5.36	8.00	2.26	9.00	0.24	7.00
F145	4.26	13.00	4.97	2.00	1.98	2.00	0.07	2.00
F147	3.63	1.00	5.03	3.00	1.8	1.00	<0.50	0.00
MEDIAN	4.2250		5.4870		2.3175		0.2515	
1CRIT	0.7419		0.8365		0.5988		0.5000	
N	20		20		20		12	
MEAN	4.2057		5.5552		2.3523		0.2547	
3STDEV	0.7642		1.1053		0.6235		0.3094	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	58.00	8.286	7	EH				Shimadzu TOC
F003	57.50	5.750	10					UV dig. IR
F004	96.50	9.650	10					06104
F007	78.50	9.812	8					
F010	38.00	4.222	9		BIASED LOW*	-4.34	-0.1093	Cond. meter
F014	127.50	18.214	7		BIASED HIGH*	2.24	0.2035	
F015	147.50	18.438	8	H	BIASED HIGH*	3.15	0.3629	Auto
F022	178.50	17.850	10	H H H H	BIASED HIGH	9.54	0.1754	Combustion IR
F026	88.00	8.800	10					Autoanal. Inv.
F032	66.50	6.650	10					Colourimetry
F037	135.00	13.500	10					Persulfate IR
F042	158.00	15.800	10					IR
F060	113.00	16.143	7					Persul. UV Color
F071	39.00	3.900	10		BIASED LOW*	-2.25	-0.1481	TOC Analyzer
F072	136.50	19.500	7	H EH EH EH	BIASED HIGH*	-3.76	1.0157	persulfate UV
F074	147.00	14.700	10					Per. as DIC
F094	23.00	3.286	7	EL	BIASED LOW	-27.97	0.4861	Infrared
F109	146.50	14.650	10					UV pers. Oxid.
F112	92.50	9.250	10					DOHRMAN
F113	83.00	8.300	10					UV persulfate
F145	75.00	7.500	10	L				Continuous Flow
F147	18.00	2.571	7		BIASED LOW	-8.59	-0.1364	colourimetry

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F147	18.00	2.571	7		BIASED LOW	-8.59	-0.1364	colourimetry
F094	23.00	3.286	7	EL	BIASED LOW	-27.97	0.4861	Infrared
F071	39.00	3.900	10		BIASED LOW*	-2.25	-0.1481	TOC Analyzer
F010	38.00	4.222	9		BIASED LOW*	-4.34	-0.1093	Cond. meter
F003	57.50	5.750	10					UV dig. IR
F032	66.50	6.650	10					Colourimetry
F145	75.00	7.500	10	L				Continuous Flow
F002	58.00	8.286	7	EH				Shimadzu TOC
F113	83.00	8.300	10					UV persulfate
F026	88.00	8.800	10					Autoanal. Inv.
F112	92.50	9.250	10					DOHRMAN
F004	96.50	9.650	10					06104
F007	78.50	9.812	8					
F037	135.00	13.500	10					Persulfate IR
F109	146.50	14.650	10					UV pers. Oxid.
F074	147.00	14.700	10					Per. as DIC
F042	158.00	15.800	10					IR
F060	113.00	16.143	7					Persul. UV Color
F022	178.50	17.850	10	HHHH	BIASED HIGH	9.54	0.1754	Combustion IR
F014	127.50	18.214	7		BIASED HIGH*	2.24	0.2035	
F015	147.50	18.438	8	H	BIASED HIGH*	3.15	0.3629	Auto
F072	136.50	19.500	7	HEHEHEH	BIASED HIGH*	-3.76	1.0157	persulfate UV

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 10.675

PARAMETER: 06592 Diss Inorg Carbon mg/L C

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.3000 CONCENTRATION ERROR INCREMENT= 0.0750

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	1.4	6.00	1.9	3.00	<0.5	0.00	<0.5	0.00	<0.5	0.00	1.4	3.00
F003	1.5	8.00	2.3	11.00	0.3	4.00	0.3	4.50	0.1	2.00	1.7	9.50
F007	1.35	5.00	2.06	5.00	<0.40	0.00	<0.40	0.00	<0.40	0.00	1.6	6.00
F010	1.6	14.50	2.2	7.50	0.3	4.00	0.3	4.50	0.3	4.00	1.8	13.50
F015	1.5	8.00	2.4	15.50	<0.5	0.00	<0.5	0.00	<0.5	0.00	1.8	13.50
F022	1.3	3.00	2.33	12.00	0.06 EL	1.00	0.01 EL	1.00	0.08 L	1.00	1.53	5.00
F026	1.525	11.00	2.270	10.00	0.300	4.00	0.247	2.00	0.237	3.00	1.690	8.00
F032	1.6	14.50	2.2	7.50	0.2W	0.00	0.4T	8.50	0.4T	6.50	2.	17.00
F036	1.58	13.00	2.34	13.50	0.36	6.00	0.44	10.00	0.4	6.50	1.78	12.00
F042	1.8	17.00	2.4	15.50	0.4	8.00	0.4	8.50	0.5	10.00	1.9	16.00
F060	1.9 H	18.00	2.8 H	18.00	0.6	11.00	0.6 EH	12.00	0.7	12.00	2.2 H	18.00
F071	1.53	12.00	2.34	13.50	0.275	2.00	0.252	3.00	0.316	5.00	1.64	7.00
F074	1.32	4.00	2.04	4.00	<0.12 EL	0.00	<0.12 EL	0.00	<0.12	0.00	1.44	4.00
F094	1.5	8.00	2.1	6.00	0.5	9.00	0.5	11.00	0.6	11.00	1.7	9.50
F112	1.77	16.00	2.62	17.00	0.37	7.00	0.38	6.00	0.48	9.00	1.87	15.00
F113	1.52	10.00	2.26	9.00	0.51	10.00	0.39	7.00	0.43	8.00	1.74	11.00
F145	0.93 VL	2.00	1.49 VL	2.00	<0.1 EL	0.00	<0.1 EL	0.00	<0.1	0.00	1.02 VL	2.00
F147	0.74 EL	1.00	1.45 EL	1.00	<0.20	0.00	<0.20	0.00	<0.20	0.00	0.84 EL	1.00
MEDIAN	1.5100		2.2650		0.3600		0.3850		0.4000		1.7000	
1CRIT	0.3758		0.4324		0.3000		0.3000		0.3000		0.3900	
N	16		16		9		10		10		16	
MEAN	1.4828		2.2031		0.3683		0.3609		0.3763		1.6631	
3STDEV	0.5888		0.7425		0.2474		0.2365		0.4084		0.6824	

PARAMETER: 06592 Diss Inorg Carbon mg/L C

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.5	0.00	0.9 L	2.00	<0.5	0.00	<0.5	0.00
F003	0.1	2.00	1.2	5.00	0.5	6.00	0.3	6.00
F007	<0.40	0.00	1.21	6.00	0.4	3.00	<0.40	0.00
F010	0.3	4.00	1.3	12.00	0.5	6.00	0.2	2.00
F015	<0.5	0.00	1.3	12.00	0.5	6.00	<0.5	0.00
F022	0.05	1.00	1.05	3.00	0.34	1.00	0.05 EL	1.00
F026	0.340	6.50	1.230	8.00	0.510	8.00	0.283	4.00
F032	0.4T	9.00	1.4	14.50	0.8T	14.00	0.4T	8.50
F036	0.34	6.50	1.28	9.00	0.52	9.00	0.3	6.00
F042	0.4	9.00	1.4	14.50	0.7	12.50	0.4	8.50
F060	0.7 EH	13.00	1.6	17.00	1.0 VH	15.00	<0.5	0.00
F071	0.302	5.00	1.22	7.00	0.493	4.00	0.246	3.00
F074	0.12	3.00	1.08	4.00	0.36	2.00	<0.12	0.00
F094	0.5	12.00	1.3	12.00	0.7	12.50	0.5	11.00
F112	0.43	11.00	1.42	16.00	0.57	10.00	0.30	6.00
F113	0.40	9.00	1.29	10.00	0.66	11.00	0.42	10.00
F145	<0.1	0.00	0.7 EL	1.00	6.04 EH	16.00	<0.1 EL	0.00
F147	<0.20	0.00	<0.20 EL	0.00	<0.20 L	0.00	<0.20	0.00
MEDIAN	0.3400		1.2800		0.5150		0.3000	
1CRIT	0.3000		0.3585		0.3011		0.3000	
N	11		15		14		9	
MEAN	0.3302		1.2387		0.5866		0.3166	
3STDEV	0.3532		0.4090		0.4914		0.2125	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	14.00	3.500	4	L	INSUFFICIENT DATA			Shimadzu TOC
F003	58.00	5.800	10					IR detection
F007	25.00	5.000	5					
F010	72.00	7.200	10					Cond. meter
F015	55.00	11.000	5					Auto
F022	29.00	2.900	10	ELELL EL	BIASED LOW	13.87	-0.3511	Combustion IR
F026	64.50	6.450	10					Autoanal. Inv.
F032	100.00	11.111	9					Colourimetry
F036	91.50	9.150	10					Colourimetry
F042	119.50	11.950	10					IR
F060	134.00	14.889	9	H H EH H EH VH	BIASED HIGH	11.03	0.2644	Auto. Color
F071	61.50	6.150	10					TOC Analyzer
F074	21.00	3.500	6	ELEL	BIASED LOW*	-2.39	-0.1780	Acid purge, IR
F094	102.00	10.200	10					Infrared
F112	113.00	11.300	10					DOHRMAN
F113	95.00	9.500	10					Phosphoric acid
F145	23.00	4.600	5	VLVLELEL VL ELEHEL				Continuous Flow
F147	3.00	1.000	3	ELEL EL ELL	INSUFFICIENT DATA			colourimetry

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 8.089

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F147	3.00	1.000	3	ELELELELL	INSUFFICIENT DATA			colourimetry
F022	29.00	2.900	10	ELELLEL	BIASED LOW	13.87	-0.3511	Combustion IR
F074	21.00	3.500	6	ELEL	BIASED LOW*	-2.39	-0.1780	Acid purge, IR
F002	14.00	3.500	4	L	INSUFFICIENT DATA			Shimadzu TOC
F145	23.00	4.600	5	VLVLELELVLELEHEL				Continuous Flow
F007	25.00	5.000	5					
F003	58.00	5.800	10					IR detection
F071	61.50	6.150	10					TOC Analyzer
F026	64.50	6.450	10					Autoanal. Inv.
F010	72.00	7.200	10					Cond. meter
F036	91.50	9.150	10					Colourimetry
F113	95.00	9.500	10					Phosphoric acid
F094	102.00	10.200	10					Infrared
F015	55.00	11.000	5					Auto
F032	100.00	11.111	9					Colourimetry
F112	113.00	11.300	10					DOHRMAN
F042	119.50	11.950	10					IR
F060	134.00	14.889	9	HHEHHEHVH	BIASED HIGH	11.03	0.2644	Auto. Color

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 8.089

Diss Inorg Carbon

PARAMETER: 07093 Nitrate-IC mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0050 BASIC ACCEPTABLE ERROR= 0.0050 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.05 EL	1.00	0.07	1.00	0.25	3.50	0.23	7.00	0.03 L	1.00	0.55	3.00
F010	0.13	10.00	0.08	10.00	0.25	3.50	0.22	1.00	0.04	13.00	0.58	18.00
F015	0.134	17.50	0.082	15.50	0.263	14.00	0.242	21.00	0.039	8.00	0.571	14.00
F017	0.141	22.00	0.088	21.00	0.263	14.00	0.241	20.00	0.042	20.50	0.57	11.50
F020	0.13	10.00	0.08	10.00	0.26	8.50	0.24	17.50	0.04	13.00	0.57	11.50
F022	0.13	10.00	0.08	10.00	0.26	8.50	0.23	7.00	0.04	13.00	0.56	6.00
F032	0.15 EH	24.50	0.09	23.00	0.29 EH	25.00	0.26 EH	25.00	0.06 EH	23.50	0.63 EH	25.00
F037	0.1429	23.00	0.0844	19.00	0.2619	12.00	0.2364	12.00	0.0403	17.00	0.5465	2.00
F053	0.13	10.00	0.08	10.00	0.27	19.00	0.24	17.50	0.04	13.00	0.59	22.00
F060	0.139	20.00	0.083	17.00	0.281	24.00	0.255	24.00	0.039	8.00	0.595	24.00
F068	0.129	5.00	0.071	2.00	0.272	21.00	0.234	10.00	0.031 L	2.00	0.577	17.00
F071	0.129	5.00	0.115 EH	25.00	0.264	16.50	0.244	22.00	<0.100	0.00	0.582	19.00
F074	0.129	5.00	0.082	15.50	0.26	8.50	0.23	7.00	0.037	6.00	0.57	11.50
F094	0.133	15.50	0.084	18.00	0.26	8.50	0.238	14.50	0.041	18.50	0.568	8.50
F107	0.15 EH	24.50	0.10 VH	24.00	0.28	23.00	0.25	23.00	0.06 EH	23.50	0.57	11.50
F109	0.134	17.50	0.079	5.00	0.263	14.00	0.236	11.00	0.036	3.50	0.576	16.00
F110	0.13	10.00	0.08	10.00	0.27	19.00	0.24	17.50	0.04	13.00	0.59	22.00
F110a	0.13	10.00	0.08	10.00	0.27	19.00	0.24	17.50	0.04	13.00	0.59	22.00
F112	0.13	10.00	0.08	10.00	0.26	8.50	0.23	7.00	0.04	13.00	0.56	6.00
F113	0.125	2.00	0.073	4.00	0.237 EL	1.00	0.225	3.00	0.036	3.50	0.558	4.00
F118	0.14	21.00	0.08	10.00	0.26	8.50	0.23	7.00	0.05T EH	22.00	0.56	6.00
F133	0.131	14.00	0.086	20.00	0.256	5.00	0.227	4.00	0.042	20.50	0.575	15.00
F139	0.133	15.50	0.0722	3.00	0.264	16.50	0.237	13.00	0.0361	5.00	0.472 EL	1.00
F145	0.127	3.00	0.08	10.00	0.248	2.00	0.224	2.00	0.039	8.00	0.568	8.50
F147	0.137	19.00	0.089	22.00	0.274	22.00	0.238	14.50	0.041	18.50	0.584	20.00
MEDIAN	0.1300		0.0800		0.2630		0.2370		0.0400		0.5700	
1CRIT	0.0150		0.0110		0.0256		0.0236		0.0078		0.0502	
N	22		23		23		23		21		23	
MEAN	0.1325		0.0819		0.2635		0.2364		0.0395		0.5722	
3STDEV	0.0139		0.0182		0.0252		0.0224		0.0102		0.0379	

PARAMETER: 07093 Nitrate-IC mg/L N

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.04 L	2.00	0.07	11.00	<0.02	0.00	0.24	4.50
F010	0.04 L	2.00	0.07	11.00	<0.01	0.00	0.24	4.50
F015	0.048	10.50	0.070	11.00	0.004	5.50	0.251	16.00
F017	0.051	21.00	0.075	20.00	0.010W	0.00	0.251	16.00
F020	0.05	16.00	0.07	11.00	<0.01	0.00	0.25	12.50
F022	0.04 L	2.00	0.06	1.00	0.003	4.00	0.24	4.50
F032	0.05	16.00	0.09 EH	23.00	0.04 EH	10.00	0.28 EH	25.00
F037	0.0569	23.00	0.0809 H	21.00	<0.05	0.00	0.2384	1.00
F053	0.05	16.00	0.07	11.00	0.006	8.50	0.26	21.00
F060	0.046	7.50	0.071	16.50	<0.004	0.00	0.262	24.00
F068	0.043	5.00	0.069	5.50		0.00	0.241	7.00
F071	<0.100	0.00	<0.100	0.00	<0.100	0.00	0.246	10.00
F074	0.046	7.50	0.068	4.00	0.005	7.00	0.24	4.50
F094	0.05	16.00	0.081 H	22.00	0.006	8.50	0.25	12.50
F107	0.07 EH	24.00	0.097 EH	24.00		0.00	0.26	21.00
F109	0.047	9.00	0.0712	18.00	0.0T EL	1.50	0.250	12.50
F110	0.05	16.00	0.07	11.00	<0.02	0.00	0.26	21.00
F110a	0.05	16.00	0.07	11.00	<0.02	0.00	0.26	21.00
F112	0.05	16.00	0.07	11.00	0.00 EL	1.50	0.25	12.50
F113	0.042	4.00	0.061	2.00	0.002	3.00	0.244	9.00
F118	0.05T	16.00	0.07T	11.00	0.01W	0.00	0.26	21.00
F133	0.052	22.00	0.071	16.50	0.004	5.50	0.239	2.00
F139	0.0451	6.00	0.0655	3.00	<0.01	0.00	0.251	16.00
F145	0.048	10.50	0.069	5.50	<0.002	0.00	0.243	8.00
F147	0.05	16.00	0.074	19.00	<0.005	0.00	0.252	18.00
MEDIAN	0.0500		0.0700		0.0040		0.2500	
1CRIT	0.0086		0.0102		0.0050		0.0246	
N	23		22		7		23	
MEAN	0.0476		0.0717		0.0043		0.2496	
3STDEV	0.0126		0.0173		0.0042		0.0230	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	34.00	3.778	9	EL L L	BIASED LOW*	-0.45	-0.0169	IC
F010	73.00	8.111	9	L				IC
F015	133.00	13.300	10					IC
F017	166.00	18.444	9					IC
F020	110.00	12.222	9					IC
F022	66.00	6.600	10	L				IC
F032	220.00	22.000	10	EH EHEHEHEH EHEHEH	BIASED HIGH	7.10	0.0126	IC
F037	130.00	14.444	9	H				IC, Waters
F053	148.00	14.800	10					IC
F060	165.00	18.333	9					IC
F068	74.50	8.278	9	L				Dionex, IC
F071	97.50	16.250	6	EH				IC
F074	76.50	7.650	10					Azo dye, auto
F094	142.50	14.250	10	H				IC
F107	198.50	22.056	9	EHVH EH EHEH	BIASED HIGH*	-4.24	0.0243	IC
F109	108.00	10.800	10	EL				IC Dionex
F110	139.50	15.500	9					IC Dionex
F110a	139.50	15.500	9					IC Dionex
F112	95.50	9.550	10	EL				IC, Dionex
F113	35.50	3.550	10	EL	BIASED LOW*	-1.94	-0.0058	IC Dionex DX 500
F118	122.50	13.611	9	EH				IC
F133	124.50	12.450	10					IC
F139	79.00	8.778	9	EL				IC
F145	57.50	6.389	9					IC
F147	169.00	18.778	9					IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 12.522

