NATIONAL WATER RESEARCH INSTITUTE

INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Ecosystem Interlaboratory QA Program
Study FP 71 - Rain and Soft Waters
(September & October 1997)

H. Alkema and L. Hjelm

National Laboratory for Environmental Testing
National Water Research Institute
867 Lakeshore Rd, Burlington, ON
Canada L7R 4A6

Environment Canada Environnement Canada

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

December 19, 1997

To: Participants of the NWRI Ecosystem Interlaboratory Quality Assurance Program

Re: Final Report for NWRI Study FP 71 - Rain and Soft Waters Portion

Dear Participant:

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

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 Alkema
QA Services
NLET/PI&QM/ESRM

Lisa Hjelm
Interlaboratory Study Logistics
NLET/PI&QM/ESRM

905-336-4929
Harry.Alkema@CCIW.ca

905-336-4989
facsimile

905-336-4926
Lisa.Hjelm@CCIW.ca

Attachment: Individual Laboratory Appraisal

Canada

National Water Research Institute
National Laboratory for Environmental Testing

Report no. NWRI-QA-97-04

Ecosystem Interlaboratory Quality Assurance Program
Study FP 71 - Final Report

September and October 1997

An Interlaboratory Quality Assurance Study for Rain and Soft Waters*

by

H. Alkema and L. Hjelm

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

December 1997

* companion studies: Major Ions/Total P; Report NWRI-QA-97-05, and Trace Metals/Mercury; Report NWRI-QA-97-06

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, 40 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.

Contacts:

Harry Alkema, QA Chemist	905-336-4929, Harry.Alkema@CCIW.ca
Lisa Hjelm, Interlaboratory Studies & CRMs	905-336-4926, Lisa.Hjelm@CCIW.ca
Dave Warry, Chief, NWRI/NLET/PI&QM	905-336-6264, Dave.Warry@CCIW.ca

Table of Contents

Table 1 List of participating[†] laboratories in the acid rain and soft waters portion of interlaboratory study FP 71 (September & October 1997).

Adirondack Lakes Survey Corporation
Alberta Research Council
ASL - Analytical Service Laboratories Ltd.
Chemex Environmental Services
Environment Canada - AES, CAPMoN Laboratory
Environment Canada - EQL, Atlantic Region
Environment Canada - ETC, AMD
Environment Canada - NHRI, WQL
Environment Canada - NWRI, NLET
Environment Canada - Pacific Environmental Science Centre
Environnement Canada - CSL, Laboratoire régional - Québec
Enviro-Test Laboratories
Enviro-Test Manitoba Technology Centre
Fisheries and Oceans Canada - Freshwater Institute
Greater Victoria Water District - Water Quality Division
Harvard School of Public Health
Illinois State Water Survey - Analytical Chemistry Unit
Laboratoire de Santé Publique du Québec
Maxxam Analytics
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
Ontario Ministry of Environment and Energy - Dorset
Ontario Ministry of Environment and Energy - Etobicoke
Pennsylvania State University - ERRI
Philip Analytical Services Corporation
State of Vermont - Department of Environmental Conservation Laboratory
TAIGA Environmental Laboratory
University of Maine - Water Research Institute
University of Maryland - Appalachian Laboratory
University of Virginia - Department of Environmental Sciences
Université du Québec - INRS Eau
US Environmental Protection Agency - Western Ecology Division
US Geological Survey - Water Resources Division
Wisconsin State Laboratory of Hygiene

[†] Laboratories select their routine parameters from the series of samples in this study.

Table 2 Laboratory Performance Scores (Study 0071)

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 AND % FLAGS SCORE
F007	15	0	0.00	129	0	0.00	0.00
F115	12	0	0.00	120	0	0.00	0.00
F017	9	0	0.00	72	1	1.39	1.39
F053	10	0	0.00	92	2	2.17	2.17
F002	13	0	0.00	110	6	5.45	5.45
F026	17	0	0.00	169	10	5.92	5.92
F036	14	1	7.14	133	4	3.01	10.15
F118	4	0	0.00	29	3	10.34	10.34
F133	12	0	0.00	113	13	11.50	11.50
F110	12	1	8.33	120	4	3.33	11.67
F122	6	0	0.00	57	7	12.28	12.28
F112	14	1	7.14	140	8	5.71	12.86
F010	18	1	5.56	159	13	8.18	13.73
F116	16	1	6.25	145	13	8.97	15.22
F032	19	1	5.26	153	25	16.34	21.60
F109	12	2	16.67	120	11	9.17	25.83
F074	16	2	12.50	160	23	14.38	26.88
F003	17	3	17.65	150	14	9.33	26.98
F107	17	3	17.65	167	17	10.18	27.83
F001	12	2	16.67	111	14	12.61	29.28
F049	12	3	25.00	118	6	5.08	30.08
F068	7	1	14.29	56	10	17.86	32.14
F004	6	1	16.67	46	9	19.57	36.23
F113	10	2	20.00	100	17	17.00	37.00
F011	14	2	14.29	117	30	25.64	39.93
F020	16	1	6.25	131	45	34.35	40.60
F009	11	3	27.27	106	17	16.04	43.31
F014	19	3	15.79	149	44	29.53	45.32
F042	15	4	26.67	145	28	19.31	45.98
F060	20	3	15.00	141	48	34.04	49.04
F008	17	4	23.53	136	35	25.74	49.26
F071	16	4	25.00	151	37	24.50	49.50
F025	16	4	25.00	138	34	24.64	49.64
F015	17	3	17.65	140	46	32.86	50.50
F131	13	3	23.08	115	33	28.70	51.77
F038	18	6	33.33	148	35	23.65	56.98
F072	17	5	29.41	142	41	28.87	58.29
F094	18	7	38.89	160	52	32.50	71.39
F012	9	3	33.33	80	38	47.50	80.83
F037	11	4	36.36	103	61	59.22	95.59

The following parameters were used in the analysis:

Cond	pH	Alk In	NO3/2	NO3	Ammon
Na	Mg	Al	SO4 IC	Cl IC	Ca
Colour	DOC	Alk Gr	Si	K	DOC
DIC	TKN	SO4	Cl	Acid	Acid 8.3

Table 3

SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Rain & Soft Waters

LAB CODE	%BIAS PLUS %FLAGS ON STUDIES 0060	0061	0062	0063	0064	0065	0066	0067	0068	0069	0070	0071	MEDIAN SCORE	COMMENTS
F001	8.0	7.2	32.6	9.6	29.7	11.8	11.5	6.8	5.2	7.1	7.1	29.3	8.8	GOOD
F002	40.9	42.6	24.7	54.0	27.4	23.8	23.5	41.3	28.2	6.5	20.8	5.5	26.0	MODERATE
F003	18.7	20.6	17.7	28.0	36.1	13.8	29.3	17.8	8.6	14.1	5.2	27.0	18.3	SATISFACTORY
F004	8.2	12.8	24.4	28.7	2.4	14.3	2.0	39.3	-	7.0	8.2	36.2	12.8	SATISFACTORY
F007	1.9	7.5	24.1	-	-	46.5	27.8	27.5	24.7	23.7	18.5	0.0	23.9	SATISFACTORY
F008	23.1	14.2	40.6	30.2	14.3	14.7	16.1	35.5	13.4	28.4	34.6	49.3	25.8	MODERATE
F009	16.9	21.6	42.0	38.5	40.0	43.0	13.0	-	27.9	31.9	5.8	43.3	31.9	MODERATE
F010	13.3	13.9	28.7	43.0	35.1	35.6	9.6	13.0	3.2	-	14.7	13.7	13.9	SATISFACTORY
F011	-	-	-	-	-	-	-	-	24.6	67.1	34.8	39.9	37.4	MODERATE
F012	81.5	91.7	155.0	-	82.7	60.8	16.0	-	83.8	-	71.0	80.8	81.5	POOR
F014	17.9	23.3	27.7	47.5	14.0	32.5	10.7	21.0	17.3	36.3	12.0	43.5	22.1	SATISFACTORY
F015	41.5	39.4	33.1	29.2	13.6	6.5	19.5	8.9	14.3	24.8	28.8	50.5	26.8	MODERATE
F017	3.8	5.5	5.3	5.8	55.2	2.6	3.7	0.0	18.6	2.5	2.5	1.4	3.7	GOOD
F017c	35.9	7.9	3.9	15.1	3.9	-	-	-	-	-	-	-	7.9	GOOD
F020	5.3	8.4	10.6	29.5	13.7	30.2	33.0	38.2	-	47.9	47.3	40.6	30.2	MODERATE
F022	13.2	3.8	20.2	18.6	13.9	28.3	-	-	-	-	-	-	16.3	SATISFACTORY
F023	49.8	103.9	-	-	-	-	-	-	-	-	-	-	76.9	POOR
F024	41.7	18.3	-	-	-	-	68.8	-	-	-	-	-	41.7	MODERATE
F025	32.9	74.2	39.7	-	-	-	-	-	-	-	45.7	49.6	45.7	MODERATE
F026	2.4	3.9	25.6	6.1	14.1	14.7	15.0	8.2	11.2	12.5	30.0	5.9	11.9	SATISFACTORY
F027	-	-	104.4	93.1	95.1	116.7	-	-	-	-	-	-	99.8	POOR
F028	77.8	46.9	36.8	42.7	93.8	36.0	26.6	-	-	-	-	-	42.7	MODERATE
F032	15.2	4.4	19.2	18.6	12.0	-	26.0	13.7	32.2	27.4	34.7	20.6	19.2	SATISFACTORY
F033	3.5	25.8	4.9	12.5	21.9	25.8	3.0	26.6	35.0	-	-	-	21.9	SATISFACTORY
F036	3.5	3.4	22.2	12.0	28.0	18.2	17.6	-	23.5	8.1	6.2	10.2	12.0	SATISFACTORY
F037	68.2	63.6	68.4	51.7	49.1	23.0	37.5	41.5	71.4	37.5	75.4	95.6	57.6	MODERATE
F038	-	-	-	-	-	-	-	-	-	-	53.7	57.0	55.3	MODERATE
F042	5.2	12.7	27.7	7.6	12.5	8.8	20.2	28.3	15.5	-	14.6	46.0	14.6	SATISFACTORY
F043	89.4	28.6	-	-	-	-	158.6	-	-	-	-	-	89.4	POOR
F046	-	-	51.4	38.9	43.3	46.4	17.3	-	49.3	-	-	-	44.8	MODERATE
F049	-	49.1	-	-	-	-	26.1	9.1	-	-	-	30.1	28.1	MODERATE
F053	3.1	3.1	5.1	2.1	5.1	2.0	3.0	12.2	19.5	62.7	18.3	2.2	4.1	GOOD
F054	-	4.3	-	2.2	5.9	0.0	0.0	-	-	-	-	-	2.2	GOOD
F056	-	14.5	-	-	-	-	-	-	-	-	-	-	-	-
F058	24.6	19.2	0.0	23.8	13.0	24.6	11.5	3.8	14.2	39.3	-	-	16.7	SATISFACTORY
F060	-	-	-	-	-	-	-	-	66.3	-	34.0	49.0	49.0	MODERATE
F063	45.4	65.2	40.7	-	-	-	-	-	-	-	-	-	45.4	MODERATE
F067	34.2	31.2	-	-	-	-	-	-	-	-	-	-	32.7	MODERATE
F068	2.1	-	23.8	23.1	25.1	1.6	0.0	2.5	28.2	0.0	3.2	32.1	3.2	GOOD
F069	16.5	13.1	31.7	8.8	39.8	10.1	19.1	36.6	-	20.3	17.4	-	18.3	SATISFACTORY
F071	60.0	67.1	33.1	35.0	41.0	32.5	73.8	49.9	22.9	37.4	-	49.5	41.0	MODERATE
F072	44.5	-	58.5	-	-	-	70.3	-	-	-	71.0	58.3	58.5	MODERATE
F074	60.0	40.0	52.5	25.0	30.0	27.5	-	-	30.6	-	-	26.9	30.3	MODERATE
F076	-	-	-	-	-	-	19.0	-	-	-	-	-	-	-
F077	65.2	51.3	-	-	-	-	-	-	-	-	-	-	58.3	MODERATE
F080	-	-	-	-	-	-	-	-	21.3	-	-	-	-	-
F081	12.7	10.0	27.8	25.8	9.6	9.6	33.9	-	-	-	-	-	12.7	SATISFACTORY
F089	14.1	46.8	72.7	99.0	53.3	57.8	-	-	-	43.0	-	-	53.3	MODERATE
F090	15.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-	0.0	GOOD
F094	-	-	-	-	-	-	-	-	-	-	-	71.4	-	-
F096	-	-	-	-	-	-	-	-	24.5	-	-	-	-	-
F099	36.4	-	-	-	-	-	-	-	-	-	-	-	-	-
F101	-	41.6	66.3	75.8	32.0	42.9	-	-	-	-	-	-	42.9	MODERATE
F104	34.3	-	-	-	-	-	-	-	-	-	-	-	-	-
F105	2.9	-	10.0	-	-	-	-	-	-	-	-	-	6.4	GOOD
F107	34.4	33.3	10.4	14.6	12.0	35.6	37.6	42.8	-	14.0	54.1	27.8	33.3	MODERATE
F108	25.0	11.9	34.3	4.8	9.9	4.8	44.4	-	-	-	-	-	11.9	SATISFACTORY
F109	63.6	18.7	-	57.7	32.3	39.5	50.0	4.4	21.7	32.5	7.3	25.8	32.3	MODERATE
F110	32.7	8.2	31.8	9.3	7.3	5.6	11.1	19.4	-	-	16.5	11.7	11.4	SATISFACTORY
F110b	175.0	0.0	0.0	33.3	0.0	-	50.0	30.0	-	-	-	-	30.0	MODERATE
F112	50.8	49.0	26.1	19.3	24.0	40.4	19.4	46.3	-	23.5	25.1	12.9	25.1	MODERATE
F113	44.8	25.2	-	-	-	-	-	-	-	-	-	37.0	37.0	MODERATE
F114	160.0	152.0	-	-	-	-	-	-	-	-	-	-	156.0	POOR
F115	-	-	-	-	20.0	-	5.8	3.6	-	0.8	-	0.0	3.6	GOOD
F116	18.4	19.9	19.9	41.7	44.9	10.9	25.8	37.2	14.6	15.2	-	15.2	19.9	SATISFACTORY
F117	6.7	-	-	-	-	-	46.7	26.7	-	-	-	-	26.7	MODERATE
F118	8.3	135.0	2.8	12.5	96.2	105.6	11.4	8.1	7.5	84.0	174.4	10.3	12.0	SATISFACTORY
F119	-	-	-	-	-	-	53.2	-	-	-	-	-	-	-
F121	3.3	6.0	4.1	1.2	9.0	1.1	6.8	6.7	10.0	26.7	-	-	6.4	GOOD
F122	0.0	10.0	18.4	25.0	7.9	0.0	5.6	2.8	5.3	7.9	8.3	12.3	7.9	GOOD
F124	78.2	-	38.5	42.4	22.4	50.9	55.8	-	-	-	-	-	46.7	MODERATE
F125	-	-	37.8	-	27.7	-	36.3	-	-	-	-	-	36.3	MODERATE
F126	-	69.2	44.0	26.7	70.9	-	-	-	-	-	-	-	56.6	MODERATE
F127	88.3	56.0	-	-	-	-	-	-	-	-	-	-	72.2	POOR
F128	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-
F129	-	-	10.0	17.8	28.8	30.6	15.0	19.0	27.1	1.8	0.0	-	17.8	SATISFACTORY
F130	41.8	30.2	17.7	12.5	-	-	25.3	-	-	-	-	-	25.3	MODERATE
F131	-	-	-	-	-	-	-	-	81.8	53.0	-	51.8	53.0	MODERATE
F133	-	-	-	-	-	-	-	-	-	-	12.4	11.5	11.9	SATISFACTORY
INTERLAB MEDIAN	24.6	20.6	26.1	25.0	25.1	23.8	19.4	19.0	22.9	23.7	18.5	30.1		

STUDY DATES: 0060(28-JAN-93), 0061(19-MAY-93), 0062(19-SEP-93), 0063(21-JAN-94), 0064(10-MAY-94), 0065(20-SEP-94), 0066(15-JAN-95), 0067(05-SEP-95), 0068(01-MAR-96), 0069(01-SEP-96), 0070(03-MAR-97), 0071(02-SEP-97)

Table 4 Sample design for the rain and soft waters portion of interlaboratory study FP 71 (September & October 1997).

Sample Number	Sample Name	Source (Province/State)	Expected Conductance (µS/cm 25°C)
FP 71 SW-1	RainGR-17	Grimsby, Ontario	10.9
FP 71 SW-2	RainGR-03	Grimsby, Ontario	12.1
FP 71 SW-3	Plastic-94	Plastic Lake, Ontario	22.3
FP 71 SW-4	Vantap-01	Vancouver, British Columbia	24.5
FP 71 SW-5	RainGR-06	Grimsby, Ontario	19.1
FP 71 SW-6	RainGR-15	Grimsby, Ontario	35.2
FP 71 SW-7	Rain97M	Grimsby, Ontario	27.8
FP 71 SW-8	Mauri-Mx	Ste-Maurice & Cartier Rivers, Quebec	32.6
FP 71 SW-9	GRM-03	Grimsby, Ontario	28.7
FP 71 SW-10	Mersey-Mx	Mersey River, Maitland & Eul-8 (unknown origin)	40.0

Table 5

Summary of Interlaboratory Median Values for Rain & Soft Waters - Study 0071

PARAMETER		SAMPLE NUMBER						
		RAINGR-17 SAMPLE 1	RAINGR-03 SAMPLE 2	PLASTIC-94 SAMPLE 3	VANTAP-01 SAMPLE 4	RAINGR-06 SAMPLE 5	RAINGR-15 SAMPLE 6	RAIN-97M SAMPLE 7
Colour	Hazen Unit	1.0000	1.0000	1.6000	6.2000	1.0000	1.8000	2.7000
Specific Conductance	uS/cm	10.900	12.100	22.250	24.500	19.100	35.150	27.800
Acidity to pH 8.3	mg/L CaCO3	2.9400	2.5000	2.2000	2.3000	2.0000	1.9000	2.0000
pH	pH Units	5.3500	5.2800	6.2260	6.8350	6.4290	6.8100	6.8100
Diss Organic Carbon	mg/L C	0.2105	0.3100	2.2300	1.6250	0.3300	0.5400	0.7600
Alkalinity Fixed End Pt pH 4.5	mg/L	1.4500	1.4000	2.6000	6.5100	3.2000	6.7300	5.9000
Alkalinity Gran Infl Extrap	mg/L	-0.0980	-	1.1000	5.1100	1.7000	5.2000	4.6950
Alkalinity Gran Titn	mg/L CaCO3	-0.1300	-0.1850	1.1700	5.1000	1.6100	5.2600	4.4800
Diss Inorg Carbon	mg/L C	0.2550	0.2750	0.4800	1.3500	0.6350	1.5300	1.2000
Nitrate + Nitrite	mg/L N	0.2640	0.5200	0.0100	0.0050	0.7020	1.4400	0.6760
Nitrate-IC	mg/L N	0.2630	0.5200	0.0070	0.0040	0.7000	1.4310	0.6700
Ammonia	mg/L N	0.1700	0.0045	0.0275	0.0045	0.0040	0.0050	0.1890
Total Kjeldahl N	mg/L N	0.2100	0.0800	0.1800	0.0800	0.0600	0.0900	0.2750
Sodium	mg/L	0.0500	0.0360	0.6200	1.1950	0.2200	0.1520	0.2760
Magnesium	mg/L	0.1600	0.3200	0.4800	0.5800	0.5600	0.5700	0.9100
Aluminum	mg/L	0.0090	0.0068	0.0124	0.0460	0.0045	0.0050	0.0220
Reactive Silica	mg/L Si	0.0205	0.0258	0.3600	1.3300	0.0300	0.1483	0.1160
Sulfate IC	mg/L	2.1300	1.8050	6.0600	2.6025	2.6596	3.7475	3.8560
Sulfate Colour	mg/L	2.1000	1.7300	6.3000	2.7000	2.4000	3.8000	3.6000
Chloride IC	mg/L	0.1200	0.0950	0.5100	1.8100	0.4100	0.2864	0.5100
Chloride Colour	mg/L	0.1295	0.1100	0.5800	1.9000	0.4045	0.2930	0.6000
Potassium	mg/L	0.0130	0.0370	0.2335	0.2700	0.0640	0.1450	0.1540
Calcium	mg/L	0.7000	0.9100	1.9900	2.1400	1.9150	4.7900	2.6000

		MAURI-MX SAMPLE 8	GRM-03 SAMPLE 9	MERSEY-MX SAMPLE 10
Colour	Hazen Unit	26.500	1.0000	21.200
Specific Conductance	uS/cm	32.550	28.700	40.000
Acidity to pH 8.3	mg/L CaCO3	2.9000	2.0000	2.6000
pH	pH Units	6.8150	6.0920	6.6600
Diss Organic Carbon	mg/L C	4.2900	0.4330	2.5700
Alkalinity Fixed End Pt pH 4.5	mg/L	7.1250	2.4000	5.1500
Alkalinity Gran Infl Extrap	mg/L	5.5200	0.9700	3.8000
Alkalinity Gran Titn	mg/L CaCO3	5.7000	0.8100	3.6800
Diss Inorg Carbon	mg/L C	1.4400	0.5150	1.0000
Nitrate + Nitrite	mg/L N	0.1570	0.9500	0.8610
Nitrate-IC	mg/L N	0.1600	0.9500	0.8600
Ammonia	mg/L N	0.0050	0.0030	0.0050
Total Kjeldahl N	mg/L N	0.1450	0.0500	0.1300
Sodium	mg/L	2.0200	0.1500	1.7725
Magnesium	mg/L	0.5500	0.9260	0.9000
Aluminum	mg/L	0.0700	0.0050	0.0567
Reactive Silica	mg/L Si	2.2900	0.0560	1.2500
Sulfate IC	mg/L	3.7500	5.9600	4.6400
Sulfate Colour	mg/L	4.2000	6.2950	5.0000
Chloride IC	mg/L	2.1000	0.3874	3.1400
Chloride Colour	mg/L	2.3000	0.4000	3.2000
Potassium	mg/L	0.3595	0.1700	0.2560
Calcium	mg/L	2.9600	2.6800	3.5000

Appendix A

Glossary of Terms
Quantifying Bias in NWRI QA Studies

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.

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.