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F113	35.50	3.550	10	EL	BIASED LOW*	-1.94	-0.0058	IC Dionex DX 500
F002	34.00	3.778	9	ELLL	BIASED LOW*	-0.45	-0.0169	IC
F145	57.50	6.389	9					IC
F022	66.00	6.600	10	L				IC
F074	76.50	7.650	10					Azo dye, auto
F010	73.00	8.111	9	L				IC
F068	74.50	8.278	9	L				Dionex, IC
F139	79.00	8.778	9	EL				IC
F112	95.50	9.550	10	EL				IC, Dionex
F109	108.00	10.800	10	EL				IC Dionex
F020	110.00	12.222	9					IC
F133	124.50	12.450	10					IC
F015	133.00	13.300	10					IC
F118	122.50	13.611	9	EH				IC
F094	142.50	14.250	10	H				IC
F037	130.00	14.444	9	H				IC, Waters
F053	148.00	14.800	10					IC
F110a	139.50	15.500	9					IC Dionex
F110	139.50	15.500	9					IC Dionex
F071	97.50	16.250	6	EH				IC
F060	165.00	18.333	9					IC
F017	166.00	18.444	9					IC
F147	169.00	18.778	9					IC
F032	220.00	22.000	10	EHEHEHEHEHEHEHEH	BIASED HIGH	7.10	0.0126	IC
F107	198.50	22.056	9	EHVHEHEHEH	BIASED HIGH*	-4.24	0.0243	IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 12.522

Nitrate-IC

PARAMETER: 07092 Nitrate + Nitrite mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0050 BASIC ACCEPTABLE ERROR= 0.0050 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.138	19.00	0.084	18.00	0.263	15.00	0.238	13.00	0.038	7.50	0.567	8.00
F004	0.134	14.00	0.082	15.50	0.272	21.00	0.246	22.00	0.038	7.50	0.586	20.00
F007	0.14	22.00	0.08	9.50	0.28	25.00	0.25	25.00	<0.04	0.00	0.58	16.50
F009	0.14	22.00	0.08	9.50	0.26	9.50	0.23	6.00	<0.05	0.00	0.59	22.50
F010	0.13	8.00	0.08	9.50	0.22 EL	1.00	0.2 EL	1.00	0.02 EL	1.00	0.51 L	3.00
F014	0.11 EL	1.00	<0.05 EL	0.00	0.24	2.00	0.21 EL	2.00	<0.05	0.00	0.55	5.50
F020	0.132	13.00	0.075	4.00	0.272	21.00	0.248	23.50	0.033	3.00	0.591	24.00
F022	0.137	17.50	0.081	13.50	0.262	14.00	0.237	11.00	0.038	7.50	0.56	7.00
F025	0.136	16.00	0.086	21.00	0.268	16.50	0.242	18.50	0.038	7.50	0.570	11.00
F026	0.1155 L	2.00	0.077	5.00	0.259	6.00	0.2345	9.00	0.038	7.50	0.5730	13.00
F032	0.14	22.00	0.08	9.50	0.27	18.50	0.245	20.50	0.04	14.00	0.59	22.50
F036	0.14	22.00	0.09	24.00	0.274	23.50	0.248	23.50	0.04	14.00	0.588	21.00
F037	0.1429	25.00	0.0844	19.00	0.2619	13.00	0.2364	10.00	0.0403	17.00	0.5465	4.00
F060	0.13	8.00	0.08	9.50	0.26	9.50	0.24	16.00	<0.05	0.00	0.57	11.00
F068	0.129	5.00	0.071	2.00	0.272	21.00	0.234	8.00	0.031	2.00	0.577	15.00
F071	0.131	11.50	0.081	13.50	0.257	5.00	0.240	16.00	0.040	14.00	0.595	25.00
F072	0.128	4.00	0.078	6.00	0.268	16.50	0.242	18.50	<0.050	0.00	0.580	16.50
F074	0.13	8.00	0.082	15.50	0.26	9.50	0.23	6.00	0.037	4.00	0.57	11.00
F094	0.135	15.00	0.086	21.00	0.26	9.50	0.238	13.00	0.041	18.50	0.568	9.00
F113	0.130	8.00	0.083	17.00	0.270	18.50	0.245	20.50	0.039	11.00	0.584	18.50
F118	0.14	22.00	0.08	9.50	0.26	9.50	0.23	6.00	0.04T	14.00	0.55	5.50
F133	0.131	11.50	0.086	21.00	0.256	4.00	0.227	3.00	0.042	20.00	0.575	14.00
F139	0.13	8.00	0.07	1.00	0.26	9.50	0.24	16.00	0.04	14.00	0.47 EL	2.00
F145	0.118	3.00	0.073	3.00	0.253	3.00	0.228	4.00	0.038	7.50	0.446 EL	1.00
F147	0.137	17.50	0.089	23.00	0.274	23.50	0.238	13.00	0.041	18.50	0.584	18.50
MEDIAN	0.1320		0.0805		0.2619		0.2380		0.0385		0.5730	
1CRIT	0.0152		0.0110		0.0256		0.0236		0.0077		0.0504	
N	23		22		23		23		18		23	
MEAN	0.1327		0.0808		0.2631		0.2368		0.0384		0.5665	
3STDEV	0.0192		0.0127		0.0236		0.0250		0.0077		0.0822	

PARAMETER: 07092 Nitrate + Nitrite mg/L N

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.047	10.00	0.071	16.50	0.008	4.50	0.268	25.00
F004	0.047	10.00	0.071	16.50	0.01T	9.00	0.258	20.50
F007	0.05	16.50	0.07	12.00	<0.04	0.00	0.25	15.00
F009	0.05	16.50	0.07	12.00	<0.05	0.00	0.24	6.50
F010	0.04	1.50	0.04 EL	1.00	<0.02	0.00	0.2 EL	1.00
F014	<0.05	0.00	<0.05 EL	0.00	<0.05	0.00	0.23	2.00
F020	0.043	4.00	0.064	3.50	<0.02	0.00	0.265	23.50
F022	0.045	6.00	0.066	7.00	0.007	3.00	0.245	9.00
F025	0.047	10.00	0.070	12.00	0.008	4.50	0.246	10.00
F026	0.0455	7.00	0.0645	5.00	0.0145 EH	13.00	0.247	11.00
F032	0.05	16.50	0.07	12.00	0.005W	0.00	0.265	23.50
F036	0.048	12.00	0.076	21.00	0.01	9.00	0.26	22.00
F037	0.0569 H	21.00	0.0809 H	22.00	<0.05	0.00	0.2384	4.00
F060	0.06 EH	22.50	0.09 EH	24.00	<0.05	0.00	0.25	15.00
F068	0.043	4.00	0.069	9.00		0.00	0.241	8.00
F071	0.050	16.50	0.074	19.50	0.012	12.00	0.249	12.00
F072	<0.050	0.00	0.065	6.00	<0.050	0.00	0.255	19.00
F074	0.046	8.00	0.068	8.00	0.009	6.00	0.24	6.50
F094	0.05	16.50	0.081 H	23.00	0.01	9.00	0.25	15.00
F113	0.049	13.00	0.071	16.50	0.010	9.00	0.258	20.50
F118	0.06T EH	22.50	0.07T	12.00	0.01T	9.00	0.25	15.00
F133	0.052	20.00	0.071	16.50	0.004 EL	1.50	0.239	5.00
F139	0.04	1.50	0.06	2.00	<0.03	0.00	0.25	15.00
F145	0.043	4.00	0.064	3.50	0.004 EL	1.50	0.234	3.00
F147	0.05	16.50	0.074	19.50	<0.005 EL	0.00	0.252	18.00
MEDIAN	0.0480		0.0700		0.0100		0.2500	
1CRIT	0.0084		0.0102		0.0054		0.0246	
N	19		22		10		23	
MEAN	0.0480		0.0700		0.0094		0.2484	
3STDEV	0.0101		0.0151		0.0041		0.0272	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	136.50	13.650	10					Cd reduction
F004	156.00	15.600	10					07110
F007	141.50	17.688	8					
F009	104.50	13.062	8					TRAACS
F010	27.00	3.000	9	ELELELL EL EL	BIASED LOW	-10.74	-0.0078	Colorimetry
F014	12.50	2.500	5	ELEL EL EL	BIASED LOW*	-0.04	-0.0229	
F020	119.50	13.278	9					TrAACs
F022	95.50	9.550	10					Colorimetry
F025	127.00	12.700	10					IC Low Level
F026	78.50	7.850	10	L EH				Autoanal.
F032	159.00	17.667	9					Colourimetry
F036	192.00	19.200	10		BIASED HIGH*	2.57	0.0028	Colourimetry
F037	135.00	15.000	9	H H				IC, Waters
F060	115.50	14.438	8	EHEH				Auto. Color
F068	74.00	8.222	9					Dionex, IC
F071	145.00	14.500	10					Colorimetric
F072	86.50	12.357	7					col.reduction
F074	82.50	8.250	10					Azo dye, auto
F094	149.50	14.950	10	H				Colorimetry
F113	152.50	15.250	10					FIA Lachat 8000
F118	125.00	12.500	10	EH				IC
F133	116.50	11.650	10	EL				IC
F139	69.00	7.667	9	EL				IC
F145	33.50	3.350	10	EL EL	BIASED LOW	-19.48	0.0131	Auto Cd redn
F147	168.00	18.667	9	EL				IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 12.236

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	12.50	2.500	5	ELELELEL	BIASED LOW*	-0.04	-0.0229	
F010	27.00	3.000	9	ELELELLELEL	BIASED LOW	-10.74	-0.0078	Colorimetry
F145	33.50	3.350	10	ELEL	BIASED LOW	-19.48	0.0131	Auto Cd redn
F139	69.00	7.667	9	EL				IC
F026	78.50	7.850	10	LEH				Autoanal.
F068	74.00	8.222	9					Dionex, IC
F074	82.50	8.250	10					Azo dye, auto
F022	95.50	9.550	10					Colorimetry
F133	116.50	11.650	10	EL				IC
F072	86.50	12.357	7					col. reduction
F118	125.00	12.500	10	EH				IC
F025	127.00	12.700	10					IC Low Level
F009	104.50	13.062	8					TRAACS
F020	119.50	13.278	9					TrAACs
F003	136.50	13.650	10					Cd reduction
F060	115.50	14.438	8	EHEH				Auto. Color
F071	145.00	14.500	10					Colorimetric
F094	149.50	14.950	10	H				Colorimetry
F037	135.00	15.000	9	HH				IC, Waters
F113	152.50	15.250	10					FIA Lachat 8000
F004	156.00	15.600	10					07110
F032	159.00	17.667	9					Colourimetry
F007	141.50	17.688	8					
F147	168.00	18.667	9	EL				IC
F036	192.00	19.200	10		BIASED HIGH*	2.57	0.0028	Colourimetry

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 12.236

Nitrate + Nitrite

PARAMETER: 07192 Ammonia mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0060 BASIC ACCEPTABLE ERROR= 0.0060 CONCENTRATION ERROR INCREMENT= 0.1250

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.006 EL	1.00	0.002	2.00	0.174	16.00	0.236	24.50	0.002	1.00	0.385	22.50
F004	0.015	10.50	0.005T	4.50	0.172	14.00	0.225	14.00	0.005T	4.50	0.377	17.00
F007	<0.010	0.00	<0.010	0.00	0.178	19.50	0.225	14.00	<0.010	0.00	0.373	14.00
F010	<0.02	0.00	<0.02	0.00	0.18	23.50	0.26 EH	28.50	<0.02	0.00	0.4	26.00
F011	0.016	13.00	0.026 EH	9.00	0.13 EL	1.00	0.183 EL	1.00	0.006	6.00	0.317 L	2.00
F014	0.014	8.00	<0.010	0.00	0.164	7.00	0.216	7.00	<0.010	0.00	0.36	8.50
F015	0.019	17.00	<0.005	0.00	0.179	21.00	0.239	26.00	0.007	8.00	0.381	21.00
F017	0.014	8.00	0.006W	0.00	0.174	16.00	0.229	16.50	0.006W	0.00	0.379	18.00
F020	<0.01	0.00	<0.01	0.00	0.19	28.00	0.26 EH	28.50	<0.01	0.00	0.41	28.00
F022	<0.008	0.00	<0.008	0.00	0.167	9.00	0.229	16.50	<0.008	0.00	0.37	12.00
F025	<0.01	0.00	<0.01	0.00	0.165	8.00	0.220	9.00	<0.01	0.00	0.364	11.00
F026	0.0132	6.00	0.0004	1.00	0.1705	13.00	0.2219	11.00	0.0022	2.00	0.3701	13.00
F032	0.014	8.00	0.002W	0.00	0.174	16.00	0.232	19.50	0.004	3.00	0.374	15.00
F036	0.012	4.00	0.002W	0.00	0.176	18.00	0.236	24.50	0.002W	0.00	0.38	19.50
F042	0.04W	0.00	0.04W	0.00	0.18	23.50	0.23	18.00	0.04 VH	12.00	0.38	19.50
F053	0.02W	0.00	0.02W	0.00	0.16	6.00	0.21	5.00	0.02W	0.00	0.35	6.00
F060	<0.05	0.00	<0.05	0.00	0.17	11.50	0.22	9.00	0.06 EH	13.00	0.40	26.00
F068		0.00		0.00	0.182	26.00	0.234	23.00		0.00	0.391	24.00
F071	0.013	5.00	<0.005	0.00	0.158	4.00	0.214	6.00	<0.005	0.00	0.354	7.00
F072	0.018	15.50	<0.010	0.00	0.178	19.50	0.233	21.50	<0.010	0.00	0.330	3.00
F074	0.015	10.50	<0.005	0.00	0.17	11.50	0.225	14.00	<0.005	0.00	0.375	16.00
F094	0.016	13.00	<0.005	0.00	0.159	5.00	0.209	4.00	<0.005	0.00	0.36	8.50
F107	0.018	15.50	0.005	4.50	0.155	2.50	0.200	2.00	0.007	8.00	0.332	4.00
F109	0.016T	13.00	0.008T	6.00	0.184	27.00	0.233	21.50	0.005T	4.50	0.385	22.50
F112	0.01	2.50		0.00	0.18	23.50	0.232	19.50		0.00	0.40	26.00
F113	0.021	19.00	0.004	3.00	0.169	10.00	0.222	12.00	0.007	8.00	0.363	10.00
F118	0.01T	2.50	0.01T	7.50	0.20 EH	29.00	0.25	27.00	0.01T	10.00	0.43 H	29.00
F145	0.02	18.00	0.01	7.50	0.18	23.50	0.22	9.00	0.02 VH	11.00	0.3 EL	1.00
F147	<0.005 EL	0.00	<0.005	0.00	0.155	2.50	0.203	3.00	<0.005	0.00	0.341	5.00
MEDIAN OR *TARGET CONC.	0.0150		0.0050		0.1740		0.2250		0.0070		0.3740	
1CRIT	0.0071		0.0060		0.0270		0.0334		0.0061		0.0520	
N	17		7		27		26		11		27	
MEAN	0.0149		0.0063		0.1720		0.2248		0.0103		0.3704	
3STDEV	0.0083		0.0086		0.0272		0.0339		0.0312		0.0666	

PARAMETER: 07192 Ammonia mg/L N

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.009	6.00	0.032	24.00	0.033	15.50	0.133	21.00
F004	0.010	8.00	0.031	20.00	0.033	15.50	0.125	12.00
F007	<0.010	0.00	0.023	6.50	0.024	3.00	0.131	19.00
F010	<0.02	0.00	0.02	4.00	0.02 L	2.00	0.14	25.50
F011	0.011	10.50	0.028	13.00	0.03	8.00	0.121	10.00
F014	<0.010	0.00	0.027	11.00	0.029	6.00	0.120	7.50
F015	0.014	12.00	0.032	24.00	0.036	21.00	0.135	23.00
F017	0.007	4.50	0.028	13.00	0.032	13.50	0.128	15.00
F020	0.015	14.00	0.03	17.50	0.04	23.50	0.15 H	28.00
F022	<0.008	0.00	0.023	6.50	0.017 VL	1.00	0.105 L	1.00
F025	<0.01	0.00	0.017 L	2.00	0.025	4.00	0.127	14.00
F026	0.0063	3.00	0.0311	21.00	0.0312	12.00	0.1234	11.00
F032	0.002W	1.00	0.028	13.00	0.032	13.50	0.13	17.50
F036	0.004T	2.00	0.024	8.00	0.03	8.00	0.136	24.00
F042	0.04W	0.00	0.04W	0.00	0.04	23.50	0.13	17.50
F053	0.02W	0.00	0.02	4.00	0.03	8.00	0.12	7.50
F060	0.08 EH	20.00	0.06 EH	28.00	0.05 VH	27.00	0.12	7.50
F068		0.00	0.032	24.00	0.034	17.00	0.133	21.00
F071	0.019 H	16.50	0.020	4.00	0.027	5.00	0.113	3.00
F072	0.010	8.00	0.029	15.00	0.035	19.00	0.129	16.00
F074	0.015	14.00	0.03	17.50	0.035	19.00	0.12	7.50
F094	<0.005	0.00	0.026	9.50	0.031	10.50	0.118	5.00
F107	0.007	4.50	0.026	9.50	0.031	10.50	0.116	4.00
F109	0.015T	14.00	0.032	24.00	0.042	26.00	0.133	21.00
F112	0.01	8.00	0.03	17.50	0.04	23.50	0.14	25.50
F113	0.011	10.50	0.032	24.00	0.035	19.00	0.126	13.00
F118	0.02T VH	18.00	0.03T	17.50	0.04T	23.50	0.15 H	28.00
F145	0.03 VH	19.00	0.04 H	27.00	0.06 EH	29.00	0.15 H	28.00
F147	0.019 H	16.50	0.006 EL	1.00	0.055 VH	28.00	0.111	2.00
MEDIAN OR *TARGET CONC.	*0.0100		0.0285		0.0330		0.1280	
1CRIT	0.0066		0.0088		0.0094		0.0213	
N	18		26		27		28	
MEAN	0.0129		0.0277		0.0341		0.1289	
3STDEV	0.0183		0.0149		0.0220		0.0312	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	133.50	13.350	10	EL				Alkaline phenol
F004	120.00	12.000	10					07540
F007	76.00	12.667	6					
F010	109.50	18.250	6	EH L				Colorimetry
F011	73.50	7.350	10	EHELEL L				
F014	55.00	7.857	7					
F015	173.00	19.222	9					Colour
F017	104.50	13.062	8					Colourimetric
F020	167.50	23.929	7	EH H	BIASED HIGH	9.98	0.0035	TrAACs
F022	46.00	7.667	6	VLL				Colorimetry
F025	48.00	8.000	6	L				IC Low Level
F026	93.00	9.300	10					Autoanal.
F032	106.50	11.833	9					Colourimetry
F036	108.00	13.500	8					Colourimetry
F042	114.00	19.000	6	VH				Colorimetric
F053	36.50	6.083	6					FIA,phenate
F060	142.00	17.750	8	EH EHEHVH				Dig. Color
F068	135.00	22.500	6		BIASED HIGH*	4.22	0.0005	Dionex, IC
F071	50.50	6.312	8	H	BIASED LOW*	-5.40	-0.0021	Colorimetric
F072	117.50	14.688	8					A.A. Phenate
F074	110.00	13.750	8					Hypochlorite auto
F094	55.50	7.929	7					Colorimetry
F107	65.00	6.500	10		BIASED LOW	-11.45	0.0011	Colourimetric
F109	179.50	17.950	10					FIA Phenate
F112	146.00	18.250	8					
F113	128.50	12.850	10					FIA Lachat 8000
F118	192.00	19.200	10	EH H VH H				IC
F145	173.00	17.300	10	VHELVHH EHH				Auto
F147	58.00	8.286	7	EL H ELVH				IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 7.50

OVERALL AVERAGE
RANK IS 13.321

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F053	36.50	6.083	6					FIA,phenate
F071	50.50	6.312	8	H	BIASED LOW*	-5.40	-0.0021	Colorimetric
F107	65.00	6.500	10		BIASED LOW	-11.45	0.0011	Colourimetric
F011	73.50	7.350	10	EHELELL				
F022	46.00	7.667	6	VLL				Colorimetry
F014	55.00	7.857	7					
F094	55.50	7.929	7					Colorimetry
F025	48.00	8.000	6	L				IC Low Level
F147	58.00	8.286	7	ELHELVH				IC
F026	93.00	9.300	10					Autoanal.
F032	106.50	11.833	9					Colourimetry
F004	120.00	12.000	10					07540
F007	76.00	12.667	6					
F113	128.50	12.850	10					FIA Lachat 8000
F017	104.50	13.062	8					Colourimetric
F003	133.50	13.350	10	EL				Alkaline phenol
F036	108.00	13.500	8					Colourimetry
F074	110.00	13.750	8					Hypochlorite auto
F072	117.50	14.688	8					A.A. Phenate
F145	173.00	17.300	10	VHELVHHEHH				Auto
F060	142.00	17.750	8	EHEHEHVH				Dig. Color
F109	179.50	17.950	10					FIA Phenate
F112	146.00	18.250	8					
F010	109.50	18.250	6	EHL				Colorimetry
F042	114.00	19.000	6	VH				Colorimetric
F118	192.00	19.200	10	EHHVHH				IC
F015	173.00	19.222	9					Colour
F068	135.00	22.500	6		BIASED HIGH*	4.22	0.0005	Dionex, IC
F020	167.50	23.929	7	EHH	BIASED HIGH	9.98	0.0035	TrAACs

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 7.50

OVERALL AVERAGE
RANK IS 13.321

Ammonia

PARAMETER: 07392 Total Kjeldahl N mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0250 BASIC ACCEPTABLE ERROR= 0.0250 CONCENTRATION ERROR INCREMENT= 0.1500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.275	7.00	0.088	4.00	0.192	4.00	0.246	5.00	0.107	5.00	0.484	8.00
F014	0.28	8.00	<0.20	0.00	0.20	5.50	0.25	6.00	<0.20	0.00	0.43	3.50
F022	0.21	2.00	0.05 L	1.00	0.231	7.00	0.242	4.00	0.068	1.00	0.436	5.00
F032	0.24	4.00	0.08T	3.00	0.2	5.50	0.26	7.00	0.1	4.00	0.48	7.00
F060	0.25	5.00	0.12	5.00	0.18	3.00	0.24	2.50	0.13	7.00	0.46	6.00
F072	0.3	9.00	<0.1	0.00	0.16	1.50	0.28	8.00	<0.1	0.00	0.43	3.50
F074	0.231	3.00	0.078	2.00	0.16	1.50	0.23	1.00	0.093	3.00	0.4	2.00
F094	0.32	10.00	0.14 VH	6.00	0.31 VH	8.00	0.24	2.50	0.09	2.00	0.52	10.00
F145	0.15 EL	1.00	<0.1	0.00	<0.1 VL	0.00	<0.1 EL	0.00	<0.1	0.00	0.32 EL	1.00
F147	0.274	6.00	0.168 EH	7.00	0.334 VH	9.00	0.299 EH	9.00	0.116	6.00	0.499	9.00
MEDIAN	0.2620		0.0880		0.2000		0.2460		0.1000		0.4480	
1CRIT	0.0605		0.0345		0.0513		0.0582		0.0363		0.0884	
N	8		5		6		7		5		8	
MEAN	0.2575		0.1012		0.2188		0.2511		0.1012		0.4524	
3STDEV	0.0836		-		0.1307		0.0404		-		0.0949	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.137	4.00	0.248	9.00	0.157	4.00	0.146	4.00
F014	<0.20	0.00	0.24	6.00	<0.20	0.00	<0.20	0.00
F022	0.112	2.00	0.244	8.00	0.104 L	1.00	0.171	6.00
F032	0.16	6.50	0.24	6.00	0.16	6.00	0.14	2.50
F060	0.16	6.50	0.24	6.00	0.15	3.00	0.14	2.50
F072	<0.1	0.00	0.16 L	2.00	<0.1 L	0.00	0.18	7.00
F074	0.124	3.00	0.212	4.00	0.165	7.00	0.125	1.00
F094	0.09 L	1.00	0.21	3.00	0.14	2.00	0.23 VH	8.00
F145	<0.1	0.00	0.15 VL	1.00	<0.1 L	0.00	0.15	5.00
F147	0.15	5.00	0.249	10.00	0.159	5.00	0.231 VH	9.00
MEDIAN	0.1370		0.2400		0.1570		0.1500	
1CRIT	0.0418		0.0573		0.0448		0.0438	
N	4		8		5		7	
MEAN	0.1308		0.2243		0.1532		0.1653	
3STDEV	-		0.0834		-		0.0902	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	54.00	5.400	10					dig. phenol
F014	29.00	5.800	5					
F022	37.00	3.700	10	L L				Colorimetry
F032	51.50	5.150	10					Colourimetry
F060	46.50	4.650	10					Dig. Color
F072	31.00	5.167	6	L L				Sal. Nitroprussate
F074	27.50	2.750	10					UV dig. to NH3
F094	52.50	5.250	10	VHVH L VH				Colorimetry
F145	8.00	2.000	4	EL VLEL EL VLL				Auto
F147	75.00	7.500	10	EHVHEH VH				dig. colour

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 4.847

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F145	8.00	2.000	4	ELVLELELVLL				Auto
F074	27.50	2.750	10					UV dig. to NH3
F022	37.00	3.700	10	LL				Colorimetry
F060	46.50	4.650	10					Dig. Color
F032	51.50	5.150	10					Colourimetry
F072	31.00	5.167	6	LL				Sal. Nitroprussate
F094	52.50	5.250	10	VHVHLVH				Colorimetry
F003	54.00	5.400	10					dig. phenol
F014	29.00	5.800	5					
F147	75.00	7.500	10	EHVHEHVH				dig. colour

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 4.847

Total Kjeldahl N

PARAMETER: 11091 Sodium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.1000 BASIC ACCEPTABLE ERROR= 0.0400 CONCENTRATION ERROR INCREMENT= 0.0400

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	4.11	26.00	1.64	23.50	<0.05	0.00	<0.05	0.00	2.96	18.00	0.29	20.00
F003	3.88	9.00	1.57	15.50	0.06	18.50	0.07	17.50	2.83	11.00	0.30	27.50
F007	4.16	30.00	1.62	19.50	0.045	6.00	0.066	11.50	3.04	28.50	0.29	20.00
F009	1.53 EL	1.00	1.55	11.00	0.05	10.50	0.07	17.50	2.94	15.00	0.27	6.50
F010	3.53 VL	2.00	1.36 VL	1.00	0.04	3.50	0.05	1.50	2.5 VL	1.50	0.24 L	1.00
F011	3.84	7.00	1.56	13.00	0.05	10.50	0.07	17.50	2.75 L	7.00	0.28	12.50
F014	3.77 L	4.00	1.48 L	3.00	<0.05	0.00	0.06	6.00	2.68 VL	5.00	0.28	12.50
F015	3.9	11.00	1.5	6.50	<0.1	0.00	<0.1	0.00	2.8 L	10.00	0.3	27.50
F017	3.973	16.00	1.6	17.00	0.046	7.00	0.064	9.00	2.723 VL	6.00	0.287	16.00
F020	4.28 H	31.00	1.77 VH	30.00	0.05	10.50	0.07	17.50	3.3 VH	32.00	0.31	30.50
F022	4.	18.00	1.53	8.50	0.05	10.50	0.06	6.00	2.95	16.00	0.28	12.50
F025	4.125	27.00	1.723 H	29.00	0.053	15.00	0.066	11.50	3.098	30.00	0.274	9.00
F026	4.041	22.00	1.566	14.00	0.057	16.00	0.072	24.00	2.965	20.00	0.289	17.00
F032	4.15	28.50	1.62	19.50	0.5 EH	23.00	0.07	17.50	3.03	27.00	0.292	25.00
F036	4.1	24.50	1.63	21.50	0.04	3.50	0.065	10.00	2.98	23.00	0.29	20.00
F037	4.382 VH	32.00	1.674	27.00	0.101 H	22.00	0.124 EH	26.00	3.265 VH	31.00	0.358 EH	32.00
F042	3.97	15.00	1.63	21.50	0.05W	0.00	0.07	17.50	2.97	21.50	0.29	20.00
F053	3.892	10.00	1.641	25.00	0.052	14.00	0.071	23.00	2.87	13.50	0.291	24.00
F060	4.15	28.50	1.64	23.50	0.05	10.50	0.06	6.00	3.04	28.50	0.29	20.00
F068	4.033	20.00	1.609	18.00		0.00		0.00	2.991	24.00	0.283	15.00
F071	3.920	13.00	2.376 EH	32.00	0.059	17.00	0.070	17.50	2.870	13.50	0.267	4.00
F072	3.91	12.00	1.55	11.00	<0.01 L	0.00	<0.01 EL	0.00	2.58 VL	3.00	0.25	2.50
F074	3.8 L	5.00	1.46 L	2.00	0.05	10.50	0.07	17.50	2.78 L	8.00	0.27	6.50
F094	4.1	24.50	1.5	6.50	<0.1	0.00	<0.1	0.00	2.5 VL	1.50	0.3	27.50
F107	3.67 VL	3.00	1.49 L	4.00	0.04	3.50	0.06	6.00	2.65 VL	4.00	0.27	6.50
F110	4.04	21.00	1.69	28.00	0.06	18.50	0.07	17.50	2.96	18.00	0.30	27.50
F110a	3.86	8.00	1.53	8.50	<0.20	0.00	<0.20	0.00	3.02	26.00	0.27	6.50
F112	4.07	23.00	3.23 EH	33.00	0.04	3.50	0.06	6.00	2.97	21.50	0.28	12.50
F113	3.938	14.00	1.66	26.00	0.036	1.00	0.056	3.00	3.006	25.00	0.278	10.00
F133	4.00	18.00	1.55	11.00	<0.05	0.00	0.05	1.50	2.85	12.00	0.25	2.50
F139	3.831	6.00	1.493 L	5.00	<0.200	0.00	<0.200	0.00	2.787 L	9.00	0.2906	23.00
F145	5.27 EH	33.00	2.03 VH	31.00	0.07	20.00	0.07	17.50	3.87 EH	33.00	0.37 EH	33.00
F147	4.	18.00	1.57	15.50	0.1 H	21.00	0.11 EH	25.00	2.96	18.00	0.31	30.50
MEDIAN	4.0000		1.6000		0.0500		0.0700		2.9600		0.2890	
1CRIT	0.1960		0.1000		0.0400		0.0400		0.1544		0.0476	
N	31		31		21		23		30		31	
MEAN	3.9815		1.6275		0.0554		0.0683		2.9205		0.2864	
3STDEV	0.5094		0.5201		0.0493		0.0302		0.4771		0.0581	