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

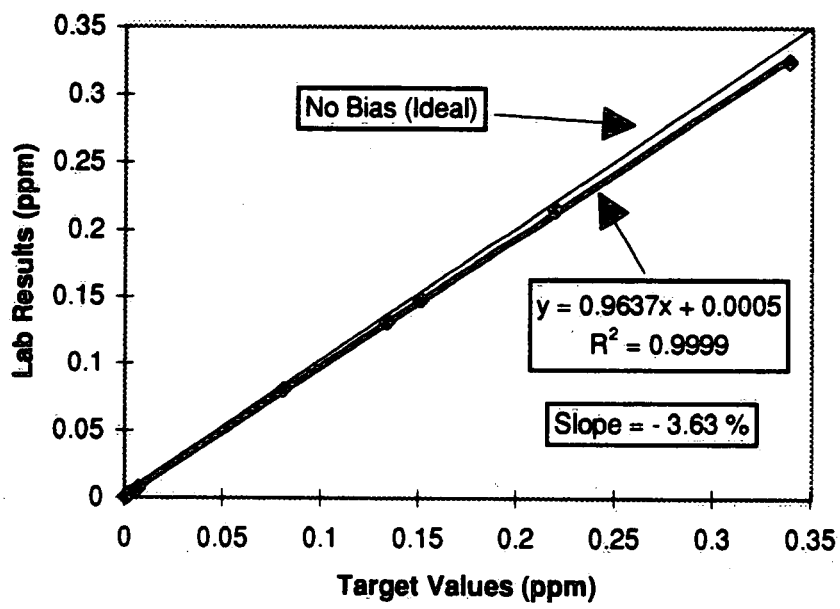
Introduction

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. Up until now, the degree of bias has not been calculated for the QA reports. 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. 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%.

Figure 1 **Parameter Performance**



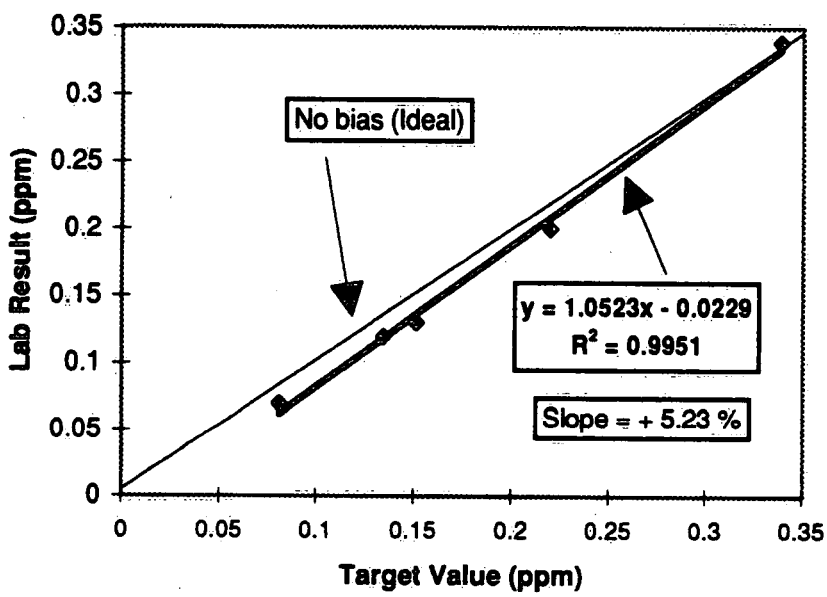
[1] Systematic bias is often identified with the comparison of data to a certified standard.

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
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	11.	23.00	12.22	21.00	22.6	28.00	24.7	20.50	19.3	24.00	35.4	20.50
F002	10.95	20.00	10.70	2.00	22.1	15.00	24.3	15.00	19.0	13.00	35.1	17.00
F003	11.0	23.00	12.6	27.00	22.5	24.50	24.7	20.50	19.3	24.00	34.2	9.00
F004	10.9	18.00	12.4	24.50	22.5	24.50	24.9	25.00	19.3	24.00	35.8	22.50
F007	10.8	15.00	12.1	17.50	22.2	16.50	25.0	27.00	19.3	24.00	34.6	12.00
F008	9.9	3.00	11.4	4.50	19.8 L	1.00	22.8	2.50	17.6	1.00	33.	2.00
F009	10.5	10.50	12.	14.50	22.	12.50	25.	27.00	19.	13.00	36.	26.50
F010	10.2	6.00	11.7	8.00	22.0	12.50	24.1	11.50	19.0	13.00	34.4	10.50
F011	10.3	7.50	11.8	10.50	21.3	4.50	23.4	6.50	18.3	5.00	33.5	3.00
F014	11.0	23.00	12.1	17.50	22.5	24.50	25.0	27.00	19.4	27.00	35.9	24.50
F015	12.	32.50	14. H	32.50	25. H	31.00	28. VH	32.50	22. VH	33.00	39. VH	32.00
F020	10.	4.50	9. EL	1.00	21.	2.50	23.	4.00	18.	2.50	34.	8.00
F026	11.83	30.00	13.24	30.00	23.65	30.00	25.70	29.00	20.55	30.00	36.65	29.00
F032	12.	32.50	12.4	24.50	22.	12.50	24.	10.00	19.	13.00	36.	26.50
F036	9.6	1.00	10.8	3.00	21.4	6.00	23.6	8.00	18.	2.50	34.8	14.00
F037	10.52	12.00	11.76	9.00	22.2	16.50	24.3	15.00	19.2	20.50	34.7	13.00
F038	10.	4.50	12.	14.50	26. EH	34.00	29. EH	34.00	23. EH	34.00	40. EH	33.50
F042	10.3	7.50	11.6	6.50	21.3	4.50	23.3	5.00	18.1	4.00	33.6	4.00
F049	10.5	10.50	12.3	22.00	21.0	2.50	22.8	2.50	18.5	6.50	32.5 L	1.00
F053	11.3	26.50	13.1	29.00	22.5	24.50	24.7	20.50	19.	13.00	36.1	28.00
F060	10.9	18.00	12.0	14.50	21.7	9.00	24.2	13.00	18.6	8.00	34.4	10.50
F071	11.68	29.00	14.31 H	34.00	25.50 VH	33.00	27.50 VH	31.00	20.80	31.00	37.90 H	31.00
F072	9.79	2.00	11.6	6.50	21.6	7.50	22.7	1.00	18.5	6.50	33.7	5.50
F074	11.	23.00	12.	14.50	22.	12.50	26.	30.00	20.	29.00	37.	30.00
F094	12.3	34.00	14.0 H	32.50	25.2 VH	32.00	28.0 VH	32.50	21.9 VH	32.00	40.0 EH	33.50
F107	10.9	18.00	11.9	12.00	21.6	7.50	23.7	9.00	18.7	9.00	33.9	7.00
F110	11.3	26.50	12.4	24.50	22.3	19.50	24.5	17.50	19.1	17.50	35.2	18.00
F112	10.8	15.00	12.2	19.50	22.3	19.50	24.5	17.50	19.2	20.50	35.3	19.00
F113	10.8	15.00	12.4	24.50	22.5	24.50	24.8	23.50	19.3	24.00	35.8	22.50
F115	10.6	13.00	12.2	19.50	22.3	19.50	24.8	23.50	19.1	17.50	35.9	24.50
F116	11.55	28.00	12.65	28.00	22.3	19.50	24.1	11.50	19.1	17.50	35.4	20.50
F122	10.4	9.00	11.8	10.50	21.9	10.00	24.3	15.00	18.9	10.00	35.0	16.00
F131	11.9	31.00	13.5	31.00	23.0	29.00	23.4	6.50	19.1	17.50	33.7	5.50
F133	11.0	23.00	11.4	4.50	22.5	24.50	24.7	20.50	19.5	28.00	34.9	15.00
MEDIAN	10.9000		12.1000		22.2500		24.5000		19.1000		35.1500	
1CRIT	1.5470		1.5830		1.8875		1.9550		1.7930		2.2745	
N	32		32		32		32		32		31	
MEAN	10.8631		12.1959		22.3891		24.6188		19.2516		35.1887	
3STDEV	1.8018		2.2398		3.2013		3.8281		2.7593		3.8877	

PARAMETER: 00392 Specific Conductance uS/cm

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	28.1	22.00	33.	25.00	28.7	18.00	40.2	21.00
F002	27.8	16.00	32.5	16.50	28.6	15.00	39.9	15.50
F003	28.2	23.00	32.8	21.00	27.9	6.00	40.1	19.50
F004	28.3	24.00	32.9	22.00	29.0	21.50	40.6	23.50
F007	27.8	16.00	32.6	18.50	28.6	15.00	39.4	10.50
F008	26.2	2.50	30.5	2.00	26.4 L	1.00	37. L	2.00
F009	28.	21.00	33.	25.00	29.	21.50	40.	17.50
F010	27.3	8.00	31.9	9.00	28.3	11.00	39.4	10.50
F011	26.6	4.50	31.1	7.00	27.4	5.00	38.4	6.00
F014	28.4	26.00	33.0	25.00	29.1	24.50	40.6	23.50
F015	31. VH	32.00	36. VH	31.00	31. H	31.00	43. H	31.00
F020	27.	7.00	31.	5.00	28.	8.00	41.	27.50
F026	29.50	30.00	34.20	30.00	30.50	30.00	41.95	30.00
F032	28.4	26.00	33.	25.00	29.6	28.00	41.	27.50
F036	27.4	9.00	32.2	12.00	28.	8.00	39.8	14.00
F037	27.8	16.00	32.6	18.50	29.0	21.50	40.1	19.50
F038	32. EH	33.00	37. VH	33.00	33. EH	33.00	45. EH	34.00
F042	26.6	4.50	31.0	5.00	27.1	3.00	38.0	4.00
F049	26.2	2.50	31.2	8.00	26.5 L	2.00	38.0	4.00
F053	27.9	19.50	32.3	14.50	28.3	11.00	38.	4.00
F060	27.5	10.50	30.9	3.00	28.0	8.00	38.7	7.00
F071	30.60 H	31.00	36.31 VH	32.00	32.11 VH	32.00	44.60 VH	33.00
F072	25.2 L	1.00	27.6 EL	1.00	27.3	4.00	35.7 VL	1.00
F074	29.	29.00	34.	29.00	30.	29.00	41.	27.50
F094	33.1 EH	34.00	37.2 EH	34.00	33.1 EH	34.00	43.5 H	32.00
F107	27.5	10.50	32.	10.00	28.3	11.00	39.2	9.00
F110	27.8	16.00	32.2	12.00	28.7	18.00	40.	17.50
F112	27.7	12.50	32.5	16.50	28.6	15.00	39.9	15.50
F113	28.4	26.00	33.0	25.00	29.1	24.50	40.7	25.00
F115	28.7	28.00	33.3	28.00	29.4	27.00	41.0	27.50
F116	27.7	12.50	32.7	20.00	29.2	26.00	40.3	22.00
F122	27.8	16.00	32.3	14.50	28.4	13.00	39.6	12.50
F131	26.8	6.00	31.0	5.00	29.0	21.50	38.8	8.00
F133	27.9	19.50	32.2	12.00	28.7	18.00	39.6	12.50
MEDIAN	27.8000		32.5500		28.7000		40.0000	
1CRIT	2.0540		2.1965		2.0810		2.4200	
N	32		32		32		32	
MEAN	28.0594		32.6941		28.8878		40.1047	
3STDEV	3.7724		4.4711		3.9403		4.7332	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	223.00	22.300	10					Meter
F002	145.00	14.500	10					METER
F003	197.50	19.750	10					Conductivity Probe
F004	229.50	22.950	10					02041
F007	172.00	17.200	10					CPQ002E2
F008	21.50	2.150	10	L L L	BIASED LOW	-6.16	-0.2867	Autoelectrode
F009	189.00	18.900	10					Conductivimeter
F010	100.00	10.000	10					Radiometer
F011	59.50	5.950	10		BIASED LOW	-4.46	0.0346	
F014	242.50	24.250	10					
F015	318.50	31.850	10	H H VHVHVHVHVHH H	BIASED HIGH	6.47	1.1579	02041
F020	70.00	7.000	10	EL	BIASED LOW	6.58	-2.7700	Radiometer
F026	298.00	29.800	10		BIASED HIGH*	2.83	0.7553	RADIOMETER
F032	225.50	22.550	10					
F036	77.50	7.750	10		BIASED LOW	4.15	-1.7947	
F037	161.50	16.150	10					V.W.R.
F038	287.50	28.750	10	EHEHEHEHEHVHEHEH	BIASED HIGH	18.88	-1.3815	Meter
F042	48.00	4.800	10		BIASED LOW	-4.79	-0.0022	Cond meter
F049	61.50	6.150	10	L L	BIASED LOW	-7.95	0.6573	Conductivity meter
F053	190.50	19.050	10					
F060	101.50	10.150	10					Conductance Meter
F071	317.00	31.700	10	H VHVH H H VHVHVH	BIASED HIGH	9.49	0.4256	Conductance meter
F072	36.00	3.600	10	L EL VL	BIASED LOW	-11.66	1.0135	Electrometric
F074	253.50	25.350	10					ELECTRODE
F094	330.50	33.050	10	H VHVHVHEHEHEHEHH	BIASED HIGH	10.64	0.8320	Cond. Meter
F107	103.00	10.300	10					ELECTROPO
F110	187.00	18.700	10					YSI meter 25C
F112	170.50	17.050	10					YSI CONDUCT METER
F113	234.50	23.450	10					Orion meter/probe
F115	228.00	22.800	10					YSI w/ pipet cell
F116	205.50	20.550	10					YSI model 32
F122	126.50	12.650	10					Radiometer CDM83
F131	161.00	16.100	10					conductivity meter
F133	177.50	17.750	10					COND. 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 17.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F008	21.50	2.150	10	LLL	BIASED LOW	-6.16	-0.2867	Autoelectrode
F072	36.00	3.600	10	LELVL	BIASED LOW	-11.66	1.0135	Electrometric
F042	48.00	4.800	10		BIASED LOW	-4.79	-0.0022	Cond meter
F011	59.50	5.950	10		BIASED LOW	-4.46	0.0346	
F049	61.50	6.150	10	LL	BIASED LOW	-7.95	0.6573	Conductivity meter
F020	70.00	7.000	10	EL	BIASED LOW	6.58	-2.7700	Radiometer
F036	77.50	7.750	10		BIASED LOW	4.15	-1.7947	
F010	100.00	10.000	10					Radiometer
F060	101.50	10.150	10					Conductance Meter
F107	103.00	10.300	10					ELECTROPO
F122	126.50	12.650	10					Radiometer CDM83
F002	145.00	14.500	10					METER
F131	161.00	16.100	10					conductivity meter
F037	161.50	16.150	10					V.W.R.
F112	170.50	17.050	10					YSI CONDUCT METER
F007	172.00	17.200	10					CPQ002E2
F133	177.50	17.750	10					COND. METER
F110	187.00	18.700	10					YSI meter 25C
F009	189.00	18.900	10					Conductivimeter
F053	190.50	19.050	10					
F003	197.50	19.750	10					Conductivity Probe
F116	205.50	20.550	10					YSI model 32
F001	223.00	22.300	10					Meter
F032	225.50	22.550	10					
F115	228.00	22.800	10					YSI w/ pipet cell
F004	229.50	22.950	10					02041
F113	234.50	23.450	10					Orion meter/probe
F014	242.50	24.250	10					
F074	253.50	25.350	10					ELECTRODE
F038	287.50	28.750	10	EHEHEHEHEHVHEHEH	BIASED HIGH	18.88	-1.3815	Meter
F026	298.00	29.800	10		BIASED HIGH*	2.83	0.7553	RADIOMETER
F071	317.00	31.700	10	HVHVHHHVHVHVH	BIASED HIGH	9.49	0.4256	Conductance meter
F015	318.50	31.850	10	HHVHVHVHVHVHHH	BIASED HIGH	6.47	1.1579	02041
F094	330.50	33.050	10	HVHVHVHEHEHEHEHH	BIASED HIGH	10.64	0.8320	Cond. 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 17.500

PARAMETER: 00292 Colour Hazen Unit

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<5.0	0.00	<5.0	0.00	<5.0	0.00	5.0	5.00	<5.0	0.00	<5.0	0.00
F003	0.3	3.00	13. EH	9.00	9.6 EH	11.00	8.0	13.50	4.3 H	8.00	15. EH	12.00
F004	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F007	<4.	0.00	<4.	0.00	<4.	0.00	5.	5.00	<4.	0.00	<4.	0.00
F008	5. H	8.50	5. H	8.00	5. H	9.50	10. H	17.00	5. H	9.00	5. H	10.50
F010	<1.	0.00	<1.	0.00	1.	3.50	5.	5.00	<1.	0.00	1.	4.00
F011	<5.	0.00	<5.	0.00	<5.	0.00	5.	5.00	<5.	0.00	<5.	0.00
F014	5. H	8.50	0.	2.00	5. H	9.50	5.	5.00	0.	2.00	5. H	10.50
F032	1.	5.00	0.8	4.00	1.2	5.00	6.2	9.00	<0.2	0.00	2.	7.00
F036	1.2	7.00	1.	5.50	2.4	8.00	7.6	11.00	1.	4.50	1.6	6.00
F038	<5.	0.00	<5.	0.00	<5.	0.00	5.	5.00	<5.	0.00	<5.	0.00
F042	1.	5.00	2.	7.00	2.	7.00	8.	13.50	2.	7.00	4.	9.00
F060	1.	5.00	1.	5.50	1.	3.50	9.	16.00	1.	4.50	1.	4.00
F072	<5.	0.00	<5.	0.00	<5.	0.00	8.	13.50	<5.	0.00	<5.	0.00
F094	<3.	0.00	<3.	0.00	<3.	0.00	5.	5.00	<3.	0.00	3.	8.00
F110	0.	1.50	0.	2.00	0.	1.50	8.	13.50	0.	2.00	1.	4.00
F116	0.	1.50	0.	2.00	0.	1.50	2.5 L	1.00	0.	2.00	0.	1.00
F122	0.5W	0.00	0.5W	0.00	1.6T	6.00	6.4	10.00	1.2T	6.00	0.82T	2.00
MEDIAN	1.0000		1.0000		1.6000		6.2000		1.0000		1.8000	
1CRIT	3.0000		3.0000		3.0000		3.4800		3.0000		3.0000	
N	5		8		8		15		8		10	
MEAN	0.9000		1.2250		2.4000		6.4133		1.1875		2.4420	
3STDEV	-		4.6999		4.7053		4.3953		4.0595		4.7999	

PARAMETER: 00292 Colour Hazen Unit

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<5.0	0.00	25.0	7.50	<5.0	0.00	20.0	7.00
F003	7.5 VH	12.00	23.	4.00	2.6	7.00	20.	7.00
F004	<5.	0.00	25.	7.50	<5.	0.00	15. L	1.50
F007	<4.	0.00	28.	10.00	<4.	0.00	24.	13.00
F008	5.	9.50	30.	13.50	5. EH	8.00	30. VH	17.00
F010	1.	3.00	21.	3.00	<1.	0.00	16.	3.00
F011	<5.	0.00	20.	1.50	<5.	0.00	15. L	1.50
F014	5.	9.50	20.	1.50	0.	2.00	20.	7.00
F032	2.	5.00	29.2	11.50	<0.2	0.00	22.6	11.00
F036	2.4	6.00	29.2	11.50	1.	4.50	22.4	10.00
F038	<5.	0.00	24.	5.00	<5.	0.00	19.	4.00
F042	3.	7.00	32.	16.00	2.	6.00	27. H	16.00
F060	5.	9.50	33.	17.00	1.	4.50	25.	14.00
F072	5.	9.50	30.	13.50	<5.	0.00	23.	12.00
F094	<3.	0.00	25.	7.50	<3.	0.00	20.	7.00
F110	0.	1.50	54. EH	18.00	0.	2.00	42. EH	18.00
F116	0.	1.50	25.	7.50	0.	2.00	20.	7.00
F122	1.2T	4.00	31.	15.00		0.00	26.	15.00
MEDIAN	2.7000		26.5000		1.0000		21.2000	
1CRIT	3.0000		6.5250		3.0000		5.7300	
N	9		15		7		15	
MEAN	3.2889		27.3600		0.9429		22.3333	
3STDEV	4.8835		10.4136		2.8991		10.4743	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	19.50	6.500	3		INSUFFICIENT DATA			PHOTOMETER
F003	86.50	8.650	10	EHEH H EHVH				Spectrophotometric
F004	9.00	4.500	2	L	INSUFFICIENT DATA			02021
F007	28.00	9.333	3		INSUFFICIENT DATA			CPQ006E0
F008	110.50	11.050	10	H H H H H H EHVH	BIASED HIGH*	9.26	3.5072	Manual visual
F010	21.50	3.583	6		BIASED LOW*	-19.96	-0.5037	Colorimetry
F011	8.00	2.667	3	L	INSUFFICIENT DATA			
F014	57.50	5.750	10	H H H				
F032	57.50	7.188	8					
F036	74.00	7.400	10					
F038	14.00	4.667	3		INSUFFICIENT DATA			Spectrophotometry
F042	93.50	9.350	10	H				Colourimetric
F060	83.50	8.350	10					Visual Comparison
F072	48.50	12.125	4		INSUFFICIENT DATA			Pt/Cobalt
F094	27.50	6.875	4		INSUFFICIENT DATA			Apparent
F110	64.00	6.400	10	EH EH				spectro 420nm-filt
F116	27.00	2.700	10	L	BIASED LOW*	0.05	-1.6530	Color comparitor
F122	58.00	8.286	7					Spec 455nm 10cm

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

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F011	8.00	2.667	3	L	INSUFFICIENT DATA			
F116	27.00	2.700	10	L	BIASED LOW*	0.05	-1.6530	Color comparitor
F010	21.50	3.583	6		BIASED LOW*	-19.96	-0.5037	Colorimetry
F004	9.00	4.500	2	L	INSUFFICIENT DATA			02021
F038	14.00	4.667	3		INSUFFICIENT DATA			Spectrophotometry
F014	57.50	5.750	10	HHH				
F110	64.00	6.400	10	EHEH				spectro 420nm-filt
F002	19.50	6.500	3		INSUFFICIENT DATA			PHOTOMETER
F094	27.50	6.875	4		INSUFFICIENT DATA			Apparent
F032	57.50	7.188	8					
F036	74.00	7.400	10					
F122	58.00	8.286	7					Spec 455nm 10cm
F060	83.50	8.350	10					Visual Comparison
F003	86.50	8.650	10	EHEHHEHVH				Spectrophotometric
F007	28.00	9.333	3		INSUFFICIENT DATA			CPQ006E0
F042	93.50	9.350	10	H				Colourimetric
F008	110.50	11.050	10	HHHHHHEHVH	BIASED HIGH*	9.26	3.5072	Manual visual
F072	48.50	12.125	4		INSUFFICIENT DATA			Pt/Cobalt