PARAMETER: 11091 Sodium mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.73	4.00	2.28	26.00	0.63	17.50	0.15	6.50
F003	0.78	18.50	2.16	10.00	0.62	14.50	0.17	20.50
F007	0.809	30.00	2.34 H	29.00	0.647	26.00	0.167	18.00
F009	0.75	6.50	2.17	11.00	0.61	11.00	0.16	12.50
F010	0.68 L	1.00	1.9 VL	1.00	0.53 VL	1.00	0.13	3.00
F011	0.76	12.00	2.1	7.50	0.6	5.50	0.15	6.50
F014	0.77	14.50	2.01 VL	3.00	0.61	11.00	0.16	12.50
F015	0.8	26.00	2.1	7.50	0.6	5.50	0.2	28.00
F017	0.784	20.00	2.183	12.00	0.633	19.50	0.166	17.00
F020	0.94 EH	31.00	2.55 VH	32.00	0.76 EH	32.00	0.19	26.00
F022	0.76	12.00	2.2	14.50	0.61	11.00	0.16	12.50
F025	0.770	14.50	2.252	21.00	0.620	14.50	0.172	24.00
F026	0.774	17.00	2.198	13.00	0.621	16.00	0.199	27.00
F032	0.804	29.00	2.3	27.50	0.65	28.00	0.17	20.50
F036	0.79	22.50	2.27	24.50	0.65	28.00	0.175	25.00
F037	0.941 EH	32.00	2.38 H	31.00	0.717 H	31.00	0.227 H	31.00
F042	0.80	26.00	2.25	20.00	0.64	23.50	0.17	20.50
F053	0.772	16.00	2.147	9.00	0.633	19.50	0.171	23.00
F060	0.80	26.00	2.27	24.50	0.64	23.50	0.16	12.50
F068	0.789	21.00	2.205	16.00	0.634	21.00	0.161	16.00
F071	0.759	10.00	2.232	19.00	0.605	9.00	0.157	9.00
F072	0.76	12.00	1.95 VL	2.00	0.60	5.50	0.11 L	2.00
F074	0.73	4.00	2.07 L	4.00	0.59	3.00	0.16	12.50
F094	0.7 L	2.00	2.3	27.50	0.6	5.50	0.1 L	1.00
F107	0.73	4.00	2.08 L	6.00	0.58	2.00	0.15	6.50
F110	0.79	22.50	2.26	22.50	0.64	23.50	0.17	20.50
F110a	0.75	6.50	2.23	18.00	0.68	30.00	0.26 EH	32.00
F112	0.80	26.00	2.26	22.50	0.64	23.50	0.16	12.50
F113	0.751	8.00	2.344 H	30.00	0.611	13.00	0.136	4.00
F133	0.80	26.00	2.20	14.50	0.65	28.00	0.15	6.50
F139	0.758	9.00	2.075 L	5.00	0.602	8.00	<0.200	0.00
F145	1.04 EH	33.00	2.94 EH	33.00	0.83 EH	33.00	0.21 H	29.50
F147	0.78	18.50	2.21	17.00	0.63	17.50	0.21 H	29.50
MEDIAN	0.7740		2.2100		0.6300		0.1635	
1CRIT	0.0670		0.1244		0.0612		0.0425	
N	31		31		31		30	
MEAN	0.7816		2.2121		0.6307		0.1674	
3STDEV	0.1467		0.3461		0.1075		0.0719	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	141.50	17.688	8					Flame Photometric
F003	162.50	16.250	10					ICP
F007	218.50	21.850	10	H				
F009	102.50	10.250	10	EL				ICP-MS
F010	16.50	1.650	10	VLVL VLL L VLVL	BIASED LOW	-12.83	-0.0151	ICP-OES
F011	99.00	9.900	10	L				
F014	71.50	7.944	9	L L VL VL				ICP MS
F015	122.00	15.250	8	L				ICP
F017	139.50	13.950	10	VL				AAF
F020	272.50	27.250	10	H VH VH EHVHEH	BIASED HIGH	8.74	0.0359	IC
F022	121.50	12.150	10					AAS
F025	195.50	19.550	10	H				IC Low Level
F026	186.00	18.600	10					FAA
F032	245.50	24.550	10	EH				AAS
F036	202.50	20.250	10					AAS
F037	295.00	29.500	10	VH H EHVHEHEHH H H	BIASED HIGH	7.80	0.0428	ICP-MS
F042	185.50	20.611	9					AAS, air
F053	177.00	17.700	10					AAS
F060	203.50	20.350	10					ICP
F068	151.00	18.875	8					Dionex, IC
F071	144.00	14.400	10	EH				FAA
F072	50.00	6.250	8	L ELVL VL L	BIASED LOW	-5.55	-0.0270	Flame AA
F074	73.00	7.300	10	L L L L	BIASED LOW	-5.59	-0.0054	AAS
F094	96.00	12.000	8	VL L L				ICP-MS
F107	45.50	4.550	10	VLL VL L	BIASED LOW	-8.59	0.0069	ICP
F110	219.50	21.950	10					AAS
F110a	135.50	16.938	8	EH				ICP
F112	184.00	18.400	10	EH				AAS 2380
F113	134.00	13.400	10	H				FAAS PE5100
F133	120.00	13.333	9					ICP-MS
F139	65.00	9.286	7	L L L				ICP-OES
F145	296.00	29.600	10	EHVH EHEHEHEHEHH	BIASED HIGH	31.63	-0.0078	ICP-AES
F147	210.50	21.050	10	H EH H				IC

OVERALL AVERAGE
RANK IS 16.288

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	16.50	1.650	10	VLVLVLLLVLVL	BIASED LOW	-12.83	-0.0151	ICP-OES
F107	45.50	4.550	10	VLLVLL	BIASED LOW	-8.59	0.0069	ICP
F072	50.00	6.250	8	LELVLVLL	BIASED LOW	-5.55	-0.0270	Flame AA
F074	73.00	7.300	10	LLLL	BIASED LOW	-5.59	-0.0054	AAS
F014	71.50	7.944	9	LLVLVL				ICP MS
F139	65.00	9.286	7	LLL				ICP-OES
F011	99.00	9.900	10	L				
F009	102.50	10.250	10	EL				ICP-MS
F094	96.00	12.000	8	VLLL				ICP-MS
F022	121.50	12.150	10					AAS
F133	120.00	13.333	9					ICP-MS
F113	134.00	13.400	10	H				FAAS PE5100
F017	139.50	13.950	10	VL				AAF
F071	144.00	14.400	10	EH				FAA
F015	122.00	15.250	8	L				ICP
F003	162.50	16.250	10					ICP
F110a	135.50	16.938	8	EH				ICP
F002	141.50	17.688	8					Flame Photometric
F053	177.00	17.700	10					AAS
F112	184.00	18.400	10	EH				AAS 2380
F026	186.00	18.600	10					FAA
F068	151.00	18.875	8					Dionex, IC
F025	195.50	19.550	10	H				IC Low Level
F036	202.50	20.250	10					AAS
F060	203.50	20.350	10					ICP
F042	185.50	20.611	9					AAS, air
F147	210.50	21.050	10	HEHH				IC
F007	218.50	21.850	10	H				
F110	219.50	21.950	10					AAS
F032	245.50	24.550	10	EH				AAS
F020	272.50	27.250	10	HVHVHEHVHEH	BIASED HIGH	8.74	0.0359	IC
F037	295.00	29.500	10	VHHEHVHEHEHHHH	BIASED HIGH	7.80	0.0428	ICP-MS
F145	296.00	29.600	10	EHVHEHEHEHEHEHH	BIASED HIGH	31.63	-0.0078	ICP-AES

OVERALL AVERAGE
RANK IS 16.288

Sodium

PARAMETER: 19091 Potassium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.1000 BASIC ACCEPTABLE ERROR= 0.0300 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.37	4.00	0.19	4.50	<0.05	0.00	<0.05	0.00	0.26	5.00	0.15	9.00
F003	0.42	26.50	0.28 VH	29.00	<0.06	0.00	<0.06	0.00	0.34 H	29.50	0.15	9.00
F007	0.417	25.00	0.225	23.00	0.014	6.50	0.026	9.00	0.303	24.00	0.164	22.00
F010	0.34 L	1.00	0.18 L	3.00	0.01	3.50	0.02	5.50	0.25 L	4.00	0.13	3.00
F011	0.39	13.00	0.21	10.00	<0.02	0.00	0.07 EH	23.00	0.29	14.00	0.16	17.50
F014	0.36	2.50	0.25	28.00	<0.05	0.00	<0.05	0.00	0.29	14.00	0.16	17.50
F015	0.5 EH	30.00	0.3 VH	30.00	<0.1	0.00	<0.1	0.00	0.3	20.00	0.2 H	29.00
F017	0.389	11.00	0.219	14.00	0.018W	0.00	0.029	12.50	0.292	17.00	0.163	21.00
F020	0.42	26.50	0.21	10.00	<0.01	0.00	0.02	5.50	0.32	28.00	0.16	17.50
F022	0.38	6.50	0.22	16.50	0.01	3.50	0.02	5.50	0.28	8.50	0.15	9.00
F025	0.381	8.50	0.210	10.00	0.012	5.00	0.024	8.00	0.281	10.00	0.154	12.00
F026	0.379	5.00	0.207	7.00	0.036	16.00	0.048	20.00	0.289	11.00	0.159	14.00
F032	0.392	15.00	0.224	21.00	0.016	9.00	0.03	15.00	0.3	20.00	0.168	25.00
F036	0.395	17.00	0.225	23.00	0.015T	8.00	0.03	15.00	0.29	14.00	0.16	17.50
F037	0.393	16.00	0.217	13.00	0.0169	10.00	0.0301	17.00	0.274	7.00	0.16	17.50
F042	0.39	13.00	0.22	16.50	0.06W	0.00	0.06W	0.00	0.29	14.00	0.16	17.50
F053	0.398	18.00	0.225	23.00	0.014	6.50	0.029	12.50	0.300	20.00	0.169	26.00
F060	0.40	20.50	0.23	25.00	<0.05	0.00	<0.05	0.00	0.30	20.00	0.15	9.00
F068	0.381	8.50	0.210	10.00		0.00		0.00	0.280	8.50	0.158	13.00
F071	0.443 H	28.00	0.052 EL	1.00	0.240 EH	18.00	0.053	22.00	0.073 EL	1.00	0.313 EH	31.00
F072	0.45 H	29.00	0.21	10.00	0.02	14.00	0.03	15.00	0.34 H	29.50	0.14	5.00
F074	0.4	20.50	0.22	16.50	0.02	14.00	0.04	18.50	0.31	26.50	0.17	27.00
F094	0.38	6.50	0.15 VL	2.00	<0.01	0.00	0.01	2.50	0.22 VL	2.00	0.12 L	2.00
F107	0.36	2.50	0.19	4.50		0.00	0.003	1.00	0.24 L	3.00	0.14	5.00
F110	0.415	23.50	0.221	19.50	0.018	11.50	0.028	10.50	0.303	24.00	0.165	23.50
F110a	0.415	23.50	0.221	19.50	0.018	11.50	0.028	10.50	0.303	24.00	0.165	23.50
F112	0.39	13.00	0.22	16.50	0.00	1.00	0.01	2.50	0.29	14.00	0.15	9.00
F113	0.388	10.00	0.239	26.00	0.008	2.00	0.02	5.50	0.27	6.00	0.14	5.00
F133	0.40	20.50	0.20	6.00	<0.05	0.00	<0.05	0.00	0.30	20.00	0.10 VL	1.00
F139	<0.5	0.00	<0.5	0.00	<0.5	0.00	<0.5	0.00	<0.5	0.00	<0.5	0.00
F145	0.52 EH	31.00	0.31 EH	31.00	0.06 EH	17.00	0.04	18.50	0.39 EH	31.00	0.23 EH	30.00
F147	0.4	20.50	0.24	27.00	0.02	14.00	0.05	21.00	0.31	26.50	0.19	28.00
MEDIAN	0.3930		0.2200		0.0165		0.0290		0.2900		0.1600	
1CRIT	0.0446		0.0360		0.0300		0.0300		0.0395		0.0330	
N	29		29		16		21		29		29	
MEAN	0.3999		0.2194		0.0192		0.0293		0.2902		0.1598	
3STDEV	0.0839		0.0812		0.0366		0.0340		0.0759		0.0609	

PARAMETER: 19091 Potassium mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.17	3.50	0.47	4.50	0.21	3.00	<0.05	0.00
F003	0.20	17.00	0.50	12.00	0.24	14.00	<0.06	0.00
F007	0.204	20.50	0.533	26.00	0.241	18.00	0.03	12.50
F010	0.16 EL	1.50	0.43 VL	3.00	0.25	25.00	0.02	4.00
F011	0.21	25.50	0.51	17.50	0.24	14.00	0.03	12.50
F014	0.20	17.00	0.48	6.00	0.24	14.00	<0.05	0.00
F015	0.3 EH	30.50	0.5	12.00	0.3 VH	29.00	<0.1	0.00
F017	0.199	14.00	0.517	20.00	0.24	14.00	0.029	9.00
F020	0.21	25.50	0.58 H	31.00	0.27	28.00	0.02	4.00
F022	0.19	9.00	0.49	9.00	0.23	4.50	0.02	4.00
F025	0.188	7.00	0.500	12.00	0.232	7.00	0.029	9.00
F026	0.198	13.00	0.488	8.00	0.231	6.00	0.052	21.00
F032	0.2	17.00	0.524	24.00	0.244	19.00	0.032	18.00
F036	0.195	11.00	0.52	22.50	0.235	9.00	0.03	12.50
F037	0.204	20.50	0.485	7.00	0.239	10.00	0.0280	7.00
F042	0.20	17.00	0.50	12.00	0.23	4.50	0.06W	0.00
F053	0.211	28.00	0.519	21.00	0.248	22.00	0.031	16.00
F060	0.21	25.50	0.53	25.00	0.25	25.00	<0.05	0.00
F068	0.185	6.00	0.504	15.00	0.249	23.00		0.00
F071	0.179	5.00	0.220 EL	1.00	0.521 EH	31.00	0.266 EH	22.00
F072	0.19	9.00	0.51	17.50	0.24	14.00	0.03	12.50
F074	0.21	25.50	0.52	22.50	0.24	14.00	0.04	19.00
F094	0.17	3.50	0.38 EL	2.00	0.2 L	1.50	<0.01	0.00
F107	0.16 EL	1.50	0.47	4.50	0.20 L	1.50	0.006	1.00
F110	0.206	22.50	0.537	28.50	0.245	20.50	0.031	16.00
F110a	0.206	22.50	0.537	28.50	0.245	20.50	0.031	16.00
F112	0.19	9.00	0.51	17.50	0.24	14.00	0.02	4.00
F113	0.197	12.00	0.535	27.00	0.233	8.00	0.029	9.00
F133	0.20	17.00	0.50	12.00	0.25	25.00	<0.05	0.00
F139	<0.5	0.00	0.551	30.00	<0.5	0.00	<0.5	0.00
F145	0.3 EH	30.50	0.68 EH	32.00	0.35 EH	30.00	0.02	4.00
F147	0.22	29.00	0.51	17.50	0.26	27.00	0.05	20.00
MEDIAN	0.2000		0.5100		0.2400		0.0300	
1CRIT	0.0350		0.0505		0.0370		0.0300	
N	27		30		28		20	
MEAN	0.1979		0.5047		0.2472		0.0301	
3STDEV	0.0358		0.1078		0.0747		0.0260	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	33.50	4.786	7		BIASED LOW*	-4.42	-0.0149	Flame Photometric
F003	137.00	19.571	7	VH H				ICP
F007	186.50	18.650	10					
F010	53.50	5.350	10	L L L ELVL	BIASED LOW	-13.03	-0.0026	ICP-OES
F011	147.00	16.333	9	EH				
F014	99.00	14.143	7					ICP MS
F015	180.50	25.786	7	EHVH H EH VH	BIASED HIGH	-14.27	0.0963	ICP
F017	132.50	14.722	9					AAF
F020	176.00	19.556	9	H				IC
F022	76.00	7.600	10		BIASED LOW*	-1.83	-0.0060	AAS
F025	88.50	8.850	10					IC Low Level
F026	121.00	12.100	10					FAA
F032	183.00	18.300	10					AAS
F036	149.50	14.950	10					AAS
F037	125.00	12.500	10					ICP-MS
F042	94.50	13.500	7					AAS, air
F053	193.00	19.300	10					AAS
F060	150.00	21.429	7					ICP
F068	84.00	12.000	7					Dionex, IC
F071	160.00	16.000	10	H ELEH ELEH ELEHEH				FAA
F072	155.50	15.550	10	H H				AAS
F074	204.00	20.400	10					AAS
F094	22.00	2.750	8	VL VLL ELL	BIASED LOW	-16.35	-0.0098	ICP-MS
F107	24.50	2.722	9	L EL L	BIASED LOW*	-3.58	-0.0254	ICP
F110	200.00	20.000	10					AAS
F110a	200.00	20.000	10					AAS
F112	100.50	10.050	10					AAS 2380
F113	110.50	11.050	10					FAAS PE5100
F133	101.50	14.500	7	VL				ICP-MS
F139	30.00	30.000	1		INSUFFICIENT DATA			ICP-OES
F145	255.00	25.500	10	EHEHEH EHEHEHEHEH	BIASED HIGH	31.45	0.0155	ICP-AES
F147	230.50	23.050	10		BIASED HIGH*	-2.51	0.0214	IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 14.961

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F107	24.50	2.722	9	LELL	BIASED LOW*	-3.58	-0.0254	ICP
F094	22.00	2.750	8	VLVLLELL	BIASED LOW	-16.35	-0.0098	ICP-MS
F002	33.50	4.786	7		BIASED LOW*	-4.42	-0.0149	Flame Photometric
F010	53.50	5.350	10	LLLELVL	BIASED LOW	-13.03	-0.0026	ICP-OES
F022	76.00	7.600	10		BIASED LOW*	-1.83	-0.0060	AAS
F025	88.50	8.850	10					IC Low Level
F112	100.50	10.050	10					AAS 2380
F113	110.50	11.050	10					FAAS PE5100
F068	84.00	12.000	7					Dionex, IC
F026	121.00	12.100	10					FAA
F037	125.00	12.500	10					ICP-MS
F042	94.50	13.500	7					AAS, air
F014	99.00	14.143	7					ICP MS
F133	101.50	14.500	7	VL				ICP-MS
F017	132.50	14.722	9					AAF
F036	149.50	14.950	10					AAS
F072	155.50	15.550	10	HH				AAS
F071	160.00	16.000	10	HELEHELEHELEHEH				FAA
F011	147.00	16.333	9	EH				
F032	183.00	18.300	10					AAS
F007	186.50	18.650	10					
F053	193.00	19.300	10					AAS
F020	176.00	19.556	9	H				IC
F003	137.00	19.571	7	VHH				ICP
F110	200.00	20.000	10					AAS
F110a	200.00	20.000	10					AAS
F074	204.00	20.400	10					AAS
F060	150.00	21.429	7					ICP
F147	230.50	23.050	10		BIASED HIGH*	-2.51	0.0214	IC
F145	255.00	25.500	10	EHEHEHEHEHEHEHEH	BIASED HIGH	31.45	0.0155	ICP-AES
F015	180.50	25.786	7	EHVHHEHVH	BIASED HIGH	-14.27	0.0963	ICP
F139	30.00	30.000	1		INSUFFICIENT DATA			ICP-OES

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 14.961

PARAMETER: 14092 Reactive Silica mg/L Si

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0250 BASIC ACCEPTABLE ERROR= 0.0250 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	1.08	8.00	3.39	6.00	0.019	6.00	0.009	2.00	1.06	7.50	0.079	7.00
F010	1.03	2.00	3.41	8.00	<0.02	0.00	<0.02	0.00	0.99	1.50	0.06	2.50
F015	1.08	8.00	3.46	16.00	<0.05	0.00	<0.05	0.00	1.08	13.00	0.09	10.50
F020	1.09	10.50	3.35	4.00	<0.1	0.00	<0.1	0.00	1.07	11.00	<0.1	0.00
F022	1.01	1.00	3.29	2.00	0.016	4.00	0.013	5.00	1.021	3.00	0.72 EH	16.00
F026	1.0777	6.00	3.4183	10.00	0.0306	9.00	0.0263	9.00	1.0528	5.00	0.0888	9.00
F032	1.08	8.00	3.44	14.50	0.02W	0.00	0.02W	0.00	1.06	7.50	0.06T	2.50
F037	1.155	17.00	3.431	13.00	0.0200	8.00	0.0183	7.00	1.143	18.00	0.114	13.50
F042	1.12	15.00	3.43	12.00	0.05 EH	11.00	0.05W	0.00	1.06	7.50	0.07	4.00
F060	1.26 EH	19.00	3.97 EH	19.00	<0.05	0.00	<0.05	0.00	1.26 EH	19.00	0.14 VH	15.00
F071	1.107	14.00	3.413	9.00	0.019	6.00	0.010	3.00	1.075	12.00	0.077	5.50
F072	1.1	12.50	3.44	14.50	0.033	10.00	0.019	8.00	1.09	15.00	0.114	13.50
F074	1.09	10.50	3.2	1.00	0.015	3.00	0.012	4.00	1.06	7.50	0.077	5.50
F094	1.1	12.50	3.4	7.00	<0.1	0.00	<0.1	0.00	1.1	17.00	<0.1	0.00
F107	1.16	18.00	3.42	11.00	0.011	2.00	0.039 EH	10.00	1.09	15.00	0.057 L	1.00
F109	1.045	4.00	3.317	3.00	0.001T	1.00	0.003T	1.00	1.037	4.00	0.095T	12.00
F112	1.37 EH	20.00	4.12 EH	20.00		0.00		0.00	1.32 EH	20.00	0.09	10.50
F113	1.077	5.00	3.493	17.00	0.019	6.00	0.015	6.00	1.067	10.00	0.083	8.00
F145	1.04	3.00	3.36	5.00	<0.1	0.00	<0.1	0.00	0.99	1.50	<0.1	0.00
F147	1.15	16.00	3.72 H	18.00	<0.20	0.00	<0.20	0.00	1.09	15.00	<0.20	0.00
MEDIAN	1.0900		3.4191		0.0190		0.0140		1.0685		0.0859	
1CRIT	0.0889		0.2286		0.0250		0.0250		0.0876		0.0287	
N	18		18		9		8		17		14	
MEAN	1.1023		3.4529		0.0203		0.0153		1.0833		0.0884	
3STDEV	0.1566		0.4574		0.0201		0.0160		0.1541		0.0639	

PARAMETER: 14092 Reactive Silica mg/L Si

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	2.06	9.00	1.96	12.00	0.350	7.00	<0.009	0.00
F010	1.91 L	1.00	1.96	12.00	0.33	4.00	<0.02	0.00
F015	2.10	14.50	1.96	12.00	0.37	14.50	<0.05	0.00
F020	2.08	12.00	1.96	12.00	0.357	10.00	<0.1	0.00
F022	1.97	3.00	1.826	1.00	0.332	5.00	0.004	2.50
F026	2.0661	10.00	1.9529	9.00	0.3539	8.00	0.0197	8.00
F032	2.08	12.00	1.96	12.00	0.34	6.00	0.02W	0.00
F037	1.964	2.00	1.896	3.00	0.415 H	18.00	0.0117	6.00
F042	2.08	12.00	1.98	16.00	0.36	12.00	0.05W	0.00
F060	2.43 EH	19.00	2.29 EH	19.00	0.47 EH	20.00	<0.05	0.00
F071	2.108	16.00	1.975	15.00	0.358	11.00	0.010	5.00
F072	2.05	8.00	1.95	6.50	0.393	16.00	0.	1.00
F074	2.04	6.00	1.93	4.00	0.354	9.00	<0.005	0.00
F094	2.1	14.50	2.	17.00	0.3 L	2.00	<0.1	0.00
F107	2.15	17.00	1.95	6.50	0.326	3.00	0.019	7.00
F109	2.027	5.00	1.943	5.00	0.370	14.50	0.004T	2.50
F112	2.47 EH	20.00	2.39 EH	20.00	0.45 VH	19.00		0.00
F113	2.048	7.00	1.952	8.00	0.363	13.00	0.009	4.00
F145	1.99	4.00	1.87	2.00	0.26 VL	1.00	<0.1	0.00
F147	2.24 H	18.00	2.15 H	18.00	0.4	17.00	<0.20	0.00
MEDIAN	2.0731		1.9600		0.3575		0.0095	
1CRIT	0.1479		0.1411		0.0450		0.0250	
N	18		18		18		6	
MEAN	2.0880		1.9799		0.3623		0.0096	
3STDEV	0.3115		0.2773		0.1024		0.0153	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	64.50	7.167	9					Colorimetric
F010	31.00	4.429	7	L	BIASED LOW*	-0.10	-0.0506	Colorimetry
F015	88.50	12.643	7					Colour
F020	59.50	9.917	6					TrAACs
F022	42.50	4.250	10	EH	BIASED LOW	-9.23	0.1037	Colorimetry
F026	83.00	8.300	10					Autoanal.
F032	62.50	8.929	7					Colourimetry
F037	105.50	10.550	10	H				ICP-MS
F042	89.50	11.188	8	EH				Colorimetric
F060	130.00	18.571	7	EHEH EHVHEHEHEH	BIASED HIGH	14.88	0.0386	ICP
F071	96.50	9.650	10					Colorimetric
F072	105.00	10.500	10					Molybdate AN.
F074	50.50	5.611	9					Moly blue FIA
F094	70.00	11.667	6	L				Colorimetry
F107	90.50	9.050	10	EH L				Colourimetric
F109	52.00	5.200	10					ICP
F112	129.50	18.500	7	EHEH EH EHEHVH	BIASED HIGH	20.03	0.0204	TECHNICON
F113	84.00	8.400	10					FIA Lachat 8000
F145	16.50	2.750	6	VL	BIASED LOW*	0.65	-0.0872	Auto
F147	102.00	17.000	6	H H H	BIASED HIGH	9.64	-0.0298	colourimetry

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 9.412

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F145	16.50	2.750	6	VL	BIASED LOW*	0.65	-0.0872	Auto
F022	42.50	4.250	10	EH	BIASED LOW	-9.23	0.1037	Colorimetry
F010	31.00	4.429	7	L	BIASED LOW*	-0.10	-0.0506	Colorimetry
F109	52.00	5.200	10					ICP
F074	50.50	5.611	9					Moly blue FIA
F003	64.50	7.167	9					Colorimetric
F026	83.00	8.300	10					Autoanal.
F113	84.00	8.400	10					FIA Lachat 8000
F032	62.50	8.929	7					Colourimetry
F107	90.50	9.050	10	EHL				Colourimetric
F071	96.50	9.650	10					Colorimetric
F020	59.50	9.917	6					TrAACs
F072	105.00	10.500	10					Molybdate AN.
F037	105.50	10.550	10	H				ICP-MS
F042	89.50	11.188	8	EH				Colorimetric
F094	70.00	11.667	6	L				Colorimetry
F015	88.50	12.643	7					Colour
F147	102.00	17.000	6	HHH	BIASED HIGH	9.64	-0.0298	colourimetry
F112	129.50	18.500	7	EHEHEHEHEHVH	BIASED HIGH	20.03	0.0204	TECHNICON
F060	130.00	18.571	7	EHEHEHVHEHEHEH	BIASED HIGH	14.88	0.0386	ICP

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 9.412

PARAMETER: 16000 Sulfate IC mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.2500 BASIC ACCEPTABLE ERROR= 0.0500 CONCENTRATION ERROR INCREMENT= 0.0350

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	2.0	14.00	2.99	15.50	2.15	15.00	1.64	17.50	2.27	21.00	3.79	8.00
F009	1.92	5.50	2.9	5.50	2.23	28.50	1.9 VH	29.50	2.22	10.00	3.7	4.00
F010	2.02	19.50	3.02	19.50	2.11	6.00	1.66	21.00	2.26	17.00	3.82	15.00
F014	2.01	16.00	2.94	7.00	2.12	8.00	1.50 L	1.00	2.24	13.00	3.88	23.00
F015	2.	14.00	2.9	5.50	2.2	25.00	1.8 VH	27.00	2.3	27.50	3.8	9.50
F017	2.026	22.00	2.982	12.00	2.149	13.00	1.663	23.00	2.251	15.00	3.812	13.00
F020	1.92	5.50	2.88	3.50	2.07	4.50	1.54	3.50	2.15	4.50	4.00	31.00
F022	1.96	9.00	3.02	19.50	2.23	28.50	1.8 VH	27.00	2.26	17.00	3.81	12.00
F025	2.018	17.00	3.037	22.00	2.174	20.00	1.661	22.00	2.261	19.00	3.861	21.00
F026	1.9163	4.00	2.9923	18.00	2.1175	7.00	1.5763	8.00	2.1984	7.00	3.8464	18.00
F032	2.05	25.00	3.15 H	30.00	2.15	15.00	1.65	19.50	2.3	27.50	3.9	25.50
F036	1.9 L	3.00	2.95	8.00	2.00 L	2.00	1.55	5.00	2.15	4.50	3.8	9.50
F037	2.0293	23.00	3.159 H	31.00	2.1785	21.00	1.5358 L	2.00	2.3015	29.00	3.7437	6.00
F042	2.00	14.00	3.05	23.50	2.14	11.50	1.58	9.00	2.24	13.00	3.92	28.00
F053	2.02	19.50	3.05	23.50	2.16	18.00	1.61	12.00	2.26	17.00	3.90	25.50
F060	2.13 H	29.00	3.18 H	32.00	2.28 H	30.00	1.80 VH	27.00	2.40 H	32.00	3.93	29.00
F068	2.053	26.00	3.078	27.00	2.184	24.00	1.681	24.00	2.286	24.00	3.932	30.00
F071	2.020	19.50	3.058	25.00	2.152	17.00	1.612	13.00	2.388 H	31.00	3.882	24.00
F072	1.95	8.00	2.88	3.50	2.07	4.50	1.63	16.00	2.16	6.00	3.67	2.00
F074	2.57 EH	32.00	3.07	26.00	2.18	22.50	1.64	17.50	2.28	23.00	3.91	27.00
F094	1.93	7.00	2.96	9.00	2.13	10.00	1.54	3.50	2.24	13.00	3.86	20.00
F107	2.06	27.00	2.99	15.50	2.21	26.50	1.72	25.00	2.27	21.00	3.76	7.00
F109	1.992	11.00	2.986	13.00	2.123	9.00	1.589	10.00	2.213	9.00	3.804	11.00
F110	2.18 H	30.50	2.99	15.50	2.29 H	31.50	2.04 EH	31.50	2.29	25.50	3.82	15.00
F110a	2.18 H	30.50	2.99	15.50	2.29 H	31.50	2.04 EH	31.50	2.29	25.50	3.82	15.00
F112	1.98	10.00	2.98	11.00	2.15	15.00	1.62	14.50	2.23	11.00	3.83	17.00
F113	1.864 L	2.00	2.869	2.00	2.053	3.00	1.553	6.00	2.206	8.00	3.729	5.00
F118	2.07	28.00	2.97	10.00	2.14	11.50	1.59	11.00	2.11 L	2.00	3.68	3.00
F133	2.04	24.00	3.03	21.00	2.21	26.50	1.90 VH	29.50	2.32	30.00	3.87	22.00
F139	1.65 EL	1.00	2.51 EL	1.00	1.78 EL	1.00	1.65	19.50	1.84 EL	1.00	3.23 EL	1.00
F145	1.994	12.00	3.087	28.00	2.169	19.00	1.561	7.00	2.136 L	3.00	4.03 H	32.00
F147	2.02	19.50	3.13	29.00	2.18	22.50	1.62	14.50	2.27	21.00	3.85	19.00
MEDIAN	2.0140		2.9900		2.1510		1.6350		2.2600		3.8250	
1CRIT	0.1117		0.1459		0.1165		0.0985		0.1204		0.1751	
N	30		30		29		29		30		30	
MEAN	2.0084		3.0029		2.1521		1.6508		2.2450		3.8310	
3STDEV	0.2165		0.2260		0.1706		0.2981		0.1785		0.2295	

PARAMETER: 16000 Sulfate IC mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	6.84	7.00	4.65	14.50	6.12	12.00	1.31	16.00
F009	6.99	23.00	4.49	2.00	6.1	10.00	1.69 VH	32.00
F010	7.01	24.00	4.58	6.00	6.31	24.00	1.26	4.00
F014	6.98	22.00	4.74	21.50	6.28	21.50	1.32	17.00
F015	6.9	15.00	4.6	9.00	6.1	10.00	1.6 VH	28.00
F017	6.893	13.00	4.629	11.00	6.18	15.00	1.401	24.00
F020	7.48 EH	31.00	5.05 EH	31.00	6.82 EH	31.00	1.27	7.50
F022	6.77	4.00	4.62	10.00	5.92 L	3.00	1.47 VH	26.00
F025	7.061	27.00	4.794	25.00	6.332	26.00	1.345	20.00
F026	6.9429	19.00	4.7414	23.00	6.3113	25.00	1.2323	2.00
F032	6.85	8.00	4.9 H	30.00	6.	4.00	1.3	14.50
F036	6.95	21.00	4.65	14.50	6.30	23.00	1.25	3.00
F037	6.6967	3.00	4.5875	7.00	5.8682 L	2.00	1.292	12.00
F042	7.11	29.00	4.82	29.00	6.38	28.00	1.28	9.00
F053	6.90	15.00	4.75	24.00	6.16	14.00	1.29	10.50
F060	6.90	15.00	4.74	21.50	6.21	18.00	1.50 VH	27.00
F068	7.101	28.00	4.804	27.00	6.368	27.00	1.354	21.00
F071	7.200 H	30.00	4.816	28.00	6.395	29.00	1.268	6.00
F072	6.82	6.00	4.53	3.00	6.04	6.00	1.36	22.00
F074	6.91	17.00	4.7	18.00	6.41	30.00	1.37	23.00
F094	6.93	18.00	4.54	4.00	6.19	16.50	1.27	7.50
F107	6.78	5.00	4.57	5.00	6.06	8.00	1.44 H	25.00
F109	6.947	20.00	4.716	20.00	6.230	19.00	1.293	13.00
F110	6.88	11.50	4.63	12.50	6.04	6.00	1.68 VH	30.50
F110a	6.88	11.50	4.63	12.50	6.04	6.00	1.68 VH	30.50
F112	7.03	26.00	4.69	16.50	6.28	21.50	1.33	18.50
F113	6.863	10.00	4.594	8.00	6.135	13.00	1.188 L	1.00
F118	6.63	2.00	4.71	19.00	6.10	10.00	1.29	10.50
F133	7.02	25.00	4.80	26.00	6.27	20.00	1.63 VH	29.00
F139	6.10 EL	1.00	4.02 EL	1.00	5.41 EL	1.00	1.33	18.50
F145	7.748 EH	32.00	5.072 EH	32.00	6.957 EH	32.00	1.264	5.00
F147	6.86	9.00	4.69	16.50	6.19	16.50	1.3	14.50
MEDIAN	6.9050		4.6900		6.1900		1.3150	
1CRIT	0.2829		0.2054		0.2579		0.0873	
N	30		30		30		30	
MEAN	6.9375		4.6921		6.2047		1.3660	
3STDEV	0.4654		0.3533		0.5380		0.3815	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	140.50	14.050	10					IC
F009	150.00	15.000	10	VH VH				IC, Dionex
F010	156.00	15.600	10					IC
F014	150.00	15.000	10	L				
F015	170.50	17.050	10	VH VH				IC
F017	161.00	16.100	10					IC
F020	153.00	15.300	10	EHEHEH				IC
F022	156.00	15.600	10	VH L VH				IC
F025	219.00	21.900	10					IC Low Level
F026	131.00	13.100	10					ICP
F032	199.00	19.900	10	H H				IC
F036	93.50	9.350	10	L L				IC
F037	136.00	13.600	10	H L L				IC, Waters
F042	194.00	19.400	10					IC
F053	179.00	17.900	10					IC
F060	260.50	26.050	10	H H H VHH VH	BIASED HIGH*	-3.16	0.2170	IC plus calc.
F068	258.00	25.800	10		BIASED HIGH*	3.07	-0.0178	Dionex, IC
F071	222.50	22.250	10	H H				IC
F072	77.00	7.700	10					IC
F074	236.00	23.600	10	EH				IC
F094	108.50	10.850	10					IC
F107	165.00	16.500	10	H				IC
F109	135.00	13.500	10					IC Dionex
F110	210.00	21.000	10	H H EH VH				IC Dionex
F110a	210.00	21.000	10	H H EH VH				IC Dionex
F112	161.00	16.100	10					IC, Dionex
F113	58.00	5.800	10	L L	BIASED LOW*	1.12	-0.1301	IC Dionex DX 500
F118	107.00	10.700	10	L				IC
F133	253.00	25.300	10	VH VH				IC
F139	46.00	4.600	10	ELELEL ELELELELEL	BIASED LOW	-13.23	0.0039	IC
F145	202.00	20.200	10	L H EHEHEH				IC
F147	182.00	18.200	10					IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	46.00	4.600	10	ELELELELELELELEL	BIASED LOW	-13.23	0.0039	IC
F113	58.00	5.800	10	LL	BIASED LOW*	1.12	-0.1301	IC Dionex DX 500
F072	77.00	7.700	10					IC
F036	93.50	9.350	10	LL				IC
F118	107.00	10.700	10	L				IC
F094	108.50	10.850	10					IC
F026	131.00	13.100	10					ICP
F109	135.00	13.500	10					IC Dionex
F037	136.00	13.600	10	HLL				IC, Waters
F002	140.50	14.050	10					IC
F014	150.00	15.000	10	L				
F009	150.00	15.000	10	VHVH				IC, Dionex
F020	153.00	15.300	10	EHEHEH				IC
F010	156.00	15.600	10					IC
F022	156.00	15.600	10	VHLVH				IC
F017	161.00	16.100	10					IC
F112	161.00	16.100	10					IC, Dionex
F107	165.00	16.500	10	H				IC
F015	170.50	17.050	10	VHVH				IC
F053	179.00	17.900	10					IC
F147	182.00	18.200	10					IC
F042	194.00	19.400	10					IC
F032	199.00	19.900	10	HH				IC
F145	202.00	20.200	10	LHEHEHEH				IC
F110a	210.00	21.000	10	HHEHVH				IC Dionex
F110	210.00	21.000	10	HHEHVH				IC Dionex
F025	219.00	21.900	10					IC Low Level
F071	222.50	22.250	10	HH				IC
F074	236.00	23.600	10	EH				IC
F133	253.00	25.300	10	VHVH				IC
F068	258.00	25.800	10		BIASED HIGH*	3.07	-0.0178	Dionex, IC
F060	260.50	26.050	10	HHHVHHVH	BIASED HIGH*	-3.16	0.2170	IC plus calc.