* 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 7.220

PARAMETER: 01090 Acidity to pH 8.3 mg/L CaCO3

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F014	1.16 EL	1.00	1.50 L	1.00	1.33 L	1.00	1.11 VL	2.00	0.923 VL	1.00	1.03 L	1.00
F015	3.	5.00	3.	5.00	3. H	6.00	3.	5.00	2.	4.00	2.	5.00
F020	2.94	4.00	6.26 EH	7.00	2.72	5.00	4.42 EH	7.00	6.34 EH	7.00	3.09 VH	7.00
F032	1.8 L	2.00	2.15	2.00	1.45 L	2.00	1. VL	1.00	1.6	2.00	1.15 L	2.00
F038	3.1	6.00	2.5	3.50	2.2	4.00	2.3	4.00	1.7	3.00	1.9	3.50
F072	4.20 VH	7.00	3.90 VH	6.00	2.00	3.00	3.50 VH	6.00	2.40	5.00	2.70 H	6.00
F133	1.9 L	3.00	2.5	3.50	3.2 H	7.00	1.9	3.00	2.5	6.00	1.9	3.50
MEDIAN	2.9400		2.5000		2.2000		2.3000		2.0000		1.9000	
1CRIT	0.7940		0.7500		0.7200		0.7300		0.7000		0.6900	
N	5		5		5		5		5		5	
MEAN	2.5480		2.8100		2.2740		2.3620		2.0400		1.9300	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F014	1.37	2.00	1.51 VL	1.00	1.71	2.00	1.38 VL	1.00
F015	2.	3.50	3.	5.00	2.	3.50	3.	5.00
F020	3.58 EH	6.00	4.68 EH	7.00	4.27 EH	7.00	3.80 VH	6.00
F032	1. L	1.00	1.6 VL	2.00	1.55	1.00	1.6 L	2.00
F038	2.	3.50	2.9	4.00	2.1	5.00	2.6	4.00
F072	2.90 H	5.00	2.40	3.00	2.00	3.50	2.20	3.00
F133	4.0 EH	7.00	4.0 H	6.00	3.2 VH	6.00	4.5 EH	7.00
MEDIAN	2.0000		2.9000		2.0000		2.6000	
1CRIT	0.7000		0.7900		0.7000		0.7600	
N	5		5		5		5	
MEAN	2.3700		2.7800		2.2020		2.6400	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	13.00	1.300	10	ELL L VLVLL VL VL				
F015	47.00	4.700	10	H				
F020	63.00	6.300	10	EH EHEHVHEHEHEHVH				Electrom Plot
F032	17.00	1.700	10	L L VL L L VL L				
F038	40.50	4.050	10					Titration
F072	47.50	4.750	10	VHVH VH H H				Titration
F133	52.00	5.200	10	L H EHH VHEH				TITRIMETRIC

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

OVERALL AVERAGE
RANK IS 4.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	13.00	1.300	10	ELLLVLVLLVLVL				
F032	17.00	1.700	10	LLVLLLVLL				
F038	40.50	4.050	10					Titration
F015	47.00	4.700	10	H				
F072	47.50	4.750	10	VHVHVHHH				Titration
F133	52.00	5.200	10	LHEHHVHEH				TITRIMETRIC
F020	63.00	6.300	10	EHEHEHVHEHEHEHVH				Electrom Plot

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

OVERALL AVERAGE
RANK IS 4.000

Acidity to pH 8.3

PARAMETER: 01092 pH pH Units

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	5.16	3.00	5.11	4.00	6.12	9.00	6.61 L	5.00	6.33	10.00	6.60 L	8.00
F002	5.20	5.50	5.30	24.50	6.20	16.50	6.70	9.00	6.40	17.00	6.60 L	8.00
F003	5.27	10.00	5.24	13.00	6.11	8.00	6.65	6.50	6.35	12.00	6.60 L	8.00
F004	5.66 VH	33.00	5.33	27.00	5.90 VL	3.50	6.58 L	4.00	6.03 VL	2.00	6.56 L	4.50
F007	5.28	11.50	5.20	8.50	6.25	22.50	6.96	28.50	6.43	20.00	6.90	28.50
F008	5.2	5.50	5.13	6.00	6.13	10.00	6.76	11.00	6.29	7.00	6.71	12.00
F009	5.23	7.00	5.20	8.50	6.28	25.50	6.96	28.50	6.43	20.00	6.86	24.50
F010	5.41	27.00	5.26	17.00	6.19	13.50	6.85	20.00	6.48	26.00	6.86	24.50
F011	5.35	18.50	5.3	24.50	6.34	32.50	6.9	23.00	6.5	29.00	6.89	27.00
F014	5.24	8.50	5.09	3.00	6.24	21.00	6.81	15.00	6.32	9.00	6.81	18.00
F015	5.64 H	32.00	5.45	32.00	6.19	13.50	6.79	13.00	6.47	23.50	6.81	18.00
F017	5.37	24.00	5.28	19.50		0.00		0.00		0.00		0.00
F020	5.36	21.50	5.50 H	35.00	6.18	11.00	6.76	11.00	6.17 L	3.00	6.70	11.00
F025	5.28	11.50	5.08 L	2.00	6.64 VH	35.00	7.75 EH	36.00	6.95 EH	35.00	7.23 VH	34.00
F026	5.41	27.00	5.36	28.00	6.20	16.50	6.82	17.00	6.48	26.00	6.82	20.50
F032	5.38	25.00	5.29	21.50	6.33	31.00	7.06 H	33.00	6.21 L	5.00	7.	32.00
F036	5.3	14.50	5.24	13.00	6.19	13.50	6.89	22.00	6.39	16.00	6.78	13.00
F037	5.56 H	30.00	5.40	30.00	6.34	32.50	7.00	31.00	6.58	33.00	6.85	22.00
F038	4.47 EL	1.00	4.56 EL	1.00	5.66 EL	1.00	6.36 VL	1.00	5.9 EL	1.00	6.38 VL	1.00
F042	5.68 VH	34.50	5.50 H	35.00	5.90 VL	3.50	6.65	6.50	6.18 L	4.00	6.49 VL	2.00
F049	5.36	21.50	5.26	17.00	6.23	20.00	6.80	14.00	6.38	13.50	6.79	14.50
F053	5.3	14.50	5.3	24.50	6.32	29.00	6.95	27.00	6.53	31.00	7.02 H	33.00
F060	5.76 VH	36.00	5.50 H	35.00	6.07	7.00	6.69	8.00	6.23	6.00	6.66	10.00
F071	5.47	29.00	5.23	11.00	5.89 VL	2.00	6.49 VL	2.00	6.34	11.00	6.53 L	3.00
F072	6.04 EH	37.00	6.56 EH	37.00	7.30 EH	36.00	7.58 EH	35.00	7.77 EH	36.00	7.62 EH	36.00
F074	5.68 VH	34.50	5.46	33.00	6.59 VH	34.00	7.27 VH	34.00	6.81 VH	34.00	7.35 VH	35.00
F094	5.24	8.50	5.12	5.00	6.01 L	5.00	6.76	11.00	6.38	13.50	6.57 L	6.00
F107	5.18	4.00	5.18	7.00	6.04	6.00	6.55 L	3.00	6.31	8.00	6.56 L	4.50
F109	5.569 H	31.00	5.365	29.00	6.224	18.00	6.811	16.00	6.384	15.00	6.820	20.50
F110	5.36	21.50	5.29	21.50	6.30	27.00	6.99	30.00	6.43	20.00	6.81	18.00
F112	5.313	16.00	5.259	15.00	6.228	19.00	6.910	24.00	6.428	18.00	6.923	30.00
F113	5.36	21.50	5.30	24.50	6.32	29.00	6.84	19.00	6.56	32.00	6.79	14.50
F115	5.35	18.50	5.28	19.50	6.28	25.50	6.92	25.00	6.48	26.00	6.86	24.50
F116	5.32	17.00	5.24	13.00	6.19	13.50	6.94	26.00	6.47	23.50	6.90	28.50
F122	5.41	27.00	5.26	17.00	6.32	29.00	6.88	21.00	6.44	22.00	6.80	16.00
F131	5.29	13.00	5.22	10.00	6.25	22.50	7.01	32.00	6.52	30.00	6.86	24.50
F133	5.13 L	2.00	5.44	31.00	6.27	24.00	6.83	18.00	6.49	28.00	6.93	31.00
MEDIAN	5.3500		5.2800		6.2260		6.8350		6.4290		6.8100	
1CRIT	0.2000		0.2000		0.2000		0.2000		0.2000		0.2000	
N	35		35		34		34		34		34	
MEAN	5.3735		5.2847		6.2136		6.8521		6.4168		6.8013	
3STDEV	0.4784		0.3410		0.4743		0.6066		0.5000		0.5515	

PARAMETER: 01092 pH pH Units

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	6.50 VL	5.00	6.61 L	6.50	5.90	2.50	6.47	6.00
F002	6.70	10.00	6.80	17.00	6.10	20.50	6.60	13.00
F003	6.60 L	7.00	6.61 L	6.50	5.91	4.00	6.45 L	5.00
F004	6.23 VL	1.00	6.48 VL	2.50	5.90	2.50	6.40 L	3.50
F007	6.88	25.00	6.95	31.00	6.14	24.00	6.82	32.00
F008	6.72	12.00	6.73	10.00	5.94	5.00	6.56	11.00
F009	6.89	27.50	6.87	26.50	6.10	20.50	6.68	24.50
F010	6.88	25.00	6.76	12.50	6.15	25.00	6.66	19.00
F011	6.9	30.00	6.88	28.00	6.17	26.50	6.74	28.00
F014	6.81	18.50	6.82	19.00	6.12	23.00	6.66	19.00
F015	6.81	18.50	6.90	29.50	6.24	31.00	6.79	31.00
F017		0.00		0.00		0.00		0.00
F020	6.32 VL	2.00	6.53 L	4.00	6.04	12.50	6.48	7.00
F025	7.05 H	34.00	7.15 VH	34.00	6.62 VH	35.00	6.66	19.00
F026	6.83	20.50	6.87	26.50	6.22	29.00	6.67	22.50
F032	7.01 H	33.00	6.96	32.00	6.2	28.00	6.75	29.00
F036	6.79	16.00	6.78	14.50	5.97	7.00	6.85	33.00
F037	6.89	27.50	6.84	22.00	6.17	26.50	6.68	24.50
F038	6.33 VL	3.00	6.3 VL	1.00	5.54 EL	1.00	6.16 EL	1.00
F042	6.49 VL	4.00	6.48 VL	2.50	5.96	6.00	6.29 VL	2.00
F049	6.75	13.00	6.81	18.00	5.98	8.00	6.58	12.00
F053	6.95	32.00	7.	33.00	6.23	30.00	6.89 H	34.00
F060	6.65	8.00	6.58 L	5.00	6.02	9.50	6.49	8.00
F071	6.71	11.00	6.76	12.50	6.03	11.00	6.40 L	3.50
F072	7.76 EH	36.00	7.87 EH	36.00	7.41 EH	36.00	7.64 EH	36.00
F074	7.28 VH	35.00	7.32 EH	35.00	6.50 VH	33.00	7.12 EH	35.00
F094	6.69	9.00	6.70	8.50	6.26	32.00	6.52	10.00
F107	6.59 L	6.00	6.70	8.50	6.07	15.50	6.50	9.00
F109	6.776	15.00	6.860	24.50	6.074	17.00	6.656	17.00
F110	6.77	14.00	6.74	11.00	6.05	14.00	6.63	14.00
F112	6.897	29.00	6.839	21.00	6.094	19.00	6.668	21.00
F113	6.88	25.00	6.86	24.50	6.11	22.00	6.67	22.50
F115	6.83	20.50	6.83	20.00	6.09	18.00	6.65	16.00
F116	6.87	22.50	6.85	23.00	6.07	15.50	6.69	26.00
F122	6.80	17.00	6.78	14.50	6.04	12.50	6.64	15.00
F131	6.87	22.50	6.79	16.00	6.02	9.50	6.7	27.00
F133	6.93	31.00	6.90	29.50	6.57 VH	34.00	6.78	30.00
MEDIAN	6.8100		6.8150		6.0920		6.6600	
1CRIT	0.2000		0.2000		0.2000		0.2000	
N	34		34		34		34	
MEAN	6.7836		6.8041		6.1194		6.6410	
3STDEV	0.5679		0.5045		0.5047		0.4725	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	59.00	5.900	10	L L VLL	BIASED LOW*	-3.51	0.0327	Mettler auto
F002	141.00	14.100	10	L				ELECTRODE
F003	80.00	8.000	10	L L L L	BIASED LOW	-9.21	0.4313	pH Electrode
F004	83.50	8.350	10	VH VLL VLL VLVL L	BIASED LOW	-34.06	1.9328	10301
F007	231.50	23.150	10					CPQ004D0
F008	89.50	8.950	10					Autoelectrode
F009	213.00	21.300	10					stirred/Radiometer
F010	209.50	20.950	10					Electrometry
F011	267.00	26.700	10					
F014	154.00	15.400	10					
F015	242.00	24.200	10	H				meter
F017	43.50	21.750	2		INSUFFICIENT DATA			
F020	118.00	11.800	10	H L VLL				pH Meter
F025	275.50	27.550	10	L VHEHEHVHH VHVH				Stirred pH Meter
F026	233.50	23.350	10					RADIOMETER
F032	269.50	26.950	10	H L H				
F036	162.50	16.250	10					
F037	279.00	27.900	10	H				ACCUMET
F038	12.00	1.200	10	ELELELVLELVLVLVLELEL	BIASED LOW	20.90	-1.8879	Meter
F042	100.00	10.000	10	VHH VL L VLVLVL VL				Unstirred
F049	151.50	15.150	10					Stirred
F053	288.00	28.800	10	H H				pH unstirred
F060	132.50	13.250	10	VHH L				pH Meter
F071	96.00	9.600	10	VLVL L L				Ionalyzer
F072	361.00	36.100	10	EHEHEHEHEHEHEHEHEH	BIASED HIGH	-8.24	1.5462	Electrometric
F074	342.50	34.250	10	VH VHVHVHVHVHEHVHEH	BIASED HIGH	15.27	-0.5596	STIRRED, EQUILIBR
F094	108.50	10.850	10	L L				pH Meter
F107	71.50	7.150	10	L L L	BIASED LOW	-6.02	0.2181	ELECTROPO
F109	203.00	20.300	10	H				ELECTRO UNSTIRRED
F110	191.00	19.100	10					stirred/meter
F112	212.00	21.200	10					ELECTRODE STIRRED
F113	234.50	23.450	10					RossElec Unstirred
F115	213.50	21.350	10					unstirred
F116	208.50	20.850	10					Unstirred elect
F122	191.00	19.100	10					HACHONE STIRRED
F131	207.00	20.700	10					stirred
F133	258.50	25.850	10	L VH				ELECTRODE

* 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 18.602

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F038	12.00	1.200	10	ELELELVLELVLVLVLELEL	BIASED LOW	20.90	-1.8879	Meter
F001	59.00	5.900	10	LLVLL	BIASED LOW*	-3.51	0.0327	Mettler auto
F107	71.50	7.150	10	LLL	BIASED LOW	-6.02	0.2181	ELECTROPO
F003	80.00	8.000	10	LLLL	BIASED LOW	-9.21	0.4313	pH Electrode
F004	83.50	8.350	10	VHVLLVLLVLVLL	BIASED LOW	-34.06	1.9328	10301
F008	89.50	8.950	10					Autoelectrode
F071	96.00	9.600	10	VLVLLL				Ionalyzer
F042	100.00	10.000	10	VHHVLLVLVLVLVL				Unstirred
F094	108.50	10.850	10	LL				pH Meter
F020	118.00	11.800	10	HLVLL				pH Meter
F060	132.50	13.250	10	VHHL				pH Meter
F002	141.00	14.100	10	L				ELECTRODE
F049	151.50	15.150	10					Stirred
F014	154.00	15.400	10					
F036	162.50	16.250	10					
F110	191.00	19.100	10					stirred/meter
F122	191.00	19.100	10					HACHONE STIRRED
F109	203.00	20.300	10	H				ELECTRO UNSTIRRED
F131	207.00	20.700	10					stirred
F116	208.50	20.850	10					Unstirred elect
F010	209.50	20.950	10					Electrometry
F112	212.00	21.200	10					ELECTRODE STIRRED
F009	213.00	21.300	10					stirred/Radiometer
F115	213.50	21.350	10					unstirred
F017	43.50	21.750	2		INSUFFICIENT DATA			
F007	231.50	23.150	10					CPQ004D0
F026	233.50	23.350	10					RADIOMETER
F113	234.50	23.450	10					RossElec Unstirred
F015	242.00	24.200	10	H				meter
F133	258.50	25.850	10	LVH				ELECTRODE
F011	267.00	26.700	10					
F032	269.50	26.950	10	HLH				
F025	275.50	27.550	10	LVHEHEHVHHVHVH				Stirred pH Meter
F037	279.00	27.900	10	H				ACCUMET
F053	288.00	28.800	10	HH				pH unstirred
F074	342.50	34.250	10	VHVHVHVHVHVHEHVHEH	BIASED HIGH	15.27	-0.5596	STIRRED, EQUILIBR
F072	361.00	36.100	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	-8.24	1.5462	Electrometric

* 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 18.602

PARAMETER: 06002 Diss Organic Carbon mg/L C

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.5	0.00	<0.5	0.00	2.2	13.00	1.4	4.50	<0.5	0.00	<0.5	0.00
F003	0.2	5.00	0.2	4.50	2.0	5.00	1.5	9.50	0.3	8.00	0.4	4.50
F004	0.185	3.00	0.199	3.00	2.08	7.00	1.49	8.00	0.239	3.00	0.460	7.00
F007	<0.15	0.00	<0.15	0.00	2.10	8.50	1.51	11.00	0.18	2.00	0.38	3.00
F008	<1.	0.00	<1.	0.00	3. H	25.00	3. EH	26.00	<1.	0.00	1.	19.00
F010	<0.1	0.00	<0.1	0.00	2.0	5.00	1.4	4.50	<0.1	0.00	0.2	1.00
F014	<1.0	0.00	<1.0	0.00	2.4	16.00	1.7	17.50	<1.0	0.00	<1.0	0.00
F015	<0.5	0.00	0.6	14.00	3.1 H	26.00	1.8	19.50	0.7 EH	15.50	0.6	12.50
F020	<1.0	0.00	<1.0	0.00	2.0	5.00	1.0 L	1.00	<1.0	0.00	<1.0	0.00
F025	<0.2	0.00	<0.2	0.00	1.9	2.00	1.3	2.00	<0.2	0.00	<0.2	0.00
F026	0.201	6.00	0.0625	1.00	2.125	10.00	1.47	7.00	0.093	1.00	0.278	2.00
F032	<0.2	0.00	<0.1	0.00	1.9	2.00	1.4	4.50	<0.3	0.00	<0.4	0.00
F038	<0.5	0.00	0.5	13.00	2.9 H	24.00	2.	24.00	0.6	14.00	0.8	16.50
F042	0.22	7.00	0.22	7.00	2.17	11.50	1.50	9.50	0.27	6.00	0.48	8.00
F049	0.08 EL	1.00	0.14	2.00	2.59	21.00	1.56	12.00	0.28	7.00	0.53	9.00
F060	<0.5	0.00	<0.5	0.00	1.9	2.00	1.4	4.50	<0.5	0.00	<0.5	0.00
F071	0.311	12.00	0.323	9.00	2.32	15.00	1.68	15.50	0.392	11.00	0.617	14.00
F072	<0.40	0.00	<0.40	0.00	2.10	8.50	2.32 H	25.00	<0.40	0.00	1.37 EH	20.00
F074	0.24	8.00	0.36	11.00	2.52	20.00	1.68	15.50	0.36	9.00	0.6	12.50
F094	<0.5	0.00	0.7 EH	15.00	2.5	18.50	1.8	19.50	0.7 EH	15.50	0.8	16.50
F107	0.30	10.50	0.38	12.00	2.79	23.00	1.91	23.00	0.44	13.00	0.90	18.00
F109	0.19T	4.00	0.21T	6.00	2.69	22.00	1.89	22.00	0.26T	4.50	0.54	10.50
F112	0.17	2.00	0.20	4.50	2.26	14.00	1.64	14.00	0.26	4.50	0.45	6.00
F113	0.28	9.00	0.31	8.00	2.17	11.50	1.61	13.00	0.38	10.00	0.54	10.50
F116	0.30	10.50	0.35	10.00	2.48	17.00	1.82	21.00	0.43	12.00	0.68	15.00
F131	<0.1	0.00	<0.1	0.00	2.5	18.50	1.7	17.50	<0.1	0.00	0.4	4.50
MEDIAN	0.2105		0.3100		2.2300		1.6250		0.3300		0.5400	
1CRIT	0.5000		0.5000		0.5922		0.5469		0.5000		0.5000	
N	10		13		25		24		13		18	
MEAN	0.2286		0.3071		2.3038		1.6450		0.3378		0.5808	
3STDEV	0.1389		0.3838		0.9394		0.6933		0.3212		0.5616	