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.500

PARAMETER: 16001 Sulfate Colour mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.3000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	3.3 VH	5.00	3.5	6.00	2.3	6.00	1.8	6.00	3.1	6.00	4.0	4.00
F007	2.7	4.00	3.2	2.50	2.	1.00	1.5	1.50	2.7	4.00	3.8	2.00
F010	2.1 L	1.00	3.1	1.00	2.1	3.50	1.6	4.50	2.4	2.50	3.9	3.00
F011	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	5. EH	7.00	5. VH	7.00
F026	3.647 EH	6.00	3.337	5.00	2.030	2.00	1.517	3.00	3.050	5.00	3.797	1.00
F060	2.4	3.00	3.20	2.50	2.20	5.00	1.60	4.50	2.40	2.50	4.10	5.50
F094	2.3	2.00	3.3	4.00	2.1	3.50	1.5	1.50	2.3	1.00	4.1	5.50
MEDIAN	2.5500		3.2500		2.1000		1.5585		2.7000		4.0000	
1CRIT	0.4240		0.4800		0.3880		0.3447		0.4360		0.5400	
N	4		4		4		3		5		5	
MEAN	2.6750		3.2592		2.1075		1.5723		2.7300		3.9800	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	7.5	6.00	5.4	6.00	6.5	5.00	1.5	6.00
F007	7.3	3.00	5.1	4.00	6.1	3.00	1.2	2.00
F010	6.6	1.00	4.5	2.00	5.9	1.00	1.	1.00
F011	8.	7.00	4. VL	1.00	8. EH	7.00	<3.	0.00
F026	7.363	4.00	5.567	7.00	6.370	4.00	1.247	3.00
F060	7.40	5.00	5.20	5.00	6.60	6.00	1.30	4.50
F094	6.9	2.00	4.9	3.00	6.	2.00	1.3	4.50
MEDIAN	7.3630		5.1000		6.3700		1.2735	
1CRIT	0.8090		0.6280		0.7296		0.3219	
N	5		5		5		4	
MEAN	7.2926		5.0200		6.3140		1.2617	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	56.00	5.600	10	VH				Colorimetric
F007	27.00	2.700	10					
F010	20.50	2.050	10	L				Color calmagite
F011	29.00	5.800	5	EHVH VLEH				
F026	40.00	4.000	10	EH				Autoanal.
F060	43.50	4.350	10					ICP plus calc.
F094	29.00	2.900	10					ICP-AES

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 3.769

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	20.50	2.050	10	L				Color calmagite
F007	27.00	2.700	10					
F094	29.00	2.900	10					ICP-AES
F026	40.00	4.000	10	EH				Autoanal.
F060	43.50	4.350	10					ICP plus calc.
F003	56.00	5.600	10	VH				Colorimetric
F011	29.00	5.800	5	EHVHVLEH				

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 3.769

Sulfate Colour

PARAMETER: 17000 Chloride IC mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.2000 BASIC ACCEPTABLE ERROR= 0.0750 CONCENTRATION ERROR INCREMENT= 0.0350

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	5.82 L	1.00	1.52	6.50	0.16	25.00	0.18	24.50	4.37 L	3.00	0.51	21.50
F009	5.96	3.00	1.48	2.00	0.16	25.00	0.17	23.00	4.5	7.00	0.48	7.50
F010	6.4	27.00	1.6	17.50	0.09	3.50	0.11	3.00	4.6	15.00	0.48	7.50
F014	6.07	11.50	1.50	4.00	0.215 EH	29.00	0.229 EH	28.00	0.453 EL	1.00	0.536	26.00
F015	6.3	24.00	1.6	17.50	0.13	16.50	<0.10	0.00	4.7	28.00	0.49	13.00
F017	6.147	16.00	1.56	12.00	0.117	12.00	0.158	21.00	4.667	22.00	0.496	16.00
F020	7.04 EH	31.00	1.74 H	31.00	0.04 EL	1.00	0.06 EL	1.00	5.28 EH	31.00	0.49	13.00
F022	6.28	23.00	1.51	5.00	0.11	9.50	0.13	8.50	4.57	11.50	0.47	5.00
F025	5.989	5.00	1.537	10.00	0.107	7.00	0.125	7.00	4.675	25.00	0.480	7.50
F026	6.0468	9.00	1.6258	22.00	0.1219	14.00	0.1936	26.00	4.6107	17.00	0.4966	17.00
F032	6.	6.50	1.68	27.50	0.11	9.50	0.14	12.00	4.57	11.50	0.51	21.50
F036	6.08	13.50	1.6	17.50	0.11	9.50	0.14	12.00	4.55	9.50	0.48	7.50
F037	6.1874	18.00	1.5988	15.00	<0.5	0.00	<0.5	0.00	4.6507	20.00	<0.5	0.00
F042	6.25	20.00	1.58	13.50	0.18	27.00	0.21	27.00	4.73	29.00	0.49	13.00
F053	6.03	8.00	1.60	17.50	0.12	13.00	0.14	12.00	4.67	23.50	0.50	19.00
F060	6.14	15.00	1.58	13.50	0.13	16.50	0.14	12.00	4.55	9.50	0.52	23.00
F068	6.154	17.00	1.543	11.00	0.100	5.50	0.117	5.00	4.602	16.00	0.461	3.00
F071	6.477 H	28.00	1.520	6.50	0.068	2.00	0.095	2.00	4.696	27.00	0.457	2.00
F072	6.06	10.00	1.46 L	1.00	<0.200	0.00	<0.200	0.00	4.58	13.50	0.490	13.00
F074	7. EH	30.00	1.63	24.00	0.13	16.50	0.15	17.00	4.2 VL	2.00	0.58 H	28.00
F094	6.07	11.50	1.71	29.00	0.14	20.50	0.15	17.00	4.58	13.50	0.53	24.50
F107	6.58 VH	29.00	1.72	30.00	0.16	25.00	0.18	24.50	5.22 EH	30.00	0.57	27.00
F109	5.823 L	2.00	1.534	9.00	0.141	23.00	0.160	22.00	4.497	6.00	0.486	10.00
F110	6.26	21.50	1.63	24.00	0.14	20.50	0.15	17.00	4.62	18.50	0.60 EH	29.50
F110a	6.26	21.50	1.63	24.00	0.14	20.50	0.15	17.00	4.62	18.50	0.60 EH	29.50
F112	6.00	6.50	1.64	26.00	0.10	5.50	0.12	6.00	4.46	5.00	0.50	19.00
F113	6.248	19.00	1.498	3.00	0.09	3.50	0.112	4.00	4.654	21.00	0.43	1.00
F133	5.97	4.00	1.61	20.50	0.11	9.50	0.13	8.50	4.52	8.00	0.49	13.00
F139	6.34	26.00	1.68	27.50	0.14	20.50	0.14	12.00	4.67	23.50	0.53	24.50
F145	6.08	13.50	1.531	8.00	0.186	28.00	0.153	20.00	4.391	4.00	0.469	4.00
F147	6.33	25.00	1.61	20.50	0.13	16.50	0.15	17.00	4.69	26.00	0.5	19.00
MEDIAN	6.1470		1.6000		0.1300		0.1450		4.6020		0.4930	
1CRIT	0.2831		0.1240		0.0750		0.0750		0.2291		0.0853	
N	29		29		27		26		29		27	
MEAN	6.1908		1.5882		0.1267		0.1459		4.6005		0.4997	
3STDEV	0.6787		0.1888		0.0814		0.0777		0.4875		0.0867	

PARAMETER: 17000 Chloride IC mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.72	11.00	1.61	5.00	0.53	16.00	0.33	24.50
F009	0.7	6.50	1.62	6.00	0.51	11.00	0.31	18.50
F010	0.73	12.50	1.7	16.50	0.48	4.00	0.3	14.50
F014	0.740	16.00	1.64	9.50	0.560	24.50	0.364	29.00
F015	0.71	9.00	1.7	16.50	0.48	4.00	0.28	7.50
F017	0.744	18.00	1.682	15.00	0.546	20.00	0.293	13.00
F020	0.84 H	31.00	2.03 EH	31.00	0.58	27.00	0.26	3.00
F022	0.7	6.50	1.6	4.00	0.48	4.00	0.27	5.00
F025	0.733	14.00	1.624	8.00	0.517	13.00	0.282	9.00
F026	0.7753	24.00	1.711	23.00	0.5551	23.00	0.3611	28.00
F032	0.78	25.50	1.84 H	30.00	0.54	18.50	0.3	14.50
F036	0.76	20.50	1.71	20.00	0.56	24.50	0.29	11.00
F037	0.4078 EL	1.00	1.5622 L	1.00	<0.5	0.00	<0.5	0.00
F042	0.73	12.50	1.71	20.00	0.55	21.50	0.33	24.50
F053	0.76	20.50	1.71	20.00	0.53	16.00	0.31	18.50
F060	0.78	25.50	1.71	20.00	0.55	21.50	0.32	22.00
F068	0.693	5.00	1.664	13.00	0.503	10.00	0.2634	4.00
F071	0.669	3.00	1.640	9.50	0.460	1.00	0.243	1.00
F072	0.680	4.00	1.58	2.00	0.53	16.00	0.34	26.00
F074	0.8	28.50	1.71	20.00	0.61	30.00	0.38	30.00
F094	0.75	19.00	1.79	27.00	0.5	9.00	0.31	18.50
F107	0.80	28.50	1.83 H	29.00	0.60	29.00	0.36	27.00
F109	0.716	10.00	1.642	11.00	0.516	12.00	0.308	16.00
F110	0.74	16.00	1.79	27.00	0.49	6.50	0.32	22.00
F110a	0.74	16.00	1.79	27.00	0.49	6.50	0.32	22.00
F112	0.77	22.50	1.74	25.00	0.52	14.00	0.29	11.00
F113	0.665	2.00	1.622	7.00	0.464	2.00	0.248	2.00
F133	0.82	30.00	1.68	14.00	0.58	27.00	0.29	11.00
F139	0.79	27.00	1.59	3.00	0.58	27.00	0.28	7.50
F145	0.702	8.00	1.657	12.00	0.496	8.00	0.278	6.00
F147	0.77	22.50	1.72	24.00	0.54	18.50	0.31	18.50
MEDIAN	0.7400		1.7000		0.5300		0.3040	
1CRIT	0.0939		0.1275		0.0866		0.0786	
N	29		29		28		28	
MEAN	0.7403		1.6901		0.5278		0.3042	
3STDEV	0.1201		0.2068		0.1055		0.0887	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	138.00	13.800	10	L L				IC
F009	109.50	10.950	10					IC, Dionex
F010	121.00	12.100	10					IC
F014	178.50	17.850	10	EHEHEL				
F015	136.00	15.111	9					IC
F017	165.00	16.500	10					IC
F020	200.00	20.000	10	EHH ELELEH H EH				IC
F022	82.00	8.200	10					IC
F025	105.50	10.550	10					IC Low Level
F026	203.00	20.300	10					IC
F032	177.00	17.700	10	H				Colourimetry
F036	145.50	14.550	10					Colourimetry
F037	55.00	11.000	5	ELL				IC, Waters
F042	208.00	20.800	10					IC
F053	168.00	16.800	10					IC
F060	178.50	17.850	10					IC
F068	89.50	8.950	10					Dionex, IC
F071	82.00	8.200	10	H				IC
F072	85.50	10.688	8	L				IC
F074	226.00	22.600	10	EH VLH				IC
F094	189.50	18.950	10					IC
F107	279.00	27.900	10	VH EH H	BIASED HIGH	8.76	0.0193	IC
F109	121.00	12.100	10	L				IC Dionex
F110	202.50	20.250	10	EH				IC Dionex
F110a	202.50	20.250	10	EH				IC Dionex
F112	140.50	14.050	10					IC, Dionex
F113	64.50	6.450	10		BIASED LOW*	2.60	-0.0785	IC Dionex DX 500
F133	145.50	14.550	10					IC
F139	198.50	19.850	10					IC
F145	111.50	11.150	10					IC
F147	207.50	20.750	10					IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 15.616

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F113	64.50	6.450	10		BIASED LOW*	2.60	-0.0785	IC Dionex DX 500
F022	82.00	8.200	10					IC
F071	82.00	8.200	10	H				IC
F068	89.50	8.950	10					Dionex, IC
F025	105.50	10.550	10					IC Low Level
F072	85.50	10.688	8	L				IC
F009	109.50	10.950	10					IC, Dionex
F037	55.00	11.000	5	ELL				IC, Waters
F145	111.50	11.150	10					IC
F010	121.00	12.100	10					IC
F109	121.00	12.100	10	L				IC Dionex
F002	138.00	13.800	10	LL				IC
F112	140.50	14.050	10					IC, Dionex
F036	145.50	14.550	10					Colourimetry
F133	145.50	14.550	10					IC
F015	136.00	15.111	9					IC
F017	165.00	16.500	10					IC
F053	168.00	16.800	10					IC
F032	177.00	17.700	10	H				Colourimetry
F014	178.50	17.850	10	EHEHEL				
F060	178.50	17.850	10					IC
F094	189.50	18.950	10					IC
F139	198.50	19.850	10					IC
F020	200.00	20.000	10	EHHELELEHHEH				IC
F110a	202.50	20.250	10	EH				IC Dionex
F110	202.50	20.250	10	EH				IC Dionex
F026	203.00	20.300	10					IC
F147	207.50	20.750	10					IC
F042	208.00	20.800	10					IC
F074	226.00	22.600	10	EHVLH				IC
F107	279.00	27.900	10	VHEHH	BIASED HIGH	8.76	0.0193	IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 15.616