PARAMETER: 06002 Diss Organic Carbon mg/L C

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.5	0.00	4.1	6.00	<0.5	0.00	2.4	6.00
F003	0.6	4.50	3.7	3.00	0.6	13.00	2.2	3.00
F004	0.635	7.00	4.21	10.50	0.337	5.00	2.38	5.00
F007	0.62	6.00	4.21	10.50	0.24	1.00	2.45	7.50
F008	2. EH	22.00	6. EH	26.00	2. EH	18.00	3.	22.50
F010	0.4	1.50	4.0	5.00	<0.1	0.00	2.3	4.00
F014	<1.0	0.00	4.5	16.50	<1.0	0.00	2.6	14.00
F015	0.8	13.00	4.6	18.00	0.7	15.00	3.0	22.50
F020	<1.0	0.00	3.2 L	2.00	<1.0	0.00	1.7 EL	1.00
F025	0.4	1.50	3.8	4.00	<0.2	0.00	2.1	2.00
F026	0.5045	3.00	4.121	7.00	0.2655	2.00	2.451	9.00
F032	0.7	9.50	4.2	8.00	<0.3	0.00	2.5	10.50
F038	1.1	18.50	5.	24.50	0.8	16.50	3.	22.50
F042	0.70	9.50	4.21	10.50	0.33	4.00	2.45	7.50
F049	0.84	15.00	4.70	20.00	0.38	7.00	2.81	18.00
F060	<0.5	0.00	4.3	14.00	<0.5	0.00	2.5	10.50
F071	0.861	16.00	4.28	13.00	0.456	10.00	2.62	15.00
F072	1.30 H	21.00	4.94	23.00	<0.40	0.00	2.93	20.00
F074	0.78	12.00	4.5	16.50	0.36	6.00	2.76	16.00
F094	1.1	18.50	2.9 EL	1.00	0.8	16.50	2.8	17.00
F107	1.11	20.00	4.89	21.00	0.61	14.00	3.03	25.00
F109	0.81	14.00	4.92	22.00	0.39	8.00	2.91	19.00
F112	0.66	8.00	4.32	15.00	0.41	9.00	2.57	13.00
F113	0.74	11.00	4.21	10.50	0.47	11.00	2.56	12.00
F116	0.88	17.00	4.66	19.00	0.49	12.00		0.00
F131	0.6	4.50	5.	24.50	0.3	3.00	3.	22.50
MEDIAN	0.7600		4.2900		0.4330		2.5700	
1CRIT	0.5000		0.7467		0.5000		0.6177	
N	19		24		16		23	
MEAN	0.8074		4.3571		0.4812		2.6213	
3STDEV	0.6184		1.3032		0.4998		0.7969	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	29.50	7.375	4		INSUFFICIENT DATA			SHIMADZU
F003	60.00	6.000	10		BIASED LOW	-13.81	0.0238	UVDig/IRDetect
F004	58.50	5.850	10		BIASED LOW*	-1.19	-0.0925	06104
F007	49.50	6.188	8					NAQ06104
F008	158.50	22.643	7	H EH EHEHEH	BIASED HIGH	7.21	0.9507	Calculation
F010	21.00	3.500	6		BIASED LOW*	1.70	-0.3199	Conductimetry
F014	64.00	16.000	4		INSUFFICIENT DATA			
F015	156.00	17.333	9	H EH				AutoCarbAnalyzer
F020	9.00	2.250	4	L L EL	INSUFFICIENT DATA			
F025	11.50	2.300	5		BIASED LOW*	-4.59	-0.2897	Persulfate IR
F026	48.00	4.800	10		BIASED LOW*	1.32	-0.1903	AUTOANALYSER
F032	34.50	6.900	5					
F038	173.50	19.278	9	H	BIASED HIGH	11.50	0.2341	Combustion IR
F042	80.50	8.050	10					IR
F049	112.00	11.200	10	EL				Combustion IR
F060	31.00	7.750	4		INSUFFICIENT DATA			Persulfa/UV Color
F071	130.50	13.050	10					Persulfate oxid.
F072	117.50	19.583	6	H EHH	BIASED HIGH	-5.15	0.5939	Persulfate/UV oxid
F074	126.50	12.650	10					PERSUL, IR DETECT
F094	138.00	15.333	9	EH EH EL				Infrared
F107	179.50	17.950	10		BIASED HIGH	12.38	0.1415	ELECTROPO
F109	132.00	13.200	10					UV OXIDATION - IR
F112	90.00	9.000	10					DOHRMAN
F113	106.50	10.650	10					UV-persulfate-IR
F116	133.50	14.833	9					Persulfate/IR
F131	95.00	13.571	7					UV asst persulfate

* 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 11.388

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F020	9.00	2.250	4	LLEL	INSUFFICIENT DATA			
F025	11.50	2.300	5		BIASED LOW*	-4.59	-0.2897	Persulfate IR
F010	21.00	3.500	6		BIASED LOW*	1.70	-0.3199	Conductimetry
F026	48.00	4.800	10		BIASED LOW*	1.32	-0.1903	AUTOANALYSER
F004	58.50	5.850	10		BIASED LOW*	-1.19	-0.0925	06104
F003	60.00	6.000	10		BIASED LOW	-13.81	0.0238	UVDig/IRDetect
F007	49.50	6.188	8					NAQ06104
F032	34.50	6.900	5					
F002	29.50	7.375	4		INSUFFICIENT DATA			SHIMADZU
F060	31.00	7.750	4		INSUFFICIENT DATA			Persulfa/UV Color
F042	80.50	8.050	10					IR
F112	90.00	9.000	10					DOHRMAN
F113	106.50	10.650	10					UV-persulfate-IR
F049	112.00	11.200	10	EL				Combustion IR
F074	126.50	12.650	10					PERSUL, IR DETECT
F071	130.50	13.050	10					Persulfate oxid.
F109	132.00	13.200	10					UV OXIDATION - IR
F131	95.00	13.571	7					UV asst persulfate
F116	133.50	14.833	9					Persulfate/IR
F094	138.00	15.333	9	EHEHEL				Infrared
F014	64.00	16.000	4		INSUFFICIENT DATA			
F015	156.00	17.333	9	HEH				AutoCarbAnalyzer
F107	179.50	17.950	10		BIASED HIGH	12.38	0.1415	ELECTROPO
F038	173.50	19.278	9	H	BIASED HIGH	11.50	0.2341	Combustion IR
F072	117.50	19.583	6	HEHH	BIASED HIGH	-5.15	0.5939	Persulfate/UV oxid
F008	158.50	22.643	7	HEHEHEHEH	BIASED HIGH	7.21	0.9507	Calculation

* 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 11.388

PARAMETER: 06592 Diss Inorg Carbon mg/L C

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.4	9.00	0.4	10.00	0.6	11.50	1.5	17.00	0.8	11.50	1.8	17.00
F007	0.25	6.00	0.30	7.00	0.46	7.00	1.38	12.00	0.63	7.00	1.53	10.00
F008	<1.	0.00	<1.	0.00	1. EH	14.00	1.	2.00	1. EH	14.00	2. H	19.00
F010	0.2	3.00	0.2	5.00	0.4	5.00	1.4	13.50	0.5	3.00	1.5	9.00
F015	<0.5	0.00	<0.5	0.00	<0.5	0.00	1.4	13.50	<0.5	0.00	1.6	13.50
F025	<0.5	0.00	<0.5	0.00	<0.5	0.00	1.0	2.00	<0.5	0.00	1.2	3.50
F026	0.09	2.00	0.14	3.00	0.34	2.50	1.28	6.00	0.505	4.00	1.455	8.00
F032	<0.2	0.00	<0.2	0.00	<0.2	0.00	1.	2.00	<0.2 EL	0.00	1.2	3.50
F036	0.34	8.00	0.34	8.00	0.56	9.00	1.42	15.00	0.7	9.00	1.6	13.50
F038	<0.5	0.00	<0.5	0.00	<0.5	0.00	1.2	5.00	<0.5	0.00	1.1 L	1.00
F049	0.26	7.00	0.25	6.00	0.41	6.00	1.35	10.00	0.64	8.00	1.45	7.00
F060	<0.5	0.00	<0.5	0.00	<0.5	0.00	1.3	7.50	<0.5	0.00	1.3	5.00
F071	0.440	11.00	0.383	9.00	0.582	10.00	1.45	16.00	0.702	10.00	1.55	11.00
F074	0.24	5.00	0.12	2.00	0.36	4.00	1.32	9.00	0.48	2.00	1.56	12.00
F094	<0.5	0.00	<0.5	0.00	0.5	8.00	1.3	7.50	0.6	6.00	1.4	6.00
F107	0.W	1.00	0.02	1.00	0.21	1.00	1.09	4.00	0.36	1.00	1.15 L	2.00
F112	0.22	4.00	0.19	4.00	0.34	2.50	1.36	11.00	0.58	5.00	1.65	16.00
F113	0.49	12.00	0.51	12.00	0.60	11.50	1.6	18.00	0.8	11.50	1.61	15.00
F116	0.43	10.00	0.43	11.00	0.65	13.00	1.61	19.00	0.83	13.00	1.89	18.00
MEDIAN	0.2550		0.2750		0.4800		1.3500		0.6350		1.5300	
1CRIT	0.3000		0.3000		0.3000		0.3638		0.3101		0.3773	
N	10		10		12		18		12		17	
MEAN	0.2870		0.2753		0.4835		1.2972		0.6472		1.4968	
3STDEV	0.3212		0.3173		0.3241		0.5119		0.3495		0.5914	

PARAMETER: 06592 Diss Inorg Carbon mg/L C

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	1.6 H	19.00	1.8	18.00	0.7	11.00	1.2	17.00
F007	1.25	11.00	1.46	12.00	0.49	4.50	1.06	12.00
F008	1.	5.00	1. L	1.00	<1.	0.00	1.	8.50
F010	1.2	9.00	1.4	7.50	0.5	6.00	1.0	8.50
F015	1.3	12.50	1.5	13.50	<0.5	0.00	0.8	4.00
F025	0.9	2.00	1.2	4.00	<0.5	0.00	0.8	4.00
F026	1.20	9.00	1.445	11.00	0.365	3.00	1.00	8.50
F032	1.	5.00	1.2	4.00	<0.2 EL	0.00	1.	8.50
F036	1.32	15.50	1.52	15.50	0.58	9.00	1.1	14.00
F038	0.8 L	1.00	1.1	2.00	<0.5	0.00	0.7	1.00
F049	1.17	7.00	1.44	9.50	0.49	4.50	1.04	11.00
F060	1.0	5.00	1.2	4.00	<0.5	0.00	0.8	4.00
F071	1.31	14.00	1.50	13.50	0.545	8.00	1.11	15.00
F074	1.32	15.50	1.44	9.50	0.36	2.00	1.08	13.00
F094	1.2	9.00	1.4	7.50	<0.5	0.00	0.9	6.00
F107	0.94	3.00	1.21	6.00	0.19 EL	1.00	0.77	2.00
F112	1.30	12.50	1.52	15.50	0.53	7.00	1.12	16.00
F113	1.39	17.00	1.53	17.00	0.69	10.00	1.21	18.00
F116	1.59 H	18.00	1.84 H	19.00	0.76	12.00		0.00
MEDIAN	1.2000		1.4400		0.5150		1.0000	
1CRIT	0.3525		0.3705		0.3011		0.3375	
N	17		17		10		16	
MEAN	1.1994		1.4038		0.5250		0.9862	
3STDEV	0.5298		0.5043		0.3248		0.3882	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	141.00	14.100	10	H	BIASED HIGH	13.88	0.0915	IR detection
F007	88.50	8.850	10					NAQ06180
F008	63.50	9.071	7	EH EHH L				Auto DNR
F010	69.50	6.950	10					Conductimetry
F015	57.00	11.400	5					AutoCarbAnalyzer
F025	15.50	3.100	5		BIASED LOW	-17.91	-0.0505	Infared
F026	57.00	5.700	10					AUTOANALYSER
F032	23.00	4.600	5	EL EL				
F036	116.50	11.650	10					
F038	10.00	2.000	5	L L	BIASED LOW	-10.02	-0.1934	Combustion IR
F049	76.00	7.600	10					
F060	25.50	5.100	5					Auto Colorimetric
F071	117.50	11.750	10					CO2 generation
F074	74.00	7.400	10					IR DETECTOR
F094	50.00	7.143	7					Infrared
F107	22.00	2.200	10	L EL	BIASED LOW*	-1.56	-0.2605	ELECTROPO
F112	93.50	9.350	10					DOHRMAN
F113	142.00	14.200	10		BIASED HIGH	-5.24	0.2205	Phosphoric acid/IR
F116	133.00	14.778	9	H H	BIASED HIGH	16.61	0.1193	Persulfate/IR

* 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 8.703

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F038	10.00	2.000	5	LL	BIASED LOW	-10.02	-0.1934	Combustion IR
F107	22.00	2.200	10	LEL	BIASED LOW*	-1.56	-0.2605	ELECTROPO
F025	15.50	3.100	5		BIASED LOW	-17.91	-0.0505	Infared
F032	23.00	4.600	5	ELEL				
F060	25.50	5.100	5					Auto Colorimetric
F026	57.00	5.700	10					AUTOANALYSER
F010	69.50	6.950	10					Conductimetry
F094	50.00	7.143	7					Infrared
F074	74.00	7.400	10					IR DETECTOR
F049	76.00	7.600	10					
F007	88.50	8.850	10					NAQ06180
F008	63.50	9.071	7	EHEHHL				Auto DNR
F112	93.50	9.350	10					DOHRMAN
F015	57.00	11.400	5					AutoCarbAnalyzer
F036	116.50	11.650	10					
F071	117.50	11.750	10					CO2 generation
F003	141.00	14.100	10	H	BIASED HIGH	13.88	0.0915	IR detection
F113	142.00	14.200	10		BIASED HIGH	-5.24	0.2205	Phosphoric acid/IR
F116	133.00	14.778	9	HH	BIASED HIGH	16.61	0.1193	Persulfate/IR

* 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 8.703

PARAMETER: 06193 Alkalinity Fixed End mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
BURLINGTON ONTARIO

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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.19 H	9.00	2.12 H	9.00	3.61 VH	10.00	7.51 H	10.00	4.14 VH	9.00	7.82 H	10.00
F007	1.5	6.50	1.2	4.00	2.5	5.00	6.5	6.00	2.9	4.00	6.7	6.00
F008	1.1	4.00	1.04	2.00	2.39	4.00	6.25	5.00	35.1 EH	11.00	6.39	5.00
F011	<0.3 EL	0.00	<0.3 EL	0.00	1.2 EL	1.00	5.1 VL	2.00	1.7 VL	1.00	5.2 VL	2.00
F014	1.57	8.00	1.53	8.00	2.90	8.00	6.52	7.00	3.23	7.00	6.76	7.00
F025	0.62 VL	1.00	1.1	3.00	2.97	9.00	8.17 VH	11.00	3.96 H	8.00	8.04 VH	11.00
F032	1.4	5.00	1.4	5.50	2.6	6.00	6.6	8.00	3.	5.00	6.8	8.50
F036	1.5	6.50	1.45	7.00	2.8	7.00	6.65	9.00	3.2	6.00	6.8	8.50
F038	<1.0	0.00	<1.0	0.00	<1.0 EL	0.00	3. EL	1.00	<1.0 VL	0.00	3.7 EL	1.00
F060	15. EH	10.00	13. EH	10.00	16. EH	11.00	19. EH	12.00	17. VH	10.00	19. EH	12.00
F094	1.0	2.00	1.4	5.50	2.2	3.00	6.1	4.00	2.8	3.00	6.1	4.00
F107	1.01	3.00	1.02	1.00	2.12	2.00	5.80	3.00	2.58 L	2.00	6.05	3.00
MEDIAN	1.4500		1.4000		2.6000		6.5100		3.2000		6.7300	
1CRIT	0.5000		0.5000		0.5550		0.7505		0.5850		0.7615	
N	8		8		9		10		9		10	
MEAN	1.4088		1.4050		2.6767		6.5200		4.7567		6.6660	
3STDEV	1.0995		0.9470		1.2956		2.4206		13.0678		2.3604	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	6.93 H	10.00	8.09 H	10.00	3.19 H	9.00	6.07 H	10.00
F007	5.8	6.00	7.1	6.00	2.4	6.50	5.0	6.00
F008	5.65	5.00	6.8	4.00	2.06	4.00	4.8	5.00
F011	4.4 VL	2.00	5.6 VL	2.00	0.8 EL	1.00	3.6 VL	2.00
F014	6.03	9.00	7.18	8.00	2.57	8.00	5.30	7.00
F025	7.05 VH	11.00	8.17 H	11.00	3.34 VH	10.00	5.44	8.00
F032	6.	7.50	7.2	9.00	2.4	6.50	5.6	9.00
F036	6.	7.50	7.15	7.00	2.35	5.00	6.1 H	11.00
F038	3.1 EL	1.00	4.2 EL	1.00	<1.0 VL	0.00	2.5 EL	1.00
F060	19. EH	12.00	19. EH	12.00	16. EH	11.00	19. EH	12.00
F094	5.1 L	3.00	7.0	5.00	1.9	3.00	4.7	4.00
F107	5.25	4.00	6.29 L	3.00	1.86	2.00	4.45 L	3.00
MEDIAN	5.9000		7.1250		2.4000		5.1500	
1CRIT	0.7200		0.7812		0.5450		0.6825	
N	10		10		9		10	
MEAN	5.8210		7.0580		2.4522		5.1060	
3STDEV	2.2735		2.1492		1.4737		2.1796	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	96.00	9.600	10	H H VHH VHH H H H H	BIASED HIGH	4.45	0.7316	Titration
F007	56.00	5.600	10					CPQ005E0
F008	49.00	4.900	10	EH				Autoelectrode
F011	13.00	1.625	8	ELELELVLVLVLVLVLELVL	BIASED LOW*	0.16	-1.5099	
F014	77.00	7.700	10					
F025	83.00	8.300	10	VL VHH VHVHH VH				NOTFOUND
F032	70.00	7.000	10					
F036	74.50	7.450	10	H				
F038	5.00	1.000	5	ELELVLELELELVLEL	BIASED LOW	-22.55	-1.5659	Titration
F060	112.00	11.200	10	EHEHEHEHVHEHEHEHEHEH	BIASED HIGH	-11.73	13.4518	Potentio Titration
F094	36.50	3.650	10	L				Autotitrater
F107	26.00	2.600	10	L L L	BIASED LOW	-5.75	-0.3595	ELECTROPO

* 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 6.177

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F038	5.00	1.000	5	ELELVLELELELVLEL	BIASED LOW	-22.55	-1.5659	Titration
F011	13.00	1.625	8	ELELELVLVLVLVLVLELVL	BIASED LOW*	0.16	-1.5099	
F107	26.00	2.600	10	LLL	BIASED LOW	-5.75	-0.3595	ELECTROPO
F094	36.50	3.650	10	L				Autotitrater
F008	49.00	4.900	10	EH				Autoelectrode
F007	56.00	5.600	10					CPQ005E0
F032	70.00	7.000	10					
F036	74.50	7.450	10	H				
F014	77.00	7.700	10					
F025	83.00	8.300	10	VLVHHVHVHHVH				NOTFOUND
F001	96.00	9.600	10	HHVHHVHHHHHH	BIASED HIGH	4.45	0.7316	Titration
F060	112.00	11.200	10	EHEHEHEHVHEHEHEHEHEH	BIASED HIGH	-11.73	13.4518	Potentio 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 6.177

PARAMETER: 06194 Alkalinity Gran Infl mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003		0.00		0.00	1.0	3.00	4.9	2.00	1.7	3.50	5.1	3.00
F010	0.2	3.00	<0.1	0.00	1.2	4.00	5.3	4.00	1.7	3.50	5.3	4.00
F015	<0.5	0.00	<0.50	0.00	3.6 EH	6.00	7.4 EH	6.00	3.9 EH	6.00	7.6 EH	6.00
F020		0.00		0.00	0.83	1.00	5.31	5.00	3.65 EH	5.00	4.42 L	1.00
F026	-0.1600T	1.00	-0.2500T	1.00	0.9550	2.00	4.3350 L	1.00	1.5650	1.00	4.5450 L	2.00
F122	-0.098	2.00	-0.08	2.00	1.25	5.00	4.92	3.00	1.66	2.00	5.35	5.00
MEDIAN	-0.0980				1.1000		5.1100		1.7000		5.2000	
1CRIT	0.3500		0.3500		0.3500		0.5305		0.3600		0.5350	
N	1		2		4		4		4		4	
MEAN	-0.0980		-0.1650		1.1012		5.1075		2.1775		5.0738	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	4.69	3.00	5.5	3.00	0.96	3.00	4.0	4.00
F010	4.7	4.00	5.7	5.00	0.9	2.00	3.6	3.00
F015	6.9 EH	6.00	8.0 EH	6.00	3.3 EH	6.00	5.7 EH	5.00
F020	5.18	5.00	2.84 EL	1.00	1.25	5.00	5.75 EH	6.00
F026	3.7750 VL	1.00	4.7100 L	2.00	0.6950	1.00	2.620 EL	1.00
F122	4.47	2.00	5.54	4.00	0.98	4.00	3.56	2.00
MEDIAN	4.6950		5.5200		0.9700		3.8000	
1CRIT	0.5098		0.5510		0.3500		0.4650	
N	4		4		4		4	
MEAN	4.7600		5.3625		1.0225		4.2150	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	24.50	3.062	8					PotentioTitration
F010	32.50	3.611	9					Titrn conduct.
F015	47.00	5.875	8	EHEHEHEHEHEHEHEH				10101
F020	29.00	3.625	8	EHL EL EH				ElectromGransPlot
F026	13.00	1.300	10	L L VLL EL				TITROPROCESSOR
F122	31.00	3.100	10					4.5/4.2 potentio

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

OVERALL AVERAGE
RANK IS 3.340

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F026	13.00	1.300	10	LLVLLEL				TITROPROCESSOR
F003	24.50	3.062	8					PotentioTitration
F122	31.00	3.100	10					4.5/4.2 potentio
F010	32.50	3.611	9					Titrn conduct.
F020	29.00	3.625	8	EHLELEH				ElectromGransPlot
F015	47.00	5.875	8	EHEHEHEHEHEHEHEH				10101

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

OVERALL AVERAGE
RANK IS 3.340

PARAMETER: 06282 Alkalinity Gran Titn mg/L CaCO3

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	-0.14	7.50	-0.11	11.00	1.17	8.00	4.93	3.00	1.45	3.00	5.20	4.00
F003	-0.17	5.00	0.02	14.00		0.00		0.00		0.00		0.00
F007	-0.21	3.00	-0.25	4.00	1.16	5.00	5.26	12.50	1.60	7.00	5.38	11.00
F014	0.166	14.00	-0.062	12.00	1.53 H	14.00	5.10	7.50	1.72	11.00	5.48	12.00
F036	-0.12	9.00	-0.23	7.00	1.1	3.00	4.92	2.00	1.59	6.00	5.14	3.00
F042	-0.14	7.50	-0.18	9.00	1.17	8.00	5.12	10.00	1.61	8.00	5.35	9.00
F071	-0.443	1.00	-0.516	1.00	0.809 L	1.00	5.110	9.00	1.323	1.00	5.352	10.00
F072	0.40 EH	16.00	0.60 EH	16.00	1.50	13.00	5.70 EH	15.00	2.40 EH	15.00	5.90 EH	15.00
F074	0.3 H	15.00	0.1	15.00	1.4	12.00	5.3	14.00	1.8	14.00	5.5	13.00
F109	-0.268	2.00	-0.245	5.00	1.165	6.00	4.662 EL	1.00	1.445	2.00	4.875 EL	1.00
F110	-0.18	4.00	-0.30	3.00	1.17	8.00	5.06	6.00	1.63	9.00	5.26	8.00
F112	-0.049	11.00	-0.122	10.00	1.285	11.00	5.175	11.00	1.632	10.00	5.226	6.00
F113	0.04	13.00	-0.4	2.00	1.15	4.00	5.1	7.50	1.54	5.00	5.22	5.00
F115	-0.11	10.00	-0.19	8.00	1.00	2.00	5.00	4.00	1.47	4.00	5.12	2.00
F116	-0.168	6.00	-0.242	6.00	1.94 EH	15.00	5.26	12.50	1.74	12.50	5.51	14.00
F131	0.03	12.00	-0.03	13.00	1.22	10.00	5.05	5.00	1.74	12.50	5.25	7.00
MEDIAN	-0.1300		-0.1850		1.1700		5.1000		1.6100		5.2600	
1CRIT	0.3500		0.3500		0.3585		0.5550		0.3805		0.5630	
N	14		14		13		13		13		13	
MEAN	-0.0728		-0.1601		1.2323		5.1065		1.6128		5.3068	
3STDEV	0.4532		0.3894		0.4488		0.3452		0.3335		0.3826	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	4.32	2.00	5.60	6.00	0.90	10.00	3.57	5.00
F003		0.00		0.00		0.00		0.00
F007	4.49	9.00	5.86	13.00	0.78	5.00	3.53	4.00
F014	4.57	12.00	5.84	12.00	0.964	12.00	3.77	11.00
F036	4.36	3.00	5.49	3.00	0.76	3.00	4.43 EH	15.00
F042	4.48	8.00	5.77	9.00	0.81	7.50	3.68	8.00
F071	4.409	5.00	5.554	5.00	0.423 EL	1.00	3.469	2.00
F072	4.60	13.00	6.30 EH	15.00	1.50 EH	15.00	4.10	14.00
F074	4.7	15.00	6.1	14.00	1.1	14.00	4.0	13.00
F109	3.985 EL	1.00	5.340	1.00	0.798	6.00	3.428	1.00
F110	4.38	4.00	5.70	8.00	0.70	2.00	3.69	9.00
F112	4.418	6.00	5.674	7.00	0.841	9.00	3.670	7.00
F113	4.5	10.00	5.83	11.00	1.04	13.00	3.9	12.00
F115	4.52	11.00	5.52	4.00	0.81	7.50	3.50	3.00
F116	4.68	14.00	5.79	10.00	0.77	4.00	3.71	10.00
F131	4.47	7.00	5.46	2.00	0.93	11.00	3.62	6.00
MEDIAN	4.4800		5.7000		0.8100		3.6800	
1CRIT	0.5240		0.5850		0.3500		0.4840	
N	13		13		13		13	
MEAN	4.4767		5.7068		0.8618		3.7084	
3STDEV	0.2924		0.5267		0.3396		0.5526	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	59.50	5.950	10					TITRATION
F003	19.00	9.500	2		INSUFFICIENT DATA			
F007	73.50	7.350	10					CPQ003E0
F014	117.50	11.750	10	H				
F036	54.00	5.400	10	EH				
F042	84.00	8.400	10					Anc gran plot
F071	36.00	3.600	10	L EL	BIASED LOW	6.19	-0.3708	Automatic Titrator
F072	147.00	14.700	10	EHEH EHEHEH EHEH	BIASED HIGH*	-2.46	0.6182	Titration
F074	139.00	13.900	10	H	BIASED HIGH*	-0.58	0.2966	AUTOTITRATOR
F109	26.00	2.600	10	EL ELEL	BIASED LOW	-6.87	-0.0421	RADIOMETER
F110	61.00	6.100	10					gran alk to 3.5
F112	88.00	8.800	10					ELECTRODE TITRATN
F113	82.50	8.250	10					Gran titration
F115	55.50	5.550	10					0.005N HCl
F116	104.00	10.400	10	EH				Manual titration
F131	85.50	8.550	10					7 pt. potent.

* 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 8.105

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F109	26.00	2.600	10	ELELEL	BIASED LOW	-6.87	-0.0421	RADIOMETER
F071	36.00	3.600	10	LEL	BIASED LOW	6.19	-0.3708	Automatic Titrator
F036	54.00	5.400	10	EH				
F115	55.50	5.550	10					0.005N HCl
F002	59.50	5.950	10					TITRATION
F110	61.00	6.100	10					gran alk to 3.5
F007	73.50	7.350	10					CPQ003E0
F113	82.50	8.250	10					Gran titration
F042	84.00	8.400	10					Anc gran plot
F131	85.50	8.550	10					7 pt. potent.
F112	88.00	8.800	10					ELECTRODE TITRATN
F003	19.00	9.500	2		INSUFFICIENT DATA			
F116	104.00	10.400	10	EH				Manual titration
F014	117.50	11.750	10	H				
F074	139.00	13.900	10	H	BIASED HIGH*	-0.58	0.2966	AUTOTITRATOR
F072	147.00	14.700	10	EHEHEHEHEHEHEH	BIASED HIGH*	-2.46	0.6182	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 8.105

PARAMETER: 07092 Nitrate + Nitrite mg/L N

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.259	5.00	0.515	13.00	0.007	3.00	<0.002	0.00	0.695	11.00	1.426	12.00
F003	0.286	25.00	0.559	27.00	<0.010	0.00	<0.010	0.00	0.733	23.50	1.50	25.00
F004	0.272	19.00	0.484	3.00	<0.010	0.00	<0.010	0.00	0.682	9.00	1.41	8.50
F007	0.26	9.50	0.49	4.00	<0.04	0.00	<0.04	0.00	0.68	7.00	1.44	15.50
F008	0.26	9.50	0.53	20.00	0.01	7.50	<0.01	0.00	0.72	21.00	1.47	18.50
F009	0.26	9.50	0.51	9.50	<0.05	0.00	<0.05	0.00	0.70	13.00	1.44	15.50
F010	0.24	1.00	0.51	9.50	<0.02	0.00	<0.02	0.00	0.68	7.00	1.40	6.00
F011	0.256	4.00	0.512	12.00	<0.008	0.00	<0.008	0.00	0.708	17.00	1.39	3.00
F014	0.29 H	26.50	0.56	28.00	<0.05	0.00	<0.05	0.00	0.74	27.00	1.50	25.00
F015	0.260	9.50	0.495	5.00	0.009	6.00	<0.002	0.00	0.638 L	3.00	1.3 L	2.00
F020	0.26	9.50	0.35 EL	1.00	<0.02	0.00	<0.02	0.00	0.59 EL	2.00	1.41	8.50
F025	0.263	14.00	0.523	19.00	0.004 L	1.00	<0.002	0.00	0.702	15.00	1.473	21.00
F026	0.264	15.50	0.5315	21.00	0.012	9.50	0.0075	5.00	0.724	22.00	1.485	23.00
F032	0.275	20.50	0.5	6.00	<0.010	0.00	<0.005	0.00	0.78 H	29.00	1.54	27.50
F036	0.276	22.00	0.532	22.00	<0.008	0.00	<0.004	0.00	0.736	25.50	1.48	22.00
F037	0.3590 EH	28.00	0.7480 EH	29.00	<0.2	0.00	0.0231 EH	7.00	0.4647 EL	1.00	1.1857 EL	1.00
F038	0.28	23.00	0.551	26.00	0.007	3.00	<0.005	0.00	0.736	25.50	1.5	25.00
F042	0.26	9.50	0.46 L	2.00	0.20 EH	13.00	0.	1.00	0.66	4.00	1.40	6.00
F060	0.44 EH	29.00	0.52	16.50	0.08 EH	12.00	<0.05	0.00	0.68	7.00	1.40	6.00
F068	0.267	17.00	0.534	23.00		0.00		0.00	0.733	23.50	1.470	18.50
F071	0.270	18.00	0.519	14.00	0.012	9.50	0.009	6.00	0.704	16.00	1.399	4.00
F072	0.275	20.50	0.550	25.00	<0.050	0.00	<0.050	0.00	0.751	28.00	1.471	20.00
F074	0.264	15.50	0.520	16.50	0.007	3.00	0.001	2.00	0.700	13.00	1.430	13.50
F094	0.250	2.50	0.504	7.00	<0.006	0.00	<0.006	0.00	0.675	5.00	1.42	10.50
F107	0.26	9.50	0.52	16.50	0.01	7.50	0.W	0.00	0.71	18.50	1.54	27.50
F113	0.29 H	26.50	0.52	16.50	0.02 VH	11.00	0.002	3.50	0.69	10.00	1.43	13.50
F118	0.26	9.50	0.51	9.50	0.01W	0.00	0.01W	0.00	0.71	18.50	1.46	17.00
F122	0.285	24.00	0.535	24.00	0.008	5.00	0.002	3.50	0.717	20.00	1.56 H	29.00
F133	0.25	2.50	0.51	9.50	<0.01	0.00	<0.01	0.00	0.70	13.00	1.42	10.50
MEDIAN OR *TARGET CONC.	0.2640		0.5200		0.0100		*0.0050		0.7020		1.4400	
1CRIT	0.0257		0.0462		0.0054		0.0050		0.0608		0.1198	
N	27		27		11		5		27		27	
MEAN	0.2708		0.5187		0.0165		0.0043		0.6998		1.4446	
3STDEV	0.0617		0.0666		0.0611		-		0.1006		0.1524	

PARAMETER: 07092 Nitrate + Nitrite mg/L N

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.667	8.00	0.156	13.50	0.944	13.00	0.861	15.50
F003	0.700	25.00	0.163	21.00	0.965	20.00	0.878	20.00
F004	0.676	15.00	0.159	17.00	0.894	4.00	0.825	4.00
F007	0.66	6.50	0.14	3.50	0.95	15.50	0.85	10.50
F008	0.67	11.50	0.15	8.50	0.96	17.50	0.87	17.50
F009	0.69	22.00	0.17	26.00	0.96	17.50	0.88	21.50
F010	0.66	6.50	0.14	3.50	0.93	8.50	0.84	7.50
F011	0.682	18.50	0.146	7.00	0.949	14.00	0.861	15.50
F014	0.72	29.00	0.18 H	28.00	1.01	28.50	0.92	28.00
F015	0.623	2.00	0.156	13.50	0.879	2.00	0.788	3.00
F020	0.68	17.00	0.17	26.00	0.93	8.50	0.84	7.50
F025	0.688	20.50	0.157	15.50	0.985	24.00	0.896	25.00
F026	0.682	18.50	0.1505	10.00	0.976	23.00	0.873	19.00
F032	0.695	24.00	0.155	11.50	1.01	28.50	0.885	24.00
F036	0.694	23.00	0.166	23.00	0.97	21.00	0.88	21.50
F037	0.3816 EL	1.00	0.0357 EL	1.00	0.6522 EL	1.00	0.5851 EL	1.00
F038	0.701	26.00	0.167	24.00	0.989	25.00	0.898	26.00
F042	0.67	11.50	0.14	3.50	0.89	3.00	0.66 EL	2.00
F060	0.63	3.00	0.14	3.50	0.90	5.00	0.84	7.50
F068	0.688	20.50	0.163	21.00	0.964	19.00	0.883	23.00
F071	0.677	16.00	0.157	15.50	0.940	11.00	0.856	13.00
F072	0.716	28.00	0.163	21.00	1.007	27.00	0.921	29.00
F074	0.670	11.50	0.155	11.50	0.930	8.50	0.860	14.00
F094	0.632	5.00	0.141	6.00	0.942	12.00	0.854	12.00
F107	0.71	27.00	0.16	18.50	1.00	26.00	0.87	17.50
F113	0.67	11.50	0.17	26.00	0.92	6.00	0.83	5.00
F118	0.67	11.50	0.16	18.50	0.95	15.50	0.85	10.50
F122	0.631	4.00	0.187 VH	29.00	0.973	22.00	0.914	27.00
F133	0.67	11.50	0.15	8.50	0.93	8.50	0.84	7.50
MEDIAN OR *TARGET CONC.	0.6760		0.1570		0.9500		0.8610	
1CRIT	0.0587		0.0172		0.0806		0.0735	
N	27		27		26		27	
MEAN	0.6741		0.1565		0.9472		0.8556	
3STDEV	0.0703		0.0317		0.0976		0.1421	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	94.00	10.444	9					Cd red auto colour
F003	186.50	23.313	8		BIASED HIGH*	2.71	0.0079	Cd reduction
F004	79.50	9.938	8					07110
F007	72.00	9.000	8					CPQ103E2
F008	131.50	14.611	9					FIA
F009	134.50	16.813	8					TRAACS
F010	49.50	6.188	8		BIASED LOW*	-1.45	-0.0111	Hydrazine SO4
F011	91.00	11.375	8					
F014	220.00	27.500	8	H H	BIASED HIGH*	3.31	0.0207	
F015	46.00	5.111	9	L L	BIASED LOW	-10.11	0.0147	IC
F020	80.00	10.000	8	EL EL				Auto Cd Red
F025	155.00	17.222	9	L				Low Level IC
F026	166.50	16.650	10					AUTOANALYSER
F032	171.00	21.375	8	H				
F036	180.00	22.500	8		BIASED HIGH*	2.22	0.0050	
F037	70.00	7.778	9	EHEH EHELELELELELEL				I.C. WATERS
F038	203.50	22.611	9		BIASED HIGH*	4.04	0.0026	IC
F042	55.50	5.550	10	L EH EL	BIASED LOW	-11.44	0.0396	IC
F060	89.50	9.944	9	EH EH				Auto Colorimetric
F068	165.50	20.688	8					IC, Dionex
F071	123.00	12.300	10					Colorimetric
F072	198.50	24.813	8		BIASED HIGH*	2.91	0.0152	AA Cd reduction
F074	109.00	10.900	10					COLOUR AUTO
F094	60.00	7.500	8					Colorimetry
F107	168.50	18.722	9					IC
F113	129.50	12.950	10	H VH				FIA Lachat
F118	110.50	13.813	8					I.C.
F122	187.50	18.750	10	H VH				Colourimetric
F133	71.50	8.938	8					I.C.

* 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 14.282

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F015	46.00	5.111	9	LL	BIASED LOW	-10.11	0.0147	IC
F042	55.50	5.550	10	LEHEL	BIASED LOW	-11.44	0.0396	IC
F010	49.50	6.188	8		BIASED LOW*	-1.45	-0.0111	Hydrazine SO4
F094	60.00	7.500	8					Colorimetry
F037	70.00	7.778	9	EHEHEHELELELELELEL				I.C. WATERS
F133	71.50	8.938	8					I.C.
F007	72.00	9.000	8					CPQ103E2
F004	79.50	9.938	8					07110
F060	89.50	9.944	9	EHEH				Auto Colorimetric
F020	80.00	10.000	8	ELEL				Auto Cd Red
F001	94.00	10.444	9					Cd red auto colour
F074	109.00	10.900	10					COLOUR AUTO
F011	91.00	11.375	8					
F071	123.00	12.300	10					Colorimetric
F113	129.50	12.950	10	HVH				FIA Lachat
F118	110.50	13.813	8					I.C.
F008	131.50	14.611	9					FIA
F026	166.50	16.650	10					AUTOANALYSER
F009	134.50	16.813	8					TRAACS
F025	155.00	17.222	9	L				Low Level IC
F107	168.50	18.722	9					IC
F122	187.50	18.750	10	HVH				Colourimetric
F068	165.50	20.688	8					IC, Dionex
F032	171.00	21.375	8	H				
F036	180.00	22.500	8		BIASED HIGH*	2.22	0.0050	
F038	203.50	22.611	9		BIASED HIGH*	4.04	0.0026	IC
F003	186.50	23.313	8		BIASED HIGH*	2.71	0.0079	Cd reduction
F072	198.50	24.813	8		BIASED HIGH*	2.91	0.0152	AA Cd reduction
F014	220.00	27.500	8	HH	BIASED HIGH*	3.31	0.0207	

* 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 14.282

Nitrate + Nitrite

PARAMETER: 07093 Nitrate-IC mg/L N

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.275	26.00	0.523	19.50	0.007	8.00	<0.001	0.00	0.710	22.00	1.381	7.00
F002	0.25	4.50	0.51	10.50	<0.02	0.00	<0.02	0.00	0.7	12.50	1.27 L	2.00
F009	0.26	11.00	0.49	5.00	<0.05	0.00	<0.05	0.00	0.67	6.50	1.34	4.00
F010	0.27	20.50	0.52	17.00	0.01	11.00	0.01 H	7.00	0.71	22.00	1.48	26.00
F012	0.24	2.50	0.51	10.50	<0.01	0.00	<0.01	0.00	0.7	12.50	1.45	19.00
F014	0.29 H	30.00	0.56	31.00	<0.05	0.00	<0.05	0.00	0.74	31.00	1.50	27.50
F015	0.260	11.00	0.495	6.00	0.009	9.00	<0.002	0.00	0.638 L	3.00	1.3 L	3.00
F017	0.273	23.00	0.533	25.50	0.010W	0.00	0.010W	0.00	0.699	8.00	1.431	16.00
F020	0.273	23.00	0.39 EL	2.00	0.006	6.50	<0.002	0.00	0.61 EL	2.00	1.52	30.00
F025	0.263	16.00	0.523	19.50	0.004	3.50	<0.002	0.00	0.702	17.00	1.473	24.50
F032	0.26	11.00	0.5	7.00	<0.01	0.00	<0.01	0.00	0.7	12.50	1.46	20.00
F037	0.0700 EL	1.00	0.2461 EL	1.00	<0.2	0.00	<0.2	0.00	0.4647 EL	1.00	1.1857 EL	1.00
F038	0.28	28.00	0.551	30.00	0.005	5.00	<0.005	0.00	0.736	30.00	1.5	27.50
F042	0.26	11.00	0.46 L	3.00	0.20 EH	16.00	0.	3.00	0.66	4.00	1.40	9.00
F049	0.27	20.50	0.54	28.50	0.05W	0.00	0.05W	0.00	0.73	27.50	1.51	29.00
F053	0.26	11.00	0.54	28.50	0.01T	11.00	<0.00	0.00	0.73	27.50	1.44	18.00
F060	0.28	28.00	0.53	23.50	<0.05	0.00	<0.05	0.00	0.72	24.50	1.41	11.50
F068	0.267	19.00	0.534	27.00		0.00		0.00	0.733	29.00	1.470	22.50
F071	0.274	25.00	0.515	14.00	<0.016	0.00	<0.016	0.00	0.703	18.00	1.432	17.00
F074	0.264	17.00	0.520	17.00	0.006	6.50	0.001	6.00	0.700	12.50	1.430	14.50
F094	0.240	2.50	0.483	4.00	<0.006	0.00	<0.006	0.00	0.662	5.00	1.41	11.50
F107	0.26	11.00	0.52	17.00	0.01	11.00	0.W	0.00	0.71	22.00	1.54	31.00
F109	0.2658	18.00	0.5185	15.00	0.0T L	1.50	0.0T	3.00	0.7093	20.00	1.473	24.50
F110	0.26	11.00	0.51	10.50	0.02T VH	14.00	0.02T EH	8.00	0.7	12.50	1.37	5.00
F112	0.26	11.00	0.53	23.50	0.00 L	1.50	0.00	3.00	0.70	12.50	1.43	14.50
F113	0.28	28.00	0.51	10.50	0.06 EH	15.00	0.0	3.00	0.67	6.50	1.38	6.00
F115	0.273	23.00	0.533	25.50	0.004	3.50	0.000	3.00	0.724	26.00	1.463	21.00
F116	0.257	6.00	0.528	21.00	0.015 VH	13.00		0.00	0.700	12.50	1.404	10.00
F118	0.26	11.00	0.51	10.50	0.01W	0.00	0.01W	0.00	0.72	24.50	1.47	22.50
F131	0.291 H	31.00	0.529	22.00	<0.02	0.00	<0.02	0.00	0.709	19.00	1.392	8.00
F133	0.25	4.50	0.51	10.50	<0.01	0.00	<0.01	0.00	0.70	12.50	1.42	13.00
MEDIAN OR *TARGET CONC.	0.2630		0.5200		*0.0070		*0.0040		0.7000		1.4310	
1CRIT	0.0256		0.0462		0.0052		0.0050		0.0606		0.1191	
N	29		29		13		7		29		29	
MEAN	0.2646		0.5126		0.0128		0.0016		0.6985		1.4279	
3STDEV	0.0340		0.0889		0.0429		0.0104		0.0841		0.1754	

PARAMETER: 07093 Nitrate-IC mg/L N

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.667	10.00	0.159	13.50	0.952	18.00	0.865	18.00
F002	0.68	19.50	0.15	6.00	0.95	16.00	0.70 VL	3.00
F009	0.65	5.50	0.17	27.00	0.88	3.00	0.82	6.50
F010	0.69	25.00	0.15	6.00	0.98	24.50	0.88	23.00
F012	0.65	5.50	0.14 L	3.50	0.94	11.50	0.85	11.50
F014	0.72	30.00	0.18 H	29.00	1.01	30.00	0.92	31.00
F015	0.623	2.00	0.156	10.00	0.879	2.00	0.788	4.00
F017	0.66	8.00	0.16	19.50	0.942	13.00	0.859	15.00
F020	0.74 EH	31.00	0.16	19.50	1.03	31.00	0.90	29.50
F025	0.688	22.50	0.157	11.00	0.985	26.00	0.896	27.00
F032	0.67	14.00	0.16	19.50	0.97	22.00	0.85	11.50
F037	0.3649 EL	1.00	0.0357 EL	1.00	0.6522 EL	1.00	0.5573 EL	2.00
F038	0.701	28.00	0.167	26.00	0.989	27.00	0.898	28.00
F042	0.67	14.00	0.12 EL	2.00	0.89	4.00	0.43 EL	1.00
F049	0.70	27.00	0.16	19.50	0.99	28.00	0.88	23.00
F053	0.69	25.00	0.16	19.50	0.98	24.50	0.9	29.50
F060	0.69	25.00	0.16	19.50	0.96	20.00	0.88	23.00
F068	0.688	22.50	0.163	25.00	0.964	21.00	0.883	25.50
F071	0.655	7.00	0.177	28.00	0.945	14.00	0.855	14.00
F074	0.670	14.00	0.155	9.00	0.930	7.50	0.860	16.00
F094	0.625	3.00	0.140 L	3.50	0.901	5.00	0.814	5.00
F107	0.71	29.00	0.16	19.50	1.00	29.00	0.87	20.00
F109	0.6717	17.00	0.1549	8.00	0.9544	19.00	0.8646	17.00
F110	0.68	19.50	0.16	19.50	0.94	11.50	0.87	20.00
F112	0.68	19.50	0.16	19.50	0.95	16.00	0.87	20.00
F113	0.64	4.00	0.19 VH	30.00	0.92	6.00	0.82	6.50
F115	0.680	19.50	0.158	12.00	0.972	23.00	0.883	25.50
F116	0.662	9.00	0.159	13.50	0.932	10.00	0.841	9.00
F118	0.67	14.00	0.16	19.50	0.95	16.00	0.85	11.50
F131	0.668	11.00	0.197 EH	31.00	0.931	9.00	0.850	11.50
F133	0.67	14.00	0.15	6.00	0.93	7.50	0.84	8.00
MEDIAN OR *TARGET CONC.	0.6700		0.1600		0.9500		0.8600	
1CRIT	0.0582		0.0174		0.0806		0.0734	
N	29		29		29		29	
MEAN	0.6731		0.1585		0.9488		0.8446	
3STDEV	0.0666		0.0372		0.0997		0.2013	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	142.00	15.778	9					IC
F002	74.00	9.250	8	L VL				I.C.
F009	68.50	8.562	8					Dionex
F010	182.00	18.200	10	H				IC
F012	76.50	9.562	8	L				IC
F014	239.50	29.938	8	H H	BIASED HIGH*	4.03	0.0178	
F015	50.00	5.556	9	L L	BIASED LOW	-9.65	0.0137	IC
F017	128.00	16.000	8					
F020	174.50	19.389	9	EL EL EH				IC
F025	167.00	18.556	9					Low Level IC
F032	117.50	14.688	8					
F037	9.00	1.125	8	ELEL ELELELELELEL	BIASED LOW	-9.11	-0.1839	I.C. WATERS
F038	229.50	25.500	9		BIASED HIGH*	4.65	0.0007	IC
F042	67.00	6.700	10	L EH EL EL	BIASED LOW	-14.39	0.0328	IC
F049	203.00	25.375	8		BIASED HIGH	5.68	-0.0112	IC Dionex
F053	194.50	21.611	9					Ion Chromatography
F060	175.00	21.875	8					IC
F068	191.50	23.938	8		BIASED HIGH*	2.65	0.0001	IC, Dionex
F071	137.00	17.125	8					Ion Chromatograph
F074	120.00	12.000	10					COLOUR AUTO
F094	39.50	4.938	8	L	BIASED LOW*	-0.68	-0.0302	IC
F107	189.50	21.056	9					IC
F109	143.00	14.300	10	L				DIONEX
F110	131.50	13.150	10	VHEH				IC Dionex
F112	141.00	14.100	10	L				DIONEX IC
F113	115.50	11.550	10	EH VH				Dionex IC
F115	182.00	18.200	10					IC
F116	104.00	11.556	9	VH				Dionex IC
F118	129.50	16.188	8					I.C.
F131	142.50	17.813	8	H EH				Ion Chromatography
F133	76.00	9.500	8					I.C.