Chloride IC

PARAMETER: 17001 Chloride Colour mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.3000 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	6.30	3.50	1.76	6.00	0.18	3.00	0.26	4.00	4.74	5.00	0.62	4.00
F007	6.05	2.00	1.41	1.00	<0.1	0.00	0.19	3.00	4.66	4.00	0.3	1.00
F010	6.3	3.50	1.7	4.00	0.1	1.00	0.1	1.00	4.3	1.00	0.5	2.00
F011	6.7	6.00	1.5	2.00	<0.2	0.00	<0.2	0.00	5.3 H	6.00	<0.2 L	0.00
F026	6.341	5.00	1.746	5.00	0.148	2.00	0.144	2.00	4.608	3.00	0.524	3.00
F060	6.0	1.00	1.6	3.00	<0.5	0.00	<0.5	0.00	4.6	2.00	<0.5	0.00
MEDIAN	6.3000		1.6500		0.1480		0.1670		4.6340		0.5120	
1CRIT	0.7240		0.3520		0.3000		0.3000		0.5907		0.3000	
N	4		4		1		2		4		2	
MEAN	6.2478		1.6365		0.1480		0.1670		4.6520		0.5120	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.92	5.00	2.00	5.00	0.62	4.00	0.36	3.50
F007	0.74	3.00	1.83	2.00	0.54	2.00	0.36	3.50
F010	0.7	2.00	1.8	1.00	0.7	5.00	0.2	1.00
F011	0.5	1.00	1.9	3.00	0.4	1.00	<0.2	0.00
F026	0.826	4.00	1.934	4.00	0.542	3.00	0.284	2.00
F060	1.0	6.00	2.1	6.00	<0.5	0.00	<0.5	0.00
MEDIAN	0.7830		1.9170		0.5420		0.3220	
1CRIT	0.3000		0.3734		0.3000		0.3000	
N	4		4		3		1	
MEAN	0.7965		1.9160		0.5673		0.2840	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	43.00	4.300	10					Hg thiocyanate
F007	21.50	2.389	9					
F010	21.50	2.150	10					Titrn cond.
F011	19.00	3.167	6	H L				
F026	33.00	3.300	10					Autoanal.
F060	18.00	3.600	5					Auto. Color

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 3.120

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	21.50	2.150	10					Titrn cond.
F007	21.50	2.389	9					
F011	19.00	3.167	6	HL				
F026	33.00	3.300	10					Autoanal.
F060	18.00	3.600	5					Auto. Color
F003	43.00	4.300	10					Hg thiocyanate

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE
RANK IS 3.120

Chloride Colour

PARAMETER: 20091 Calcium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.2500 BASIC ACCEPTABLE ERROR= 0.0750 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	3.16 H	29.00	3.55 H	30.00	0.78	30.00	0.31	30.00	0.86	32.00	2.88 H	31.00
F003	2.89	12.50	3.26	16.00	0.74	26.50	0.29	24.50	0.81	20.00	2.58	10.50
F007	3.01	23.00	3.4	25.50	0.708	18.00	0.277	15.00	0.815	21.00	2.8	29.50
F009	2.97	20.00	3.36	21.00	0.7	13.00	0.28	17.50	0.82	25.00	2.68	21.00
F010	3.02	24.50	3.39	23.50	0.73	24.00	0.28	17.50	0.85	29.50	2.7	23.00
F011	2.81	9.00	3.17	10.00	0.7	13.00	0.26	8.50	0.78	11.00	2.57	9.00
F014	2.90	14.50	3.34	20.00	0.70	13.00	0.28	17.50	0.79	14.00	2.52	8.00
F015	3.1	27.50	3.2	12.00	0.7	13.00	0.3	28.00	0.8	18.00	2.6	13.50
F017	3.225 H	32.00	3.645 VH	31.00	0.731	25.00	0.283	20.00	0.817	22.00	2.92 H	33.00
F020	2.99	22.00	3.39	23.50	0.67	4.50	0.26	8.50	0.78	11.00	2.69	22.00
F022	3.18 H	30.00	3.4	25.50	0.72	22.00	0.29	24.50	0.82	25.00	2.75	26.00
F025	3.278 VH	33.00	3.784 VH	32.00	0.717	20.00	0.269	12.00	0.819	23.00	2.902 H	32.00
F026	2.712	5.00	3.122	9.00	0.672	6.00	0.256	6.00	0.745	6.00	2.432 L	5.00
F032	2.71	4.00	3.02 L	4.00	0.72	22.00	0.285	21.50	0.8	18.00	2.2 VL	2.00
F036	2.9	14.50	3.28	18.00	0.68	7.00	0.26	8.50	0.76	9.00	2.6	13.50
F037	3.219 H	31.00	3.408	27.00	0.7	13.00	0.285	21.50	0.855	31.00	2.734	24.00
F042	2.89	12.50	3.05	5.00	0.69	9.50	0.27	13.50	0.80	18.00	2.39 L	3.50
F053	2.829	10.00	3.18	11.00	0.688	8.00	0.266	11.00	0.783	13.00	2.604	16.00
F060	3.06	26.00	3.47	28.00	0.79	31.50	0.30	28.00	0.89	33.00	2.77	28.00
F071	2.069 EL	1.00	0.111 EL	1.00	1.952 EH	33.00	0.665 EH	32.00	0.260 EL	1.00	0.481 EL	1.00
F072	2.44 VL	2.00	2.04 EL	2.00	0.666	3.00	<0.25	0.00	0.551 EL	2.00	2.39 L	3.50
F074	2.94	18.00	3.22	14.00	0.71	19.00	0.28	17.50	0.82	25.00	2.63	17.50
F094	2.68 L	3.00	2.68 VL	3.00	0.77	29.00	0.25	4.00	0.66 L	3.00	2.58	10.50
F107	2.74	6.00	3.09	6.00	0.64	1.00	0.24	2.00	0.72	4.00	2.47	7.00
F109	2.917	17.00	3.313	19.00	0.702	16.00	0.270	13.50	0.798	16.00	2.666	20.00
F110	2.85	11.00	3.27	17.00	0.69	9.50	0.25	4.00	0.78	11.00	2.60	13.50
F110a	3.02	24.50	3.38	22.00	0.72	22.00	0.26	8.50	0.84	27.00	2.74	25.00
F112	2.95	19.00	3.12	8.00	0.67	4.50	0.18 EL	1.00	0.75	7.50	2.63	17.50
F113	2.987	21.00	3.968 VH	33.00	0.753	28.00	0.293	26.00	0.843	28.00	2.759	27.00
F133	2.80	8.00	3.10	7.00	0.65	2.00	0.25	4.00	0.75	7.50	2.60	13.50
F139	2.903	16.00	3.248	15.00	0.706	17.00	0.2857	23.00	0.791	15.00	2.648	19.00
F145	2.77	7.00	3.21	13.00	0.79	31.50	0.36 EH	31.00	0.74	5.00	2.44	6.00
F147	3.1	27.50	3.54 H	29.00	0.74	26.50	0.3	28.00	0.85	29.50	2.8	29.50
MEDIAN	2.9170		3.2700		0.7060		0.2800		0.8000		2.6300	
1CRIT	0.2084		0.2260		0.0978		0.0765		0.1025		0.1940	
N	31		31		31		30		31		31	
MEAN	2.9249		3.2461		0.7130		0.2780		0.7870		2.6244	
3STDEV	0.5127		0.9007		0.1061		0.0689		0.1826		0.4525	

PARAMETER: 20091 Calcium mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	2.34 H	31.00	2.67 H	31.00	2.14	31.00	0.16	29.50
F003	2.13	14.00	2.44	15.50	1.95	12.50	0.15	28.00
F007	2.19	19.50	2.59	27.00	2.05	23.00	0.13	21.50
F009	2.19	19.50	2.55	23.50	2.03	22.00	0.13	21.50
F010	2.3	29.00	2.56	25.00	2.12	30.00	0.12	13.00
F011	2.08	10.00	2.4	10.50	1.9	9.00	0.11	8.50
F014	2.12	12.50	2.43	14.00	1.95	12.50	0.13	21.50
F015	2.2	21.50	2.4	10.50	2.	20.50	0.1	4.00
F017	2.208	23.00	2.703 H	32.00	2.056	24.00	0.128	19.00
F020	2.22	24.00	2.55	23.50	1.99	17.50	0.11	8.50
F022	2.27	28.00	2.62	29.00	2.09	28.00	0.11	8.50
F025	2.259	27.00	2.772 VH	33.00	2.141	32.00	0.122	16.00
F026	2.072	9.00	2.267	4.00	1.856	7.00	0.144	27.00
F032	2.12	12.50	2.45	17.50	1.92	10.00	0.125	17.50
F036	2.14	15.00	2.44	15.50	1.96	14.00	0.12	13.00
F037	2.316	30.00	2.577	26.00	2.067	25.00	0.125	17.50
F042	1.92 L	3.00	2.42	12.50	1.80 L	4.00	0.11	8.50
F053	2.007	6.00	2.388	8.00	1.933	11.00	0.121	15.00
F060	2.25	26.00	2.60	28.00	2.07	26.50	0.14	25.50
F071	2.396 H	32.00	1.222 EL	1.00	1.604 EL	1.00	1.756 EH	32.00
F072	1.45 EL	1.00	1.68 EL	2.00	1.79 L	3.00	<0.25	0.00
F074	2.09	11.00	2.45	17.50	2.	20.50	0.14	25.50
F094	1.86 VL	2.00	2. VL	3.00	1.7 VL	2.00	0.1	4.00
F107	1.99	4.00	2.34	5.00	1.81 L	5.00	0.10	4.00
F109	2.156	17.00	2.531	22.00	1.997	19.00	0.118	11.00
F110	2.07	8.00	2.42	12.50	1.89	8.00	0.10	4.00
F110a	2.23	25.00	2.52	21.00	2.07	26.50	0.12	13.00
F112	2.02	7.00	2.39	9.00	1.97	16.00	0.06	1.00
F113	2.811 EH	33.00	2.514	20.00	2.51 EH	33.00	0.13	21.50
F133	2.00	5.00	2.35	6.00	1.85	6.00	0.10	4.00
F139	2.141	16.00	2.463	19.00	1.963	15.00	0.1383	24.00
F145	2.18	18.00	2.37	7.00	1.99	17.50	0.32 EH	31.00
F147	2.2	21.50	2.65 H	30.00	2.11	29.00	0.16	29.50
MEDIAN	2.1560		2.4500		1.9900		0.1235	
1CRIT	0.1703		0.1850		0.1620		0.0750	
N	31		31		31		30	
MEAN	2.1505		2.4430		1.9730		0.1304	
3STDEV	0.3625		0.5798		0.3268		0.1168	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	304.50	30.450	10	H H H H H	BIASED HIGH	8.23	0.0103	AAS
F003	180.00	18.000	10					ICP
F007	223.00	22.300	10					
F009	204.00	20.400	10					ICP-MS
F010	239.00	23.900	10					ICP-OES
F011	98.50	9.850	10					
F014	147.50	14.750	10					ICP MS
F015	168.50	16.850	10					ICP
F017	261.00	26.100	10	H VH H H	BIASED HIGH	11.46	-0.0591	AAF
F020	165.00	16.500	10					ICP
F022	246.50	24.650	10	H				AAS
F025	260.00	26.000	10	VHVH H VH				IC Low Level
F026	84.00	8.400	10	L				FAA
F032	129.00	12.900	10	L VL				AAS
F036	128.00	12.800	10					AAS
F037	246.00	24.600	10	H				ICP-MS
F042	90.00	9.000	10	L L L				AAS, nitrous
F053	109.00	10.900	10					AAS
F060	280.50	28.050	10		BIASED HIGH*	4.56	0.0228	ICP
F071	135.00	13.500	10	ELELEHEHELELH ELELEH				FAA
F072	18.50	2.312	8	VLEL ELL ELELL	BIASED LOW	-29.66	0.1383	AAS
F074	185.50	18.550	10					AAS
F094	63.50	6.350	10	L VL L VLVLVL	BIASED LOW	-13.47	0.0290	ICP-MS
F107	44.00	4.400	10	L	BIASED LOW*	-4.92	-0.0331	ICP
F109	170.50	17.050	10					ICP
F110	98.50	9.850	10					AAS
F110a	214.50	21.450	10					ICP
F112	90.50	9.050	10	EL				AAS 2380
F113	270.50	27.050	10	VH EH EH	BIASED HIGH	13.48	-0.0090	FAAS PE5100
F133	63.00	6.300	10		BIASED LOW*	-3.48	-0.0270	ICP-MS
F139	179.00	17.900	10					ICP-OES
F145	167.00	16.700	10	EH EH				ICP-AES
F147	280.00	28.000	10	H H	BIASED HIGH	6.76	-0.0044	IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.902

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F072	18.50	2.312	8	VLELELLELELL	BIASED LOW	-29.66	0.1383	AAS
F107	44.00	4.400	10	L	BIASED LOW*	-4.92	-0.0331	ICP
F133	63.00	6.300	10		BIASED LOW*	-3.48	-0.0270	ICP-MS
F094	63.50	6.350	10	LVLLVLVLVL	BIASED LOW	-13.47	0.0290	ICP-MS
F026	84.00	8.400	10	L				FAA
F042	90.00	9.000	10	LLL				AAS, nitrous
F112	90.50	9.050	10	EL				AAS 2380
F011	98.50	9.850	10					
F110	98.50	9.850	10					AAS
F053	109.00	10.900	10					AAS
F036	128.00	12.800	10					AAS
F032	129.00	12.900	10	LVL				AAS
F071	135.00	13.500	10	ELELEHEHELELHELELEH				FAA
F014	147.50	14.750	10					ICP MS
F020	165.00	16.500	10					ICP
F145	167.00	16.700	10	EHEH				ICP-AES
F015	168.50	16.850	10					ICP
F109	170.50	17.050	10					ICP
F139	179.00	17.900	10					ICP-OES
F003	180.00	18.000	10					ICP
F074	185.50	18.550	10					AAS
F009	204.00	20.400	10					ICP-MS
F110a	214.50	21.450	10					ICP
F007	223.00	22.300	10					
F010	239.00	23.900	10					ICP-OES
F037	246.00	24.600	10	H				ICP-MS
F022	246.50	24.650	10	H				AAS
F025	260.00	26.000	10	VHVHHVH				IC Low Level
F017	261.00	26.100	10	HVHHH	BIASED HIGH	11.46	-0.0591	AAF
F113	270.50	27.050	10	VHEHEH	BIASED HIGH	13.48	-0.0090	FAAS PE5100
F147	280.00	28.000	10	HH	BIASED HIGH	6.76	-0.0044	IC
F060	280.50	28.050	10		BIASED HIGH*	4.56	0.0228	ICP
F002	304.50	30.450	10	HHHHH	BIASED HIGH	8.23	0.0103	AAS

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.902

PARAMETER: 12091 Magnesium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.1000 BASIC ACCEPTABLE ERROR= 0.0200 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.66	9.50	0.71	10.00	0.16	14.50	0.06	3.50	0.36	6.50	1.0	9.00
F003	0.685	23.00	0.734	21.50	0.166	21.00	0.069	14.50	0.400	24.50	1.01	11.00
F007	0.681	21.50	0.734	21.50	0.159	10.00	0.066	11.00	0.392	19.00	1.05	25.50
F009	0.74 H	32.00	0.74	24.00	0.17	24.00	0.07	20.00	0.4	24.50	1.	9.00
F010	0.7	28.50	0.75	27.00	0.17	24.00	0.07	20.00	0.41	31.00	1.06	28.00
F011	0.67	13.50	0.72	14.00	0.16	14.50	0.07	20.00	0.39	17.00	1.02	13.50
F014	0.66	9.50	0.72	14.00	0.15	4.00	0.06	3.50	0.36	6.50	0.96 L	3.50
F015	0.7	28.50	0.8 H	32.00	0.2 VH	30.50	0.1 H	30.00	0.4	24.50	1.1 H	32.00
F017	0.671	15.00	0.73	17.50	0.164	19.50	0.07	20.00	0.394	20.00	1.037	22.00
F020	0.72	31.00	0.77	30.50	0.17	24.00	0.08	25.50	0.41	31.00	1.07	30.00
F022	0.63	3.00	0.7	7.00	0.15	4.00	0.06	3.50	0.38	11.00	1.03	19.00
F025	0.676	16.00	0.732	19.00	0.154	6.00	0.062	6.50	0.382	13.00	1.021	16.00
F026	0.643	5.00	0.693	5.00	0.156	7.00	0.066	11.00	0.371	8.00	0.994	7.00
F032	0.64	4.00	0.70	7.00	0.16	14.50	0.07	20.00	0.38	11.00	0.95 L	2.00
F036	0.68	19.00	0.73	17.50	0.16	14.50	0.065	9.00	0.38	11.00	1.03	19.00
F037	0.8844 EH	33.00	0.9391 EH	33.00	<0.5	0.00	<0.5	0.00	0.5359 EH	33.00	1.38 EH	33.00
F042	0.69	25.00	0.77	30.50	0.17	24.00	0.07	20.00	0.39	17.00	1.07	30.00
F053	0.655	8.00	0.708	9.00	0.158	9.00	0.066	11.00	0.375	9.00	0.989	6.00
F060	0.68	19.00	0.74	24.00	0.16	14.50	0.07	20.00	0.39	17.00	1.02	13.50
F071	0.645	6.00	0.045 EL	1.00	0.717 EH	32.00	0.170 EH	32.00	0.073 EL	1.00	0.396 EL	1.00
F072	0.70	28.50	0.75	27.00	0.14	2.00	0.02 EL	1.00	0.40	24.50	1.04	23.50
F074	0.69	25.00	0.74	24.00	0.16	14.50	0.07	20.00	0.4	24.50	1.02	13.50
F094	0.68	19.00	0.66 L	3.00	0.17	24.00	0.09	28.00	0.33 VL	3.00	1.07	30.00
F107	0.62 L	2.00	0.68	4.00	0.15	4.00	0.07	20.00	0.35 L	4.50	0.96 L	3.50
F109	0.666	12.00	0.715	12.00	0.160	14.50	0.067	13.00	0.384	14.00	1.033	21.00
F110	0.690	25.00	0.750	27.00	0.164	19.50	0.069	14.50	0.405	29.00	1.04	23.50
F110a	0.664	11.00	0.713	11.00	0.157	8.00	0.064	8.00	0.395	21.00	1.02	13.50
F112	0.67	13.50	0.72	14.00	0.16	14.50	0.06	3.50	0.40	24.50	1.00	9.00
F113	0.678	17.00	0.733	20.00	0.18	27.50	0.082	27.00	0.386	15.00	1.03	19.00
F133	0.549 EL	1.00	0.595 EL	2.00	0.138	1.00	0.062	6.50	0.319 VL	2.00	1.055	27.00
F139	0.681	21.50	0.728	16.00	0.1816	29.00	0.0907 H	29.00	0.4047	28.00	1.027	17.00
F145	0.65	7.00	0.7	7.00	0.18	27.50	0.08	25.50	0.35 L	4.50	0.97	5.00
F147	0.7	28.50	0.76	29.00	0.2 VH	30.50	0.12 EH	31.00	0.41	31.00	1.05	25.50
MEDIAN	0.6780		0.7300		0.1600		0.0700		0.3900		1.0270	
1CRIT	0.0489		0.0515		0.0230		0.0200		0.0345		0.0663	
N	31		31		30		30		31		31	
MEAN	0.6747		0.7234		0.1647		0.0723		0.3838		1.0234	
3STDEV	0.0755		0.1085		0.0393		0.0390		0.0676		0.1041	