* 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 15.221

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F037	9.00	1.125	8	ELELELELELELELEL	BIASED LOW	-9.11	-0.1839	I.C. WATERS
F094	39.50	4.938	8	L	BIASED LOW*	-0.68	-0.0302	IC
F015	50.00	5.556	9	LL	BIASED LOW	-9.65	0.0137	IC
F042	67.00	6.700	10	LEHELEL	BIASED LOW	-14.39	0.0328	IC
F009	68.50	8.562	8					Dionex
F002	74.00	9.250	8	LVL				I.C.
F133	76.00	9.500	8					I.C.
F012	76.50	9.562	8	L				IC
F113	115.50	11.550	10	EHVH				Dionex IC
F116	104.00	11.556	9	VH				Dionex IC
F074	120.00	12.000	10					COLOUR AUTO
F110	131.50	13.150	10	VHEH				IC Dionex
F112	141.00	14.100	10	L				DIONEX IC
F109	143.00	14.300	10	L				DIONEX
F032	117.50	14.688	8					
F001	142.00	15.778	9					IC
F017	128.00	16.000	8					
F118	129.50	16.188	8					I.C.
F071	137.00	17.125	8					Ion Chromatograph
F131	142.50	17.813	8	HEH				Ion Chromatography
F010	182.00	18.200	10	H				IC
F115	182.00	18.200	10					IC
F025	167.00	18.556	9					Low Level IC
F020	174.50	19.389	9	ELELEH				IC
F107	189.50	21.056	9					IC
F053	194.50	21.611	9					Ion Chromatography
F060	175.00	21.875	8					IC
F068	191.50	23.938	8		BIASED HIGH*	2.65	0.0001	IC, Dionex
F049	203.00	25.375	8		BIASED HIGH	5.68	-0.0112	IC Dionex
F038	229.50	25.500	9		BIASED HIGH*	4.65	0.0007	IC
F014	239.50	29.938	8	HH	BIASED HIGH*	4.03	0.0178	

* 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 15.221

Nitrate-IC

PARAMETER: 07192 Ammonia mg/L N

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.178	23.00	<0.001	0.00	0.032	21.00	<0.001	0.00	<0.001	0.00	<0.001	0.00
F003	0.175	20.00	<0.005	0.00	0.032	21.00	0.005	7.00	0.005	7.50	0.006	9.00
F004	0.157	7.00	0.005	7.50	0.032	21.00	<0.005	0.00	0.006	9.00	0.007	10.50
F007	0.166	14.50	<0.010	0.00	0.026	11.50	<0.010	0.00	<0.010	0.00	<0.010	0.00
F008	0.128 VL	2.00	0.004	6.00	0.024	7.50	<0.002	0.00	0.003	6.00	0.003	6.00
F010	0.02 EL	1.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F011	0.136 L	3.00	<0.002	0.00	0.02	4.50	<0.002	0.00	<0.002	0.00	<0.002	0.00
F012	0.27 EH	33.00	0.07 EH	12.00	0.69 EH	28.00	0.1 EH	12.00	0.09 EH	12.00	0.02 EH	15.00
F014	0.163	9.50	<0.010	0.00	0.017 L	2.00	<0.010	0.00	<0.010	0.00	<0.010	0.00
F015	0.179	24.00	<0.005	0.00	0.028	15.50	<0.005	0.00	<0.005	0.00	<0.005	0.00
F017	0.174	19.00	0.006W	0.00	0.027	13.50	0.006W	0.00	0.006W	0.00	0.006W	0.00
F020	0.163	9.50	<0.008	0.00	0.023	6.00	<0.008	0.00	<0.008	0.00	<0.008	0.00
F025	0.18	26.50	<0.01	0.00	<0.01 VL	0.00	<0.01	0.00	<0.01	0.00	<0.01	0.00
F026	0.1661	16.00	0.0017	5.00	0.0257	10.00	0.0004	3.00	0.0009	4.00	0.0008	3.00
F032	0.17	17.50	<0.002	0.00	0.028	15.50	0.01	9.50	<0.002	0.00	0.01	13.50
F036	0.182	29.00	<0.003	0.00	0.04 H	24.50	0.007	8.00	<0.004	0.00	0.005	7.50
F038	0.164	11.00	<0.005	0.00	0.027	13.50	<0.005	0.00	<0.005	0.00	<0.005	0.00
F042	0.17	17.50	0.0T	2.00	0.02W	0.00	0.0T	1.50	0.0T	2.00	0.0T	1.50
F053	0.16	8.00	<0.02	0.00	0.02	4.50	<0.02	0.00	<0.02	0.00	<0.02	0.00
F060	0.144	5.00	<0.005	0.00	<0.005 EL	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F068	0.177	22.00		0.00	0.026	11.50		0.00		0.00		0.00
F071	0.184	30.00	<0.005	0.00	0.034	23.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F072	0.180	26.50	<0.010	0.00	0.030	17.00	<0.010	0.00	<0.010	0.00	<0.010	0.00
F074	0.165	12.50	0.	2.00	0.025	9.00	0.	1.50	0.	2.00	0.	1.50
F094	0.149	6.00	0.005	7.50	0.031	18.50	<0.005	0.00	<0.005	0.00	0.007	10.50
F107	0.166	14.50	0.001	4.00	0.031	18.50	0.004	5.50	0.001	5.00	0.001	4.00
F109	0.1895	31.00	0.0T	2.00	0.041T VH	26.00	0.004T	5.50	0.01T	10.00	0.009T	12.00
F113	0.18	26.50	0.02 VH	11.00	0.04 H	24.50	0.01	9.50	0.0	2.00	0.01	13.50
F115	0.165	12.50	0.006	9.00	0.024	7.50	0.001	4.00	0.005	7.50	0.005	7.50
F116	0.140 L	4.00		0.00	0.019T	3.00		0.00		0.00		0.00
F118	0.18T	26.50	0.01W	0.00	0.01T VL	1.00	0.01W	0.00	0.01W	0.00	0.01W	0.00
F122	0.219 VH	32.00	0.0181 VH	10.00	0.0433 VH	27.00	0.0354 VH	11.00	0.0119 H	11.00	0.0029	5.00
F131	0.176	21.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
MEDIAN OR *TARGET CONC.	0.1700		0.0045		0.0275		0.0045		0.0040		0.0050	
1CRIT	0.0265		0.0060		0.0087		0.0060		0.0060		0.0060	
N	31		11		26		9		11		12	
MEAN	0.1686		0.0055		0.0287		0.0085		0.0039		0.0056	
3STDEV	0.0516		0.0202		0.0203		0.0301		0.0119		0.0092	

PARAMETER: 07192 Ammonia mg/L N

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.202	30.50	<0.001	0.00	<0.001	0.00	<0.001	0.00
F003	0.186	16.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F004	0.163	4.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F007	0.180	12.00	<0.010	0.00	<0.010	0.00	<0.010	0.00
F008	0.141 EL	2.00	0.005	6.50	0.003	5.00	0.008	6.00
F010	0.05 EL	1.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F011	0.153 L	3.00	<0.002	0.00	<0.002	0.00	<0.002	0.00
F012	0.21	33.00	0.04 EH	11.00	0.02 EH	8.50	<0.01	0.00
F014	0.180	12.00	<0.010	0.00	<0.010	0.00	<0.010	0.00
F015	0.198	26.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F017	0.189	17.00	0.006W	0.00	0.006W	0.00	0.006W	0.00
F020	0.194	23.00	<0.008	0.00	<0.008	0.00	<0.008	0.00
F025	0.19	19.50	<0.01	0.00	<0.01	0.00	<0.01	0.00
F026	0.1798	9.00	0.0002	3.00	0.0006	3.00	0.0008	3.00
F032	0.196	24.50	<0.008	0.00	<0.006	0.00	<0.008	0.00
F036	0.199	27.00	0.006	8.00	<0.004	0.00	<0.003	0.00
F038	0.196	24.50	<0.005	0.00	<0.005	0.00	0.01	8.00
F042	0.18	12.00	0.0T	1.50	0.0T	1.50	0.0T	1.50
F053	0.18	12.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F060	0.182	15.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F068	0.201	28.50		0.00		0.00		0.00
F071	0.193	22.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F072	0.190	19.50	<0.010	0.00	<0.010	0.00	<0.010	0.00
F074	0.190	19.50	0.	1.50	0.	1.50	0.	1.50
F094	0.175	7.00	<0.005	0.00	<0.005	0.00	0.009	7.00
F107	0.173	6.00	0.002	5.00	0.W	0.00	0.002	4.50
F109	0.203	32.00	0.001T	4.00	0.011T H	7.00	0.0291 EH	11.00
F113	0.19	19.50	0.02 VH	10.00	0.02 EH	8.50	0.02 VH	10.00
F115	0.179	8.00	0.005	6.50	0.005	6.00	0.002	4.50
F116	0.165	5.00		0.00		0.00		0.00
F118	0.18T	12.00	0.01W	0.00	0.01W	0.00	0.01W	0.00
F122	0.202	30.50	0.0068	9.00	0.0025	4.00	0.0104	9.00
F131	0.201	28.50	<0.02	0.00	<0.02	0.00	<0.02	0.00
MEDIAN OR *TARGET CONC.	0.1890		0.0050		0.0030		*0.0050	
1CRIT	0.0289		0.0060		0.0060		0.0063	
N	31		8		5		8	
MEAN	0.1849		0.0057		0.0044		0.0078	
3STDEV	0.0437		0.0175		-		0.0177	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	74.50	24.833	3		INSUFFICIENT DATA			IC
F003	80.50	13.417	6					Alkaline phenol
F004	59.00	9.833	6					07540
F007	38.00	12.667	3		INSUFFICIENT DATA			CPQ117E0
F008	47.00	5.222	9	VL EL	BIASED LOW	-25.57	0.0010	Autocolormetric
F010	2.00	1.000	2	EL EL	INSUFFICIENT DATA			Colim. Berthelot
F011	10.50	3.500	3	L L	INSUFFICIENT DATA			
F012	164.50	18.278	9	EHEHEHEHEHEH EHEH	BIASED HIGH	-20.92	0.1315	Technicon
F014	23.50	7.833	3	L	INSUFFICIENT DATA			
F015	65.50	21.833	3		INSUFFICIENT DATA			07557
F017	49.50	16.500	3		INSUFFICIENT DATA			
F020	38.50	12.833	3		INSUFFICIENT DATA			IC
F025	46.00	23.000	2	VL	INSUFFICIENT DATA			Autophenate
F026	59.00	5.900	10		BIASED LOW*	-1.62	-0.0037	AUTOANALYSER
F032	80.50	16.100	5					
F036	104.00	17.333	6	H				
F038	57.00	14.250	4		INSUFFICIENT DATA			Colourimetric
F042	41.00	4.556	9		BIASED LOW*	-0.01	-0.0048	Colourimetric
F053	24.50	8.167	3		INSUFFICIENT DATA			FIA Phenate method
F060	20.00	10.000	2	EL	INSUFFICIENT DATA			Digest/Colorimetry
F068	62.00	20.667	3		INSUFFICIENT DATA			IC, Dionex
F071	75.00	25.000	3		INSUFFICIENT DATA			Colorimetric
F072	63.00	21.000	3		INSUFFICIENT DATA			A analyzer phenate
F074	52.50	5.250	10		BIASED LOW*	1.66	-0.0047	COLOUR AUTO
F094	56.50	9.417	6					Colorimetry
F107	67.00	7.444	9		BIASED LOW*	-4.39	-0.0020	COLOR
F109	140.50	14.050	10	VH H EH				FIA- PHENATE
F113	135.00	13.500	10	VHH VHEHVH				FIA Lachat
F115	73.00	7.300	10		BIASED LOW*	-3.96	-0.0007	Auto-Analyzer
F116	12.00	4.000	3	L	INSUFFICIENT DATA			Auto/colorimetric
F118	39.50	13.167	3	VL	INSUFFICIENT DATA			I.C.
F122	148.50	14.850	10	VHVHVHVHH				Colourimetric
F131	49.50	24.750	2		INSUFFICIENT DATA			Ion Chromatography

* 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 11.699

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	2.00	1.000	2	ELEL	INSUFFICIENT DATA			Colim. Berthelot
F011	10.50	3.500	3	LL	INSUFFICIENT DATA			
F116	12.00	4.000	3	L	INSUFFICIENT DATA			Auto/colorimetric
F042	41.00	4.556	9		BIASED LOW*	-0.01	-0.0048	Colourimetric
F008	47.00	5.222	9	VLEL	BIASED LOW	-25.57	0.0010	Autocolormetric
F074	52.50	5.250	10		BIASED LOW*	1.66	-0.0047	COLOUR AUTO
F026	59.00	5.900	10		BIASED LOW*	-1.62	-0.0037	AUTOANALYSER
F115	73.00	7.300	10		BIASED LOW*	-3.96	-0.0007	Auto-Analyzer
F107	67.00	7.444	9		BIASED LOW*	-4.39	-0.0020	COLOR
F014	23.50	7.833	3	L	INSUFFICIENT DATA			
F053	24.50	8.167	3		INSUFFICIENT DATA			FIA Phenate method
F094	56.50	9.417	6					Colorimetry
F004	59.00	9.833	6					07540
F060	20.00	10.000	2	EL	INSUFFICIENT DATA			Digest/Colorimetry
F007	38.00	12.667	3		INSUFFICIENT DATA			CPQ117E0
F020	38.50	12.833	3		INSUFFICIENT DATA			IC
F118	39.50	13.167	3	VL	INSUFFICIENT DATA			I.C.
F003	80.50	13.417	6					Alkaline phenol
F113	135.00	13.500	10	VHHVHEHVH				FIA Lachat
F109	140.50	14.050	10	VHHEH				FIA- PHENATE
F038	57.00	14.250	4		INSUFFICIENT DATA			Colourimetric
F122	148.50	14.850	10	VHVHVHVHH				Colourimetric
F032	80.50	16.100	5					
F017	49.50	16.500	3		INSUFFICIENT DATA			
F036	104.00	17.333	6	H				
F012	164.50	18.278	9	EHEHEHEHEHEHEHEH	BIASED HIGH	-20.92	0.1315	Technicon
F068	62.00	20.667	3		INSUFFICIENT DATA			IC, Dionex
F072	63.00	21.000	3		INSUFFICIENT DATA			A analyzer phenate
F015	65.50	21.833	3		INSUFFICIENT DATA			07557
F025	46.00	23.000	2	VL	INSUFFICIENT DATA			Autophenate
F131	49.50	24.750	2		INSUFFICIENT DATA			Ion Chromatography
F001	74.50	24.833	3		INSUFFICIENT DATA			IC
F071	75.00	25.000	3		INSUFFICIENT DATA			Colorimetric

* 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 11.699

Ammonia

PARAMETER: 07392 Total Kjeldahl N mg/L N

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.183	4.00	<0.014 VL	0.00	0.155	3.00	0.061	2.00	<0.014 VL	0.00	<0.014 EL	0.00
F008	0.3 EH	11.00	0.2 EH	5.00	0.2	8.50	0.2 EH	8.00	0.2 EH	5.00	0.2 EH	7.00
F014	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00
F020	0.17	2.50	<0.04 L	0.00	0.05 EL	1.00	<0.04 EL	0.00	<0.04	0.00	<0.04 L	0.00
F025	0.22	8.50	<0.05	0.00	0.18	5.50	0.08	4.00	<0.05	0.00	0.06	3.00
F032	0.22	8.50	<0.06	0.00	0.2	8.50	0.1	6.50	<0.08	0.00	0.12	6.00
F038	0.24	10.00	0.08	2.50	0.18	5.50	0.1	6.50	0.07	4.00	0.09	4.00
F060	0.06 EL	1.00	<0.05	0.00	<0.05 EL	0.00	<0.05	0.00	<0.05	0.00	<0.05 L	0.00
F072	0.21	6.50	0.11	4.00	0.31 EH	10.00	<0.10	0.00	<0.10	0.00	0.10	5.00
F074	0.2	5.00	0.03 VL	1.00	0.17	4.00	0.08	4.00	0.01 VL	1.50	0.01 EL	2.00
F094	0.17	2.50	<0.05	0.00	0.19	7.00	0.08	4.00	0.06	3.00	<0.05 L	0.00
F107	0.21	6.50	0.08	2.50	0.13 L	2.00	0.04 EL	1.00	0.01 VL	1.50	0.W	1.00
MEDIAN	0.2100		0.0800		0.1800		0.0800		0.0600		0.0900	
1CRIT	0.0527		0.0333		0.0483		0.0333		0.0302		0.0347	
N	9		3		8		6		2		5	
MEAN	0.2026		0.0900		0.1756		0.0835		0.0650		0.0760	
3STDEV	0.0680		-		0.0668		0.0404		-		-	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.250	4.00	0.121	3.00	0.027	2.00	0.113	4.00
F008	0.4 EH	12.00	0.2 H	9.50	<0.2	0.00	0.2 VH	9.00
F014	0.28	7.00	<0.20	0.00	<0.20	0.00	<0.20	0.00
F020	0.31	8.50	0.09 L	1.50	<0.04	0.00	0.13	5.50
F025	0.32	10.00	0.16	6.00	0.05	4.00	0.13	5.50
F032	0.34 H	11.00	0.2 H	9.50	0.14 EH	7.00	0.22 VH	10.00
F038	0.27	6.00	0.17	7.00	0.07	5.00	0.16	8.00
F060	0.24	2.50	<0.05 EL	0.00	<0.05	0.00	0.06 VL	2.00
F072	0.24	2.50	0.13	4.50	<0.10	0.00	0.14	7.00
F074	0.26	5.00	0.13	4.50	0.01 L	1.00	0.055 VL	1.00
F094	0.31	8.50	0.19 H	8.00	0.10 VH	6.00	0.41 EH	11.00
F107	0.22	1.00	0.09 L	1.50	0.03	3.00	0.09	3.00
MEDIAN	0.2750		0.1450		0.0500		0.1300	
1CRIT	0.0625		0.0430		0.0288		0.0408	
N	10		6		5		9	
MEAN	0.2820		0.1502		0.0554		0.1381	
3STDEV	0.1020		0.0749		-		0.1421	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	22.00	3.143	7	VL VLEL				BlockDig/Phenol
F008	75.00	8.333	9	EHEH EHEHEHEHH VH	BIASED HIGH	-16.14	0.1169	FIA
F014	7.00	7.000	1		INSUFFICIENT DATA			
F020	19.00	3.800	5	L ELEL L L				Colourimetric
F025	46.50	5.812	8					Block Dig-Tech
F032	67.00	8.375	8	H H EHVH	BIASED HIGH*	-7.85	0.0589	
F038	58.50	5.850	10					Digestion - SIE
F060	5.50	1.833	3	EL EL L EL VL	INSUFFICIENT DATA			ICP
F072	39.50	5.643	7	EH				AA block digestion
F074	29.00	2.900	10	VL VLEL L VL	BIASED LOW	18.11	-0.0580	UV DIG COLOUR
F094	50.00	6.250	8	L H VHEH				Colorimetry
F107	23.00	2.300	10	L ELVL L	BIASED LOW*	-1.25	-0.0384	COLOR

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 10.00

OVERALL AVERAGE
RANK IS 5.140

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F060	5.50	1.833	3	ELELLELVL	INSUFFICIENT DATA			ICP
F107	23.00	2.300	10	LELVLL	BIASED LOW*	-1.25	-0.0384	COLOR
F074	29.00	2.900	10	VLVLELLVL	BIASED LOW	18.11	-0.0580	UV DIG COLOUR
F003	22.00	3.143	7	VLVLEL				BlockDig/Phenol
F020	19.00	3.800	5	LELELLL				Colourimetric
F072	39.50	5.643	7	EH				AA block digestion
F025	46.50	5.812	8					Block Dig-Tech
F038	58.50	5.850	10					Digestion - SIE
F094	50.00	6.250	8	LHVHEH				Colorimetry
F014	7.00	7.000	1		INSUFFICIENT DATA			
F008	75.00	8.333	9	EHEHEHEHEHEHHVH	BIASED HIGH	-16.14	0.1169	FIA
F032	67.00	8.375	8	HHEHVH	BIASED HIGH*	-7.85	0.0589	