PARAMETER: 12091 Magnesium mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.53	6.00	0.59	8.50	0.48	7.50	<0.05	0.00
F003	0.550	17.00	0.617	20.00	0.485	12.00	0.038	7.00
F007	0.552	20.00	0.625	24.00	0.496	22.00	0.043	21.00
F009	0.56	22.50	0.62	22.00	0.5	25.50	0.04	14.50
F010	0.58	28.50	0.63	25.50	0.51	28.50	0.04	14.50
F011	0.54	10.00	0.6	11.00	0.49	18.00	0.04	14.50
F014	0.51	3.50	0.56 L	3.00	0.45 L	2.50	<0.05	0.00
F015	0.6 H	30.50	0.7 VH	32.00	0.5	25.50	<0.1	0.00
F017	0.548	14.00	0.613	17.00	0.491	21.00	0.04	14.50
F020	0.60 H	30.50	0.65	30.00	0.52	30.50	0.06	22.00
F022	0.54	10.00	0.62	22.00	0.49	18.00	0.03	1.50
F025	0.532	8.00	0.610	14.50	0.484	11.00	0.038	7.00
F026	0.529	5.00	0.577	5.00	0.462	4.00	0.041	20.00
F032	0.54	10.00	0.59	8.50	0.49	18.00	0.04	14.50
F036	0.545	13.00	0.605	12.00	0.48	7.50	0.04	14.50
F037	0.7336 EH	32.00	0.8354 EH	33.00	0.6472 EH	33.00	<0.5	0.00
F042	0.57	26.00	0.64	28.00	0.50	25.50	0.05W	0.00
F053	0.531	7.00	0.588	7.00	0.489	15.00	0.037	5.00
F060	0.55	17.00	0.61	14.50	0.49	18.00	0.04	14.50
F071	1.078 EH	33.00	0.557 L	2.00	0.612 EH	32.00	0.508 EH	26.00
F072	0.58	28.50	0.64	28.00	0.51	28.50	<0.01 EL	0.00
F074	0.55	17.00	0.61	14.50	0.48	7.50	0.04	14.50
F094	0.46 VL	2.00	0.62	22.00	0.49	18.00	0.03	1.50
F107	0.51	3.50	0.57	4.00	0.45 L	2.50	0.04	14.50
F109	0.543	12.00	0.614	18.00	0.486	13.50	0.038	7.00
F110	0.565	25.00	0.630	25.50	0.483	10.00	0.039	9.00
F110a	0.563	24.00	0.596	10.00	0.486	13.50	<0.050	0.00
F112	0.55	17.00	0.61	14.50	0.48	7.50	0.04	14.50
F113	0.573	27.00	0.673 H	31.00	0.5	25.50	0.034	4.00
F133	0.440 VL	1.00	0.497 EL	1.00	0.399 EL	1.00	0.033	3.00
F139	0.556	21.00	0.616	19.00	0.497	23.00	0.0622 H	23.00
F145	0.55	17.00	0.58	6.00	0.47	5.00	0.07 H	24.50
F147	0.56	22.50	0.64	28.00	0.52	30.50	0.07 H	24.50
MEDIAN	0.5500		0.6130		0.4900		0.0400	
1CRIT	0.0425		0.0456		0.0395		0.0200	
N	31		31		31		23	
MEAN	0.5549		0.6129		0.4926		0.0436	
3STDEV	0.1258		0.0902		0.0812		0.0313	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	75.00	8.333	9					AAS
F003	171.50	17.150	10					ICP
F007	195.50	19.550	10					
F009	218.00	21.800	10	H				ICP-MS
F010	255.50	25.550	10					ICP-OES
F011	146.00	14.600	10					
F014	50.00	5.556	9	L L L	BIASED LOW*	-4.52	-0.0072	ICP MS
F015	265.50	29.500	9	H VHH H H VH	BIASED HIGH*	4.97	0.0176	ICP
F017	180.50	18.050	10					AAF
F020	285.00	28.500	10	H	BIASED HIGH*	3.82	0.0121	ICP
F022	99.00	9.900	10					AAS
F025	117.00	11.700	10					IC Low Level
F026	77.00	7.700	10		BIASED LOW*	-4.21	-0.0016	FAA
F032	109.50	10.950	10	L				AAS
F036	137.00	13.700	10					AAS
F037	230.00	32.857	7	EHEH EHEHEHEHEH	BIASED HIGH	32.04	0.0061	ICP-MS
F042	226.00	25.111	9					AAS, nitrous
F053	86.00	8.600	10					AAS
F060	172.00	17.200	10					ICP
F071	166.00	16.600	10	ELEHEHELELEHL EHEH				FAA
F072	191.50	21.278	9	EL EL				Flame AA
F074	175.00	17.500	10					AAS
F094	150.50	15.050	10	L VL VL				ICP-MS
F107	62.50	6.250	10	L L L L	BIASED LOW	-7.21	-0.0006	ICP
F109	137.00	13.700	10					ICP
F110	208.00	20.800	10					AAS
F110a	120.00	13.333	9					ICP
F112	132.50	13.250	10					AAS 2380
F113	213.00	21.300	10	H				FAAS PE5100
F133	45.50	4.550	10	ELEL VL VLELEL	BIASED LOW	-5.77	-0.0387	ICP-MS
F139	226.50	22.650	10	H H				ICP-OES
F145	129.00	12.900	10	L H				ICP-AES
F147	281.00	28.100	10	VHEH H	BIASED HIGH*	-1.99	0.0376	IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.617

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F133	45.50	4.550	10	ELELVLVLELEL	BIASED LOW	-5.77	-0.0387	ICP-MS
F014	50.00	5.556	9	LLL	BIASED LOW*	-4.52	-0.0072	ICP MS
F107	62.50	6.250	10	LLLL	BIASED LOW	-7.21	-0.0006	ICP
F026	77.00	7.700	10		BIASED LOW*	-4.21	-0.0016	FAA
F002	75.00	8.333	9					AAS
F053	86.00	8.600	10					AAS
F022	99.00	9.900	10					AAS
F032	109.50	10.950	10	L				AAS
F025	117.00	11.700	10					IC Low Level
F145	129.00	12.900	10	LH				ICP-AES
F112	132.50	13.250	10					AAS 2380
F110a	120.00	13.333	9					ICP
F036	137.00	13.700	10					AAS
F109	137.00	13.700	10					ICP
F011	146.00	14.600	10					
F094	150.50	15.050	10	LVLVL				ICP-MS
F071	166.00	16.600	10	ELEHEHELELEHLEHEH				FAA
F003	171.50	17.150	10					ICP
F060	172.00	17.200	10					ICP
F074	175.00	17.500	10					AAS
F017	180.50	18.050	10					AAF
F007	195.50	19.550	10					
F110	208.00	20.800	10					AAS
F072	191.50	21.278	9	ELEL				Flame AA
F113	213.00	21.300	10	H				FAAS PE5100
F009	218.00	21.800	10	H				ICP-MS
F139	226.50	22.650	10	HH				ICP-OES
F042	226.00	25.111	9					AAS, nitrous
F010	255.50	25.550	10					ICP-OES
F147	281.00	28.100	10	VHEHH	BIASED HIGH*	-1.99	0.0376	IC
F020	285.00	28.500	10	H	BIASED HIGH*	3.82	0.0121	ICP
F015	265.50	29.500	9	HVHHHHVH	BIASED HIGH*	4.97	0.0176	ICP
F037	230.00	32.857	7	EHEHEHEHEHEHEH	BIASED HIGH	32.04	0.0061	ICP-MS

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 5.00

OVERALL AVERAGE
RANK IS 16.617

Magnesium

PARAMETER: 13091 Aluminum mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Rain Waters

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0080 BASIC ACCEPTABLE ERROR= 0.0080 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = MIRAM-97		2 = BEAUPRE-95		3 = RAINGR-17		4 = AES-04		5 = MERSEY-01		6 = GRM-07	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F010	0.068	8.00	0.045	6.50	0.002	1.00	<0.001	0.00	0.099	9.00	0.048	4.00
F011	0.085 H	17.50	0.063 H	17.50	<0.010	0.00	<0.010	0.00	0.110	17.50	0.063	17.00
F014	0.061	5.00	0.045	6.50	0.008	5.50	0.004	3.50	0.090	5.50	0.051	6.00
F015	0.08	15.00	<0.05	0.00	<0.05	0.00	<0.05	0.00	0.09	5.50	0.06	12.50
F020	0.0692	11.00	0.0474	8.00	0.0087	9.00	0.0051	8.00	0.106	15.00	0.0609	14.00
F022	0.06	4.00	0.04	4.50	0.09 EH	13.00	0.01	11.00	0.09	5.50	0.05	5.00
F026	0.0700	12.00	0.0539	14.00	0.0088	10.00	0.0066	10.00	0.1014	13.00	0.0589	9.00
F037	0.0847 H	16.00	0.0583	16.00	0.0093	11.00	0.0054	9.00	0.136 EH	19.00	0.0751 H	19.00
F060	0.071	13.00	0.055	15.00	0.019 H	12.00	0.014 EH	12.00	0.102	14.00	0.063	17.00
F072	0.085 H	17.50	0.063 H	17.50	<0.010	0.00	<0.010	0.00	0.110	17.50	0.063	17.00
F094	0.09 VH	19.00	0.04	4.50	<0.01	0.00	<0.01	0.00	0.09	5.50	0.06	12.50
F107	0.077	14.00	0.050	10.50	0.008	5.50	0.004	3.50	0.098	8.00	0.061	15.00
F109	0.065	6.50	0.050	10.50	0.008T	5.50	0.005T	6.50	0.101	11.00	0.056	8.00
F110	0.069	9.50	0.050	10.50	0.008	5.50	0.004	3.50	0.101	11.00	0.059	10.50
F110a	0.069	9.50	0.050	10.50	0.008	5.50	0.004	3.50	0.101	11.00	0.059	10.50
F112	0.065	6.50	0.051	13.00	0.004	2.00	0.001	1.00	0.108	16.00	0.052	7.00
F133	0.051 L	3.00	0.036 L	3.00	0.008	5.50	0.005	6.50	0.075 VL	1.00	0.039 VL	1.00
F139	0.0506 L	1.00	0.0328 VL	2.00	<0.022	0.00	<0.022	0.00	0.0783 L	3.00	0.041 L	2.00
F145	0.0507 L	2.00	0.0317 VL	1.00	<0.03	0.00	<0.03	0.00	0.0777 VL	2.00	0.0447 L	3.00
MEDIAN	0.0690		0.0500		0.0080		0.0050		0.1010		0.0590	
1CRIT	0.0129		0.0114		0.0080		0.0080		0.0154		0.0121	
N	17		15		11		10		17		17	
MEAN	0.0694		0.0470		0.0089		0.0053		0.0973		0.0559	
3STDEV	0.0307		0.0208		0.0104		0.0053		0.0287		0.0199	

PARAMETER: 13091 Aluminum mg/L

SAMPLE	7 = DORSET-95		8 = TROIS-94		9 = PLASTIC-94		10 = AES-03	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F010	0.152	10.00	0.065	7.00	0.009	1.50	0.002	1.50
F011	0.218 VH	17.50	0.102 EH	17.50	<0.011	0.00	<0.010	0.00
F014	0.147	6.00	0.061	6.00	0.012	6.00	0.006	5.50
F015	0.15	8.00	<0.05 VL	0.00	<0.05	0.00	<0.05	0.00
F020	0.162	12.00	0.0698	8.00	0.0142	10.00	0.0075	8.00
F022	0.136	3.00	0.06	4.50	0.01	3.50	0.01	10.00
F026	0.1643	13.00	0.0716	12.00	0.0170	12.50	0.0102	11.00
F037	0.222 VH	19.00	0.0926 VH	16.00	0.0170	11.00	0.0080	9.00
F060	0.151	9.00	0.073	13.00	0.022	15.00	0.016 EH	13.00
F072	0.218 VH	17.50	0.102 EH	17.50	0.011	5.00	<0.010	0.00
F094	0.2 VH	15.00	0.06	4.50	0.02	14.00	<0.01	0.00
F107	0.166	14.00	0.075	14.00	0.014	8.00	0.006	5.50
F109	0.161	11.00	0.071	10.00	0.017T	12.50	0.012T	12.00
F110	0.147	6.00	0.071	10.00	0.014	8.00	0.006	5.50
F110a	0.147	6.00	0.071	10.00	0.014	8.00	0.006	5.50
F112	0.202 VH	16.00	0.080	15.00	0.009	1.50	0.002	1.50
F133	0.122 VL	2.00	0.053 L	2.00	0.010	3.50	0.005	3.00
F139	0.1411	4.00	0.0524 L	1.00	<0.022	0.00	<0.022	0.00
F145	0.1085 VL	1.00	0.0556 L	3.00	<0.03	0.00	<0.03	0.00
MEDIAN	0.1520		0.0710		0.0140		0.0060	
1CRIT	0.0195		0.0130		0.0085		0.0080	
N	17		15		12		10	
MEAN	0.1638		0.0686		0.0142		0.0077	
3STDEV	0.0831		0.0292		0.0090		0.0066	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	48.50	5.389	9					ICP-OES
F011	104.50	17.417	6	H H VHEH	BIASED HIGH	49.42	-0.0182	
F014	55.50	5.550	10					ICP MS
F015	41.00	10.250	4	VL	INSUFFICIENT DATA			ICP
F020	103.00	10.300	10					ICP MS
F022	64.00	6.400	10	EH				ICP AES
F026	116.50	11.650	10					ICP
F037	145.00	14.500	10	H EHH VHVH	BIASED HIGH	43.05	-0.0057	ICP-MS
F060	133.00	13.300	10	H EH EH				ICP
F072	109.50	15.643	7	H H VHEH	BIASED HIGH	45.03	-0.0138	Furnace AA
F094	75.00	10.714	7	VH VH				ICP-MS
F107	98.00	9.800	10					ICP
F109	93.50	9.350	10					ICP
F110	80.00	8.000	10					GFAAS
F110a	80.00	8.000	10					Furnace
F112	79.50	7.950	10	VH				HGA 300 FURNACE
F133	30.50	3.050	10	L L VLVLVLL	BIASED LOW	-22.32	-0.0012	ICP-MS
F139	13.00	2.167	6	L VL L L L	BIASED LOW	5.51	-0.0222	ICP-OES
F145	12.00	2.000	6	L VL VLL VLL	BIASED LOW	-27.43	0.0008	ICP-AES

OVERALL AVERAGE
RANK IS 8.982

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F145	12.00	2.000	6	LVLVLLVLL	BIASED LOW	-27.43	0.0008	ICP-AES
F139	13.00	2.167	6	LVLLLL	BIASED LOW	5.51	-0.0222	ICP-OES
F133	30.50	3.050	10	LLVLVLVLL	BIASED LOW	-22.32	-0.0012	ICP-MS
F010	48.50	5.389	9					ICP-OES
F014	55.50	5.550	10					ICP MS
F022	64.00	6.400	10	EH				ICP AES
F112	79.50	7.950	10	VH				HGA 300 FURNACE
F110	80.00	8.000	10					GFAAS
F110a	80.00	8.000	10					Furnace
F109	93.50	9.350	10					ICP
F107	98.00	9.800	10					ICP
F015	41.00	10.250	4	VL	INSUFFICIENT DATA			ICP
F020	103.00	10.300	10					ICP MS
F094	75.00	10.714	7	VHVH				ICP-MS
F026	116.50	11.650	10					ICP
F060	133.00	13.300	10	HEHEH				ICP
F037	145.00	14.500	10	HEHHVHVH	BIASED HIGH	43.05	-0.0057	ICP-MS
F072	109.50	15.643	7	HHVHEH	BIASED HIGH	45.03	-0.0138	Furnace AA
F011	104.50	17.417	6	HHVHEH	BIASED HIGH	49.42	-0.0182	

OVERALL AVERAGE
RANK IS 8.982

Aluminum

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