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 10.00

OVERALL AVERAGE
RANK IS 5.140

PARAMETER: 11091 Sodium mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.058	24.00	0.043	26.00	0.657	31.00	1.217	24.00	0.227	24.00	0.167	28.50
F002	<0.05	0.00	<0.05	0.00	0.64	26.50	1.23	30.00	0.20	6.50	0.15	13.50
F003	0.05	18.00	0.02	2.00	0.62	19.50	1.22	26.50	0.22	18.50	0.15	13.50
F007	<0.020	0.00	<0.020	0.00	0.618	16.00	1.22	26.50	0.201	9.00	0.130	2.50
F008	<0.2	0.00	<0.2	0.00	0.6	11.50	1.2	20.50	0.2	6.50	<0.2	0.00
F009	0.05	18.00	0.04	21.00	0.63	24.00	1.19	18.00	0.23	26.00	0.16	22.50
F010	0.04	5.50	0.02	2.00	0.58	8.00	1.08 L	7.00	0.21	11.50	0.14	7.50
F011	0.05	18.00	0.03	9.50	0.62	19.50	1.15	11.00	0.22	18.50	0.16	22.50
F012	0.05	18.00	0.04	21.00	0.65	29.00	1.28 H	33.00	0.24	29.50	0.15	13.50
F014	<0.10	0.00	<0.10	0.00	0.43 EL	2.00	0.81 EL	1.00	0.16 L	1.00	0.12	1.00
F015	<0.1	0.00	<0.1	0.00	0.4 EL	1.00	1. VL	2.00	<0.1 EL	0.00	<0.1 EL	0.00
F017	0.047	10.00	0.034	14.00	0.623	22.00	1.214	23.00	0.225	22.50	0.153	18.00
F020	0.005 EL	1.00	0.03	9.50	0.66	32.50	1.31 H	35.00	0.22	18.50	0.16	22.50
F025	0.046	9.00	0.042	24.50	0.694 H	35.00	1.439 EH	36.00	0.271 H	33.00	0.201 H	32.00
F026	0.065	28.00	0.065	28.00	0.636	25.00	1.221	29.00	0.240	29.50	0.167	28.50
F032	0.06	26.00	0.042	24.50	0.656	30.00	1.27	32.00	0.234	28.00	0.164	27.00
F036	0.045	8.00	0.03	9.50	0.61	14.00	1.2	20.50	0.21	11.50	0.15	13.50
F037	0.2538 EH	30.00	0.6725 EH	30.00	0.9221 EH	36.00	1.023 VL	4.00	0.3210 EH	34.00	0.4094 EH	33.00
F038	0.05	18.00	0.03	9.50	0.57	6.50	1.11 L	10.00	0.2	6.50	0.14	7.50
F042	0.06	26.00	0.04	21.00	0.64	26.50	1.20	20.50	0.23	26.00	0.16	22.50
F049	0.05	18.00	0.03	9.50	0.60	11.50	1.16	12.00	0.23	26.00	0.16	22.50
F053	0.048	12.00	0.037	16.50	0.6	11.50	1.181	17.00	0.216	15.00	0.15	13.50
F060	<0.6	0.00	<0.6	0.00	0.6	11.50	1.2	20.50	<0.6	0.00	<0.6	0.00
F068	0.043	7.00	0.033	13.00	0.617	15.00	1.265	31.00	0.215	14.00	0.148	10.00
F071	0.048	12.00	0.022	5.00	0.552 L	5.00	1.017 VL	3.00	0.184	3.00	0.134	4.00
F072	0.03	3.50	0.02	2.00	0.49 VL	3.00	1.08 L	7.00	0.18	2.00	0.13	2.50
F074	0.05	18.00	0.04	21.00	0.57	6.50	1.08 L	7.00	0.21	11.50	0.15	13.50
F094	0.08	29.00	0.08 EH	29.00	0.68	34.00	1.29 H	34.00	0.27 H	32.00	0.19	31.00
F107	0.06	26.00	0.05	27.00	0.66	32.50	1.17	13.00	0.25	31.00	0.18	30.00
F109	0.03	3.50	0.021T	4.00	0.62	19.50	1.18	16.00	0.21	11.50	0.14	7.50
F110	0.05	18.00	0.04	21.00	0.62	19.50	1.22	26.50	0.22	18.50	0.16	22.50
F112	0.04	5.50	0.03	9.50	0.55 L	4.00	1.03 VL	5.00	0.20	6.50	0.14	7.50
F115	0.053	23.00	0.038	18.00	0.619	17.00	1.175	14.50	0.218	16.00	0.152	17.00
F116	0.048	12.00	0.035T	15.00	0.643	28.00	1.22	26.50	0.223	21.00	0.154	19.00
F131	0.027	2.00	0.024	6.00	0.586	9.00	1.095 L	9.00	0.192	4.00	0.136	5.00
F133	0.050	18.00	0.037	16.50	0.625	23.00	1.175	14.50	0.225	22.50	0.162	26.00
MEDIAN	0.0500		0.0360		0.6200		1.1950		0.2200		0.1520	
1CRIT	0.0400		0.0400		0.0608		0.0838		0.0448		0.0421	
N	28		29		34		34		32		31	
MEAN	0.0492		0.0360		0.6108		1.1727		0.2194		0.1545	
3STDEV	0.0317		0.0384		0.1515		0.2397		0.0616		0.0472	

PARAMETER: 11091 Sodium mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.287	26.00	2.136	30.00	0.161	27.00	1.852	29.00
F002	0.28	22.00	2.11	28.50	0.15	16.00	1.86	30.00
F003	0.28	22.00	2.04	21.00	0.15	16.00	1.80	24.50
F007	0.263	12.00	2.02	16.50	0.140	8.00	1.72	10.00
F008	0.3	31.50	2.1	27.00	<0.2	0.00	1.8	24.50
F009	0.29	28.50	2.05	22.50	0.19	31.00	1.76	15.50
F010	0.25	6.00	1.89 L	3.00	0.15	16.00	1.68	8.00
F011	0.28	22.00	2.	11.00	0.15	16.00	1.74	12.50
F012	0.26	10.50	2.2 VH	34.50	0.13	4.50	1.92 H	33.00
F014	0.22 L	3.00	1.96	8.00	0.12	2.50	1.77	17.50
F015	0.2 EL	2.00	2.0	11.00	<0.1 EL	0.00	1.6 VL	3.00
F017	0.276	18.50	2.05	22.50	0.152	20.00	1.787	22.00
F020	0.31	33.00	2.20 VH	34.50	0.17	30.00	2.06 VH	35.00
F025	0.269	13.50	2.741 EH	36.00	0.192	32.00	2.423 EH	36.00
F026	0.288	27.00	2.081	25.00	0.163	28.00	1.800	24.50
F032	0.292	30.00	2.16 H	32.00	0.16	24.50	1.9 H	32.00
F036	0.27	16.00	2.08	24.00	0.145	10.50	1.81	27.00
F037	0.3556 EH	35.00	2.082	26.00	0.1692	29.00	1.488 VL	1.00
F038	0.25	6.00	1.93	6.00	0.14	8.00	1.67	5.50
F042	0.29	28.50	2.03	20.00	0.16	24.50	1.78	20.50
F049	0.27	16.00	1.98	9.00	0.15	16.00	1.73	11.00
F053	0.269	13.50	2.02	16.50	0.145	10.50	1.76	15.50
F060	<0.6	0.00	2.0	11.00	<0.6	0.00	1.8	24.50
F068	0.258	9.00	2.139 H	31.00	0.146	12.00	1.877	31.00
F071	0.256	8.00	1.220 EL	1.00	0.134	6.00	1.490 VL	2.00
F072	0.13 EL	1.00	1.95	7.00	0.12	2.50	1.69	9.00
F074	0.26	10.50	1.82 VL	2.00	0.15	16.00	1.62 L	4.00
F094	0.32	34.00	2.17 H	33.00	0.20 EH	33.00	1.94 VH	34.00
F107	0.30	31.50	1.92	4.00	0.16	24.50	1.67	5.50
F109	0.27	16.00	2.02	16.50	0.14	8.00	1.78	20.50
F110	0.28	22.00	2.02	16.50	0.16	24.50	1.74	12.50
F112	0.25	6.00	2.02	16.50	0.13	4.50	1.77	17.50
F115	0.276	18.50	2.017	13.00	0.155	21.50	1.749	14.00
F116	0.286	25.00	2.11	28.50	0.155	21.50	1.83	28.00
F131	0.238	4.00	1.928	5.00	0.118	1.00	1.675	7.00
F133	0.280	22.00	2.020	16.50	0.150	16.00	1.775	19.00
MEDIAN	0.2760		2.0200		0.1500		1.7725	
1CRIT	0.0470		0.1168		0.0420		0.1069	
N	33		34		31		34	
MEAN	0.2718		2.0369		0.1512		1.7707	
3STDEV	0.0715		0.2602		0.0484		0.3120	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	269.50	26.950	10					IC
F002	173.00	21.625	8					FLAME
F003	181.50	18.150	10					Flame AA
F007	100.50	12.563	8					CPQ116E3
F008	121.50	20.250	6					ICP/Flame
F009	227.00	22.700	10					ICP-MS
F010	74.50	7.450	10	L L	BIASED LOW	-6.17	-0.0051	ICP
F011	160.50	16.050	10					EPA-200.7
F012	226.50	22.650	10	H VH H				ICP-MS
F014	36.00	4.500	8	ELELL L	BIASED LOW*	-2.17	-0.0845	ICP-MS
F015	19.00	3.800	5	ELVLELELEL ELVL	BIASED LOW*	3.10	-0.1731	11111
F017	192.50	19.250	10					
F020	251.50	25.150	10	EL H VH VH				IC
F025	287.00	28.700	10	H EHH H EH EH	BIASED HIGH	35.72	-0.0493	Low Level IC
F026	272.50	27.250	10		BIASED HIGH*	1.49	0.0138	AUTOANALYSER
F032	286.00	28.600	10	H H	BIASED HIGH	6.86	0.0001	
F036	154.50	15.450	10					
F037	258.00	25.800	10	EHEHEHVLEHEHEH VL				ICP-MS
F038	83.50	8.350	10	L	BIASED LOW	-5.02	-0.0076	FAES
F042	236.00	23.600	10					Flame AA, air
F049	151.50	15.150	10					ICP
F053	141.50	14.150	10					Atomic Absorption
F060	67.50	16.875	4		INSUFFICIENT DATA			ICP
F068	173.00	17.300	10	H				IC, Dionex
F071	49.00	4.900	10	L VL EL VL	BIASED LOW	-29.22	0.0463	Flame-AA
F072	39.50	3.950	10	VLL EL	BIASED LOW*	-2.57	-0.0505	AA air/C2H2
F074	110.00	11.000	10	L VL L				AAS
F094	323.00	32.300	10	EH H H H EHVH	BIASED HIGH	6.35	0.0316	IC
F107	225.00	22.500	10					ICP
F109	123.00	12.300	10					AA- FLAME
F110	201.50	20.150	10					flame AAS
F112	82.50	8.250	10	L VL	BIASED LOW*	-0.94	-0.0271	AA2380 FLAME
F115	172.50	17.250	10					AA
F116	224.50	22.450	10					ICP
F131	52.00	5.200	10	L	BIASED LOW*	-4.36	-0.0189	Ion Chromatography
F133	194.00	19.400	10					FAA

* 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 17.525

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F015	19.00	3.800	5	ELVLELELELELVL	BIASED LOW*	3.10	-0.1731	11111
F072	39.50	3.950	10	VLLEL	BIASED LOW*	-2.57	-0.0505	AA air/C2H2
F014	36.00	4.500	8	ELELLL	BIASED LOW*	-2.17	-0.0845	ICP-MS
F071	49.00	4.900	10	LVLELVL	BIASED LOW	-29.22	0.0463	Flame-AA
F131	52.00	5.200	10	L	BIASED LOW*	-4.36	-0.0189	Ion Chromatography
F010	74.50	7.450	10	LL	BIASED LOW	-6.17	-0.0051	ICP
F112	82.50	8.250	10	LVL	BIASED LOW*	-0.94	-0.0271	AA2380 FLAME
F038	83.50	8.350	10	L	BIASED LOW	-5.02	-0.0076	FAES
F074	110.00	11.000	10	LVLL				AAS
F109	123.00	12.300	10					AA- FLAME
F007	100.50	12.563	8					CPQ116E3
F053	141.50	14.150	10					Atomic Absorption
F049	151.50	15.150	10					ICP
F036	154.50	15.450	10					
F011	160.50	16.050	10					EPA-200.7
F060	67.50	16.875	4		INSUFFICIENT DATA			ICP
F115	172.50	17.250	10					AA
F068	173.00	17.300	10	H				IC, Dionex
F003	181.50	18.150	10					Flame AA
F017	192.50	19.250	10					
F133	194.00	19.400	10					FAA
F110	201.50	20.150	10					flame AAS
F008	121.50	20.250	6					ICP/Flame
F002	173.00	21.625	8					FLAME
F116	224.50	22.450	10					ICP
F107	225.00	22.500	10					ICP
F012	226.50	22.650	10	HVHH				ICP-MS
F009	227.00	22.700	10					ICP-MS
F042	236.00	23.600	10					Flame AA, air
F020	251.50	25.150	10	ELHVHVH				IC
F037	258.00	25.800	10	EHEHEHVLEHEHEHVL				ICP-MS
F001	269.50	26.950	10					IC
F026	272.50	27.250	10		BIASED HIGH*	1.49	0.0138	AUTOANALYSER
F032	286.00	28.600	10	HH	BIASED HIGH	6.86	0.0001	
F025	287.00	28.700	10	HEHHHEHEH	BIASED HIGH	35.72	-0.0493	Low Level IC
F094	323.00	32.300	10	EHHHHEHVH	BIASED HIGH	6.35	0.0316	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 17.525

PARAMETER: 12091 Magnesium mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.158	12.00	0.308	7.00	0.462	9.00	0.562	10.00	0.54	10.00	0.55	8.50
F002	0.17	28.50	0.32	20.00	0.49	24.00	0.60	31.00	0.58	30.50	0.59	29.50
F003	0.16	17.50	0.31	11.00	0.48	18.00	0.58	17.50	0.56	20.00	0.57	16.00
F007	0.160	17.50	0.318	17.00	0.478	15.00	0.587	20.00	0.556	17.00	0.572	19.00
F008	0.16	17.50	0.32	20.00	0.48	18.00	0.61	34.50	0.57	25.00	0.58	24.00
F009	0.18	32.00	0.35	34.00	0.50	30.50	0.59	24.00	0.60	34.00	0.60	32.50
F010	0.15	6.00	0.31	11.00	0.47	11.00	0.57	12.00	0.55	13.50	0.58	24.00
F011	0.154	9.00	0.307	6.00	0.471	13.00	0.575	15.00	0.551	16.00	0.558	11.50
F012	0.16	17.50	0.31	11.00	0.47	11.00	0.58	17.50	0.58	30.50	0.6	32.50
F014	0.114 EL	2.00	0.219 EL	2.00	0.340 EL	1.00	0.410 EL	1.00	0.386 EL	1.00	0.386 EL	1.00
F015	0.1 EL	1.00	0.3	4.00	0.5	30.50	0.6	31.00	0.5 L	2.50	0.6	32.50
F017	0.166	26.00	0.329	26.50	0.491	26.00	0.595	29.00	0.573	27.50	0.575	20.00
F020	0.16	17.50	0.32	20.00	0.49	24.00	0.58	17.50	0.56	20.00	0.57	16.00
F025	0.144	4.00	0.286 L	3.00	0.423 L	3.00	0.531 L	4.00	0.503 L	5.00	0.504 VL	2.00
F026	0.160	17.50	0.327	25.00	0.475	14.00	0.574	14.00	0.560	20.00	0.553	10.00
F032	0.167	27.00	0.332	29.00	0.497	27.00	0.546	5.00	0.54	10.00	0.558	11.50
F036	0.165	25.00	0.325	24.00	0.49	24.00	0.59	24.00	0.57	25.00	0.58	24.00
F037	0.1564	11.00	0.3167	16.00	0.4408 L	4.00	0.4930 EL	2.00	0.5025 L	4.00	0.5158 L	3.00
F038	0.17	28.50	0.34	32.00	0.5	30.50	0.58	17.50	0.55	13.50	0.57	16.00
F042	0.18	32.00	0.33	28.00	0.48	18.00	0.59	24.00	0.56	20.00	0.58	24.00
F049	0.16	17.50	0.31	11.00	0.47	11.00	0.57	12.00	0.55	13.50	0.55	8.50
F053	0.154	9.00	0.306	5.00	0.455	5.50	0.55	6.50	0.53	7.00	0.54	6.50
F060	<0.1 EL	0.00	0.2 EL	1.00	0.4 EL	2.00	0.5 VL	3.00	0.5 L	2.50	0.6	32.50
F071	0.174	30.00	0.333	30.00	0.518	34.00	0.593	28.00	0.577	29.00	0.578	21.00
F072	0.15	6.00	0.31	11.00	0.48	18.00	0.57	12.00	0.55	13.50	0.56	13.00
F074	0.16	17.50	0.31	11.00	0.46	7.50	0.56	8.50	0.53	7.00	0.53	4.00
F094	0.16	17.50	0.32	20.00	0.50	30.50	0.61	34.50	0.59	32.00	0.59	29.50
F107	0.18	32.00	0.36 H	35.00	0.50	30.50	0.59	24.00	0.61 H	35.00	0.61	35.00
F109	0.16	17.50	0.32	20.00	0.48	18.00	0.59	24.00	0.57	25.00	0.57	16.00
F110	0.154	9.00	0.311	15.00	0.455	5.50	0.550	6.50	0.530	7.00	0.535	5.00
F112	0.15	6.00	0.31	11.00	0.46	7.50	0.56	8.50	0.54	10.00	0.54	6.50
F115	0.164	24.00	0.329	26.50	0.485	21.00	0.592	27.00	0.573	27.50	0.583	27.00
F116	0.163	23.00	0.321	23.00	0.486	22.00	0.589	21.00	0.560	20.00	0.580	24.00
F131	0.143	3.00	0.341	33.00	0.519	35.00	0.608	33.00	0.594	33.00	0.588	28.00
F133	0.187 H	34.00	0.337	31.00	0.500	30.50	0.600	31.00	0.562	23.00	0.570	16.00
MEDIAN	0.1600		0.3200		0.4800		0.5800		0.5600		0.5700	
1CRIT	0.0230		0.0310		0.0390		0.0440		0.0430		0.0435	
N	32		33		33		32		33		33	
MEAN	0.1596		0.3162		0.4769		0.5733		0.5534		0.5673	
3STDEV	0.0368		0.0645		0.0706		0.0796		0.0776		0.0713	

PARAMETER: 12091 Magnesium mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.892	11.00	0.537	9.50	0.893	8.00	0.875	8.00
F002	0.95	30.00	0.57	30.00	0.96	31.50	0.93	32.00
F003	0.93	25.50	0.55	18.00	0.94	26.50	0.91	22.50
F007	0.926	24.00	0.554	20.00	0.930	20.00	0.915	25.00
F008	0.92	20.00	0.56	24.50	0.93	20.00	0.91	22.50
F009	0.10 EL	1.00	0.57	30.00	0.97	33.00	0.92	27.50
F010	0.90	13.50	0.57	30.00	0.92	17.00	0.92	27.50
F011	0.923	22.00	0.548	16.00	0.933	22.00	0.893	16.00
F012	0.92	20.00	0.54	13.00	0.93	20.00	0.94	33.50
F014	0.723 VL	3.00	0.369 EL	1.00	0.632 EL	1.00	0.614 EL	1.00
F015	1. H	35.00	0.7 EH	35.00	1. H	35.00	0.9	19.00
F017	0.925	23.00	0.56	24.50	0.939	24.50	0.919	26.00
F020	0.91	17.00	0.55	18.00	0.91	15.00	0.89	14.50
F025	0.853	5.00	0.507 L	3.00	0.874	4.00	0.857	4.00
F026	0.900	13.50	0.537	9.50	0.903	12.00	0.877	9.00
F032	0.888	9.00	0.528	4.00	0.906	13.00	0.882	13.00
F036	0.935	27.00	0.56	24.50	0.935	23.00	0.91	22.50
F037	0.7807 VL	4.00	0.4965 L	2.00	0.7499 EL	2.00	0.7412 EL	2.00
F038	0.91	17.00	0.53	6.00	0.9	10.00	0.89	14.50
F042	0.91	17.00	0.56	24.50	0.91	15.00	0.90	19.00
F049	0.90	13.50	0.54	13.00	0.91	15.00	0.88	11.00
F053	0.879	7.00	0.533	8.00	0.88	5.50	0.86	6.00
F060	0.7 EL	2.00	0.6 H	34.00	0.8 VL	3.00	0.9	19.00
F071	0.920	20.00	0.550	18.00	0.939	24.50	0.929	31.00
F072	0.89	10.00	0.54	13.00	0.90	10.00	0.88	11.00
F074	0.88	8.00	0.54	13.00	0.89	7.00	0.86	6.00
F094	0.99 H	34.00	0.58	32.00	0.99 H	34.00	0.96	35.00
F107	0.96	32.00	0.54	13.00	0.96	31.50	0.86	6.00
F109	0.93	25.50	0.56	24.50	0.95	29.00	0.94	33.50
F110	0.875	6.00	0.530	6.00	0.880	5.50	0.845	3.00
F112	0.90	13.50	0.53	6.00	0.90	10.00	0.88	11.00
F115	0.937	28.00	0.564	28.00	0.943	28.00	0.923	29.00
F116	0.951	31.00	0.559	21.00	0.926	18.00	0.898	17.00
F131	0.987 H	33.00	0.581	33.00	0.956	30.00	0.927	30.00
F133	0.940	29.00	0.560	24.50	0.940	26.50	0.910	22.50
MEDIAN	0.9100		0.5500		0.9260		0.9000	
1CRIT	0.0605		0.0425		0.0613		0.0600	
N	33		33		33		33	
MEAN	0.9011		0.5495		0.9151		0.8931	
3STDEV	0.1833		0.0617		0.1352		0.1098	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	93.00	9.300	10					ICP
F002	287.00	28.700	10		BIASED HIGH*	4.28	-0.0051	A.A.
F003	192.50	19.250	10					Flame AA
F007	194.50	19.450	10					CPQ106E3
F008	226.00	22.600	10					ICP/Flame
F009	278.50	27.850	10	EL	BIASED HIGH	-43.94	0.2041	ICP-MS
F010	165.50	16.550	10					ICP
F011	146.50	14.650	10					EPA-200.7
F012	206.50	20.650	10					ICP-MS
F014	14.00	1.400	10	ELELELELELELVLELELEL	BIASED LOW	-26.91	-0.0161	ICP-MS
F015	225.50	22.550	10	EL L H EHH				12321
F017	253.00	25.300	10					
F020	179.50	17.950	10					ICP
F025	37.00	3.700	10	L L L L VL L	BIASED LOW*	-3.22	-0.0282	Low Level IC
F026	144.50	14.450	10					FLAME AA
F032	148.50	14.850	10					
F036	243.00	24.300	10					
F037	50.00	5.000	10	L ELL L VLL ELEL	BIASED LOW	-22.76	0.0593	ICP-MS
F038	185.50	18.550	10					ICPOES
F042	221.50	22.150	10					Flame AA, nitrous
F049	126.00	12.600	10					ICP
F053	66.00	6.600	10		BIASED LOW*	-4.23	-0.0017	Atomic Absorption
F060	99.00	11.000	9	ELELELVLL ELH VL				ICP
F071	265.50	26.550	10					Flame-AA
F072	117.50	11.750	10					AA air/C2H2
F074	89.50	8.950	10					AAS
F094	299.00	29.900	10	H H	BIASED HIGH	10.07	-0.0266	IC
F107	274.00	27.400	10	H H				ICP
F109	233.00	23.300	10					AA- FLAME
F110	68.50	6.850	10		BIASED LOW	-5.41	0.0031	flame AAS
F112	90.00	9.000	10					AA2380 FLAME
F115	266.00	26.600	10					AA
F116	220.00	22.000	10					ICP
F131	291.00	29.100	10	H	BIASED HIGH	6.15	-0.0078	Ion Chromatography
F133	268.00	26.800	10	H				FAA

* 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 17.951

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	14.00	1.400	10	ELELELELELELVLELELEL	BIASED LOW	-26.91	-0.0161	ICP-MS
F025	37.00	3.700	10	LLLLVLL	BIASED LOW*	-3.22	-0.0282	Low Level IC
F037	50.00	5.000	10	LELLLVLLELEL	BIASED LOW	-22.76	0.0593	ICP-MS
F053	66.00	6.600	10		BIASED LOW*	-4.23	-0.0017	Atomic Absorption
F110	68.50	6.850	10		BIASED LOW	-5.41	0.0031	flame AAS
F074	89.50	8.950	10					AAS
F112	90.00	9.000	10					AA2380 FLAME
F001	93.00	9.300	10					ICP
F060	99.00	11.000	9	ELELELVLLELHVL				ICP
F072	117.50	11.750	10					AA air/C2H2
F049	126.00	12.600	10					ICP
F026	144.50	14.450	10					FLAME AA
F011	146.50	14.650	10					EPA-200.7
F032	148.50	14.850	10					
F010	165.50	16.550	10					ICP
F020	179.50	17.950	10					ICP
F038	185.50	18.550	10					ICPOES
F003	192.50	19.250	10					Flame AA
F007	194.50	19.450	10					CPQ106E3
F012	206.50	20.650	10					ICP-MS
F116	220.00	22.000	10					ICP
F042	221.50	22.150	10					Flame AA, nitrous
F015	225.50	22.550	10	ELLHEHH				12321
F008	226.00	22.600	10					ICP/Flame
F109	233.00	23.300	10					AA- FLAME
F036	243.00	24.300	10					
F017	253.00	25.300	10					
F071	265.50	26.550	10					Flame-AA
F115	266.00	26.600	10					AA
F133	268.00	26.800	10	H				FAA
F107	274.00	27.400	10	HH				ICP
F009	278.50	27.850	10	EL	BIASED HIGH	-43.94	0.2041	ICP-MS
F002	287.00	28.700	10		BIASED HIGH*	4.28	-0.0051	A.A.
F131	291.00	29.100	10	H	BIASED HIGH	6.15	-0.0078	Ion Chromatography
F094	299.00	29.900	10	HH	BIASED HIGH	10.07	-0.0266	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 17.951

PARAMETER: 14092 Reactive Silica mg/L Si

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.02	0.00	<0.02	0.00	0.38	18.00	1.27	4.50	0.08 EH	15.00	0.19 EH	20.50
F003	0.014	5.00	0.019	2.50	0.360	8.50	1.33	11.50	0.023	6.50	0.093 EL	2.00
F008	0.05 H	14.00	0.05	14.00	0.37	17.00	1.31	8.50	0.05	14.00	0.19 EH	20.50
F011	0.013	4.00	0.021	6.00	0.366	15.50	1.37	18.00	0.041	13.00	0.019 EL	1.00
F015	<0.05	0.00	<0.05	0.00	0.43 EH	20.00	1.38	19.50	<0.05	0.00	0.16	18.50
F020	<0.09	0.00	<0.09	0.00	0.36	8.50	1.31	8.50	<0.09	0.00	0.15	14.50
F025	0.03	9.00	0.02	4.50	0.46 EH	21.00	1.27	4.50	0.02	4.00	0.16	18.50
F026	0.0141	6.00	0.0216	7.00	0.3647	14.00	1.3689	17.00	0.0230	6.50	0.1483	11.00
F032	<0.04	0.00	<0.02	0.00	0.34	3.50	1.3	6.00	<0.02	0.00	0.14	7.00
F042	0.02W	0.00	0.03W	0.00	0.36	8.50	1.33	11.50	0.03W	0.00	0.15	14.50
F060	<0.05	0.00	<0.05	0.00	0.34	3.50	1.23	3.00	<0.05	0.00	0.12	3.00
F071	0.01	2.50	0.03	8.50	0.360	8.50	1.39	21.00	0.02	4.00	0.144	8.00
F072	0.02	7.00	0.03	8.50	0.36	8.50	1.36	16.00	0.03	8.50	0.15	14.50
F074	0.033	10.00	0.037	11.00	0.362	13.00	1.33	11.50	0.037	11.00	0.149	12.00
F107	0.034	11.00	0.031	10.00	0.35	5.00	1.308	7.00	0.018	2.00	0.145	9.00
F109	0.04T	13.00	0.04T	13.00	0.33	1.50	1.38	19.50	0.04T	12.00	0.13T	4.50
F112	0.00	1.00	0.00 EL	1.00	0.39	19.00	1.33	11.50	0.03	8.50	0.13	4.50
F115	0.021	8.00	0.019	2.50	0.361	12.00	1.343	14.00	0.015	1.00	0.139	6.00
F116	0.01	2.50	0.02	4.50	0.360	8.50	1.35	15.00	0.02	4.00	0.146	10.00
F131	0.036	12.00	0.039	12.00	0.366	15.50	1.211 L	2.00	0.033	10.00	0.152	17.00
F133	<0.10	0.00	<0.10	0.00	0.33	1.50	1.10 EL	1.00	<0.10	0.00	0.15	14.50
MEDIAN	0.0205		0.0258		0.3600		1.3300		0.0300		0.1483	
1CRIT	0.0250		0.0250		0.0451		0.1033		0.0253		0.0324	
N	12		12		18		19		13		18	
MEAN	0.0229		0.0273		0.3655		1.3200		0.0296		0.1420	
3STDEV	0.0317		0.0235		0.0581		0.1398		0.0291		0.0464	

PARAMETER: 14092 Reactive Silica mg/L Si

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.14 EH	20.50	2.25	6.00	0.08	16.00	1.18	3.00
F003	0.117	12.50	2.29	10.50	0.056	9.00	1.26	13.50
F008	0.14 EH	20.50	2.29	10.50	0.05	5.00	1.26	13.50
F011	0.114	10.00	2.39	17.00	0.05	5.00	1.28	18.00
F015	0.12	16.00	2.43	20.00	<0.05	0.00	1.24	7.00
F020	0.12	16.00	2.30	13.00	<0.09	0.00	1.25	10.50
F025	0.13	19.00	2.21	5.00	0.10 EH	17.00	1.21	4.00
F026	0.1114	9.00	2.3939	18.00	0.0524	8.00	1.2967	19.00
F032	0.12	16.00	2.28	7.00	<0.06	0.00	1.24	7.00
F042	0.11	5.50	2.29	10.50	0.07	13.00	1.24	7.00
F060	0.07 EL	1.00	2.15	3.00	<0.05	0.00	1.16	2.00
F071	0.109	4.00	2.421	19.00	0.05	5.00	1.31	20.00
F072	0.11	5.50	2.29	10.50	0.05	5.00	1.26	13.50
F074	0.120	16.00	2.33	14.00	0.064	11.00	1.26	13.50
F107	0.111	7.50	2.283	8.00	0.041	2.00	1.242	9.00
F109	0.10T	3.00	2.56 EH	21.00	0.04T	1.00	1.32	21.00
F112	0.09	2.00	2.19	4.00	0.07	13.00	1.25	10.50
F115	0.116	11.00	2.350	16.00	0.059	10.00	1.274	17.00
F116	0.111	7.50	2.34	15.00	0.05	5.00	1.27	16.00
F131	0.117	12.50	2.099 L	1.00	0.074	15.00	1.129 EL	1.00
F133	0.12	16.00	2.11 L	2.00	0.07	13.00	1.22	5.00
MEDIAN	0.1160		2.2900		0.0560		1.2500	
1CRIT	0.0305		0.1609		0.0269		0.0985	
N	18		19		15		19	
MEAN	0.1137		2.2941		0.0591		1.2475	
3STDEV	0.0256		0.2530		0.0332		0.1062	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	103.50	12.938	8	EHEHEH				AUTO-ANALYZER
F003	81.50	8.150	10	EL				Colorimetric
F008	137.50	13.750	10	H EHEH				Autocolormetric
F011	107.50	10.750	10	EL				
F015	101.00	16.833	6	EH	BIASED HIGH*	4.28	0.0051	
F020	71.00	11.833	6					Auto Molybibl
F025	106.50	10.650	10	EH EH				ICP-AES
F026	115.50	11.550	10					AUTOANALYSER
F032	46.50	7.750	6					
F042	70.50	10.071	7					Colourimetric
F060	15.50	2.583	6	EL	BIASED LOW	-5.24	-0.0228	ICP
F071	100.50	10.050	10					Colorimetric
F072	97.50	9.750	10					Molub/oxalic
F074	123.00	12.300	10					FLOW INJ COLOUR
F107	70.50	7.050	10					COLOR
F109	109.50	10.950	10	EH				FIA- MOLYBDATE
F112	75.00	7.500	10	EL				TECHNICON
F115	97.50	9.750	10					Auto-Analyzer
F116	88.00	8.800	10					Auto/colorimetric
F131	98.00	9.800	10	L L EL				ICP
F133	53.00	7.571	7	EL L				COLORIMETRIC

* 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
F060	15.50	2.583	6	EL	BIASED LOW	-5.24	-0.0228	ICP
F107	70.50	7.050	10					COLOR
F112	75.00	7.500	10	EL				TECHNICON
F133	53.00	7.571	7	ELL				COLORIMETRIC
F032	46.50	7.750	6					
F003	81.50	8.150	10	EL				Colorimetric
F116	88.00	8.800	10					Auto/colorimetric
F072	97.50	9.750	10					Molub/oxalic
F115	97.50	9.750	10					Auto-Analyzer
F131	98.00	9.800	10	LLEL				ICP
F071	100.50	10.050	10					Colorimetric
F042	70.50	10.071	7					Colourimetric
F025	106.50	10.650	10	EHEH				ICP-AES
F011	107.50	10.750	10	EL				
F109	109.50	10.950	10	EH				FIA- MOLYBDATE
F026	115.50	11.550	10					AUTOANALYSER
F020	71.00	11.833	6					Auto Molybibl
F074	123.00	12.300	10					FLOW INJ COLOUR
F002	103.50	12.938	8	EHEHEH				AUTO-ANALYZER
F008	137.50	13.750	10	HEHEH				Autocolormetric
F015	101.00	16.833	6	EH	BIASED HIGH*	4.28	0.0051	

* 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 10.048

PARAMETER: 16000 Sulfate IC mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.172	25.00	1.84	22.50	6.114	22.00	2.638	23.00	2.712	27.00	3.782	21.00
F002	2.11	12.50	1.76	7.50	6.06	18.00	2.57	9.50	2.63	9.00	3.69	7.00
F009	2.06	5.00	1.78	11.00	5.75 L	4.00	2.50	4.00	2.51 L	2.00	3.50 L	2.00
F010	2.1	9.50	1.8	15.00	6.6 VH	34.00	2.7	28.00	2.6	5.00	3.8	25.50
F011	<3.	0.00	<3.	0.00	6.	12.00	<3.	0.00	<3.	0.00	4. H	34.00
F012	1.94 VL	2.00	1.65 L	1.00	6.08	19.00	2.49	3.00	2.58	4.00	3.68	6.00
F014	2.23	29.00	1.90	30.50	7.42 EH	35.00	2.70	28.00	2.74	29.00	3.82	28.00
F015	2.2	27.00	1.9	30.50	6.0	12.00	2.6	15.50	2.7	24.50	3.7	9.00
F017	2.146	21.00	1.846	24.00	6.056	17.00	2.594	12.00	2.646	11.00	3.724	17.00
F020	2.14	20.00	1.80	15.00	5.60 VL	2.00	2.76 H	32.00	2.76	30.00	3.70	9.00
F025	2.102	11.00	1.794	12.00	5.980	8.00	2.605	18.00	2.670	19.50	3.757	19.00
F026	2.0829	8.00	1.7454	6.00	6.2751	28.00	2.5959	13.00	2.6352	10.00	3.7475	18.00
F032	2.05	4.00	1.7 L	3.50	6.	12.00	2.55	7.50	2.65	14.00	3.8	25.50
F036	2.15	22.50	1.8	15.00	6.25	27.00	2.7	28.00	2.7	24.50	3.8	25.50
F037	1.8609 EL	1.00	1.6688 L	2.00	6.2141	26.00	2.5165	5.00	2.6260	7.00	3.7864	22.00
F038	2.1	9.50	1.9	30.50	5.7 L	3.00	2.6	15.50	2.7	24.50	3.6	4.00
F042	2.24	30.50	1.87	25.50	6.43 H	33.00	2.77 H	34.00	2.81 H	33.00	3.96 H	33.00
F049	2.16	24.00	1.81	18.00	6.29	29.00	2.68	24.50	2.77	31.00	3.91	32.00
F053	2.15	22.50	1.82	19.50	6.14	23.00	2.68	24.50	2.72	28.00	3.84	29.00
F060	2.2	27.00	1.8	15.00	6.3	30.50	2.7	28.00	2.7	24.50	3.9	30.50
F068	2.272 H	32.00	1.892	27.00	6.416 H	32.00	2.765 H	33.00	2.813 H	34.00	4.012 VH	35.00
F071	2.080	6.50	1.743	5.00	5.983	9.00	2.628	22.00	2.629	8.00	3.718	13.00
F072	2.13	18.00	1.84	22.50	5.95	7.00	2.55	7.50	2.61	6.00	3.618	5.00
F074	2.28 H	33.00	1.97 VH	33.00	6.09	20.50	2.28 EL	1.00	2.67	19.50	3.71	11.00
F094	2.0 L	3.00	1.7 L	3.50	5.8 L	5.00	2.4 VL	2.00	2.5 L	1.00	3.5 L	2.00
F107	2.13	18.00	1.76	7.50	6.09	20.50	2.60	15.50	2.65	14.00	3.72	15.00
F109	2.1161	14.00	1.7730	10.00	6.0427	16.00	2.5889	11.00	2.6551	17.00	3.7125	12.00
F110	2.24	30.50	1.87	25.50	5.88	6.00	2.62	20.50	2.65	14.00	3.72	15.00
F112	2.13	18.00	1.80	15.00	6.21	25.00	2.62	20.50	2.68	21.50	3.79	23.00
F113	2.11	12.50	1.83	21.00	5.59 VL	1.00	2.52	6.00	2.57	3.00	3.50 L	2.00
F115	2.124	15.00	1.770	9.00	6.176	24.00	2.611	19.00	2.680	21.50	3.800	25.50
F116	2.08	6.50	1.82	19.50	6.02	14.50	2.57	9.50	2.65	14.00	3.72	15.00
F118	2.2	27.00	1.9	30.50	6.3	30.50	2.7	28.00	2.8 H	32.00	3.9	30.50
F131	2.129	16.00	1.895	28.00	5.995	10.00	2.711	31.00	2.664	18.00	3.768	20.00
F133	2.36 EH	34.00	1.99 VH	34.00	6.02	14.50	2.60	15.50	2.65	14.00	3.70	9.00
MEDIAN	2.1300		1.8050		6.0600		2.6025		2.6596		3.7475	
1CRIT	0.1158		0.1044		0.2533		0.1323		0.1343		0.1724	
N	32		32		33		32		32		34	
MEAN	2.1361		1.8155		6.0852		2.6145		2.6693		3.7463	
3STDEV	0.2182		0.2014		0.6259		0.2413		0.1904		0.3469	

PARAMETER: 16000 Sulfate IC mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	3.856	18.00	3.815	24.00	5.978	20.00	4.682	19.00
F002	3.81	13.50	3.66	6.50	5.98	21.00	4.56	12.00
F009	3.59 VL	2.00	3.53 L	2.00	5.65 L	6.00	4.34 L	2.00
F010	3.8	11.00	3.7	9.50	6.2	30.00	4.8	30.50
F011	4.	28.50	5. EH	35.00	4. EL	1.00	5. VH	35.00
F012	3.68	3.00	3.66	6.50	5.96	18.50	4.54	10.00
F014	3.90	25.00	3.82	25.00	7.45 EH	35.00	4.74	26.00
F015	4.4 EH	35.00	3.7	9.50	5.9	12.00	4.6	16.00
F017	3.798	9.00	3.724	14.00	5.944	16.00	4.591	15.00
F020	3.85	17.00	3.90	27.50	5.62 L	5.00	4.40 L	4.00
F025	3.870	21.50	3.791	21.00	6.039	23.00	4.720	24.00
F026	3.8718	23.00	3.7882	20.00	6.1636	27.00	4.7096	22.00
F032	3.9	25.00	3.75	17.50	6.05	24.00	4.75	27.50
F036	3.9	25.00	3.9	27.50	5.95	17.00	4.75	27.50
F037	4.2003 VH	34.00	3.9527 H	30.00	6.1681	28.00	4.7365	25.00
F038	3.7	4.00	3.7	9.50	5.4 VL	2.00	4.4 L	4.00
F042	4.08 H	32.00	4.00 H	31.50	6.36 VH	34.00	4.92 H	33.00
F049	4.02	30.00	3.92	29.00	6.20	30.00	4.85 H	32.00
F053	3.94	27.00	3.87	26.00	6.02	22.00	4.76	29.00
F060	4.2 VH	33.00	4.2 VH	34.00	6.3 H	33.00	4.8	30.50
F068	4.053 H	31.00	4.006 H	33.00	6.218 H	32.00	4.970 VH	34.00
F071	3.777	7.00	3.736	16.00	5.888	11.00	4.510	9.00
F072	3.71	5.00	3.63	4.00	5.83	9.00	4.49	8.00
F074	3.79	8.00	3.57 L	3.00	5.76	7.00	4.58	14.00
F094	3.8	11.00	3.7	9.50	5.6 L	4.00	4.4 L	4.00
F107	3.80	11.00	3.75	17.50	5.96	18.50	4.64	18.00
F109	3.8280	16.00	3.7113	12.00	5.9279	15.00	4.5730	13.00
F110	3.81	13.50	3.73	15.00	5.87	10.00	4.48	6.50
F112	3.87	21.50	3.80	23.00	6.13	26.00	4.71	23.00
F113	3.57 VL	1.00	3.51 L	1.00	5.50 VL	3.00	4.29 VL	1.00
F115	3.867	20.00	3.794	22.00	6.078	25.00	4.695	20.00
F116	3.77	6.00	3.65	5.00	5.78	8.00	4.48	6.50
F118	4.0	28.50	4.0 H	31.50	6.2	30.00	4.7	21.00
F131	3.858	19.00	3.775	19.00	5.906	13.00	4.558	11.00
F133	3.82	15.00	3.72	13.00	5.91	14.00	4.62	17.00
MEDIAN	3.8560		3.7500		5.9600		4.6400	
1CRIT	0.1762		0.1725		0.2499		0.2036	
N	33		33		33		33	
MEAN	3.8703		3.7865		5.9527		4.6380	
3STDEV	0.3996		0.4148		0.6685		0.4534	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	221.50	22.150	10					IC
F002	116.50	11.650	10					I.C.
F009	40.00	4.000	10	L L L VLL L L	BIASED LOW	-6.58	0.0447	Dionex
F010	198.00	19.800	10	VH				IC
F011	145.50	24.250	6	H EHELVH				EPA-375.2
F012	73.00	7.300	10	VLL	BIASED LOW*	3.69	-0.2325	IC
F014	290.50	29.050	10	EH EH	BIASED HIGH	30.52	-0.7849	
F015	191.00	19.100	10	EH				IC
F017	156.00	15.600	10					
F020	161.50	16.150	10	VLH L L				IC
F025	177.00	17.700	10					Low Level IC
F026	175.00	17.500	10					DIONEX
F032	160.50	16.050	10	L				
F036	239.50	23.950	10					
F037	180.00	18.000	10	ELL VHH				I.C. WATERS
F038	106.50	10.650	10	L VLL				IC
F042	319.50	31.950	10	H H H H H H VHH	BIASED HIGH	7.10	-0.0412	IC
F049	279.50	27.950	10	H	BIASED HIGH	5.21	-0.0539	IC Dionex
F053	250.50	25.050	10					Ion Chromatography
F060	286.00	28.600	10	VHVHH	BIASED HIGH	6.42	-0.0499	IC
F068	323.00	32.300	10	H H H H VHH H H VH	BIASED HIGH	5.10	0.0307	IC, Dionex
F071	106.50	10.650	10					Ion Chromatograph
F072	92.00	9.200	10					IC
F074	150.00	15.000	10	H VH EL L				IC
F094	45.00	4.500	10	L L L VLL L L L	BIASED LOW*	-4.25	-0.0230	IC
F107	155.50	15.550	10					IC
F109	136.00	13.600	10					DIONEX
F110	156.50	15.650	10					IC Dionex
F112	216.50	21.650	10					DIONEX IC
F113	51.50	5.150	10	VL L VLL VLVL	BIASED LOW	-11.70	0.2133	Dionex IC
F115	201.00	20.100	10					IC
F116	104.50	10.450	10					Dionex IC
F118	289.50	28.950	10	H H	BIASED HIGH*	3.18	0.0308	I.C.
F131	185.00	18.500	10					Ion Chromatography
F133	180.00	18.000	10	EHVH				I.C.

* 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 17.803

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F009	40.00	4.000	10	LLLVLLLL	BIASED LOW	-6.58	0.0447	Dionex
F094	45.00	4.500	10	LLLVLLLLL	BIASED LOW*	-4.25	-0.0230	IC
F113	51.50	5.150	10	VLLVLLVLVL	BIASED LOW	-11.70	0.2133	Dionex IC
F012	73.00	7.300	10	VLL	BIASED LOW*	3.69	-0.2325	IC
F072	92.00	9.200	10					IC
F116	104.50	10.450	10					Dionex IC
F038	106.50	10.650	10	LVLL				IC
F071	106.50	10.650	10					Ion Chromatograph
F002	116.50	11.650	10					I.C.
F109	136.00	13.600	10					DIONEX
F074	150.00	15.000	10	HVHELL				IC
F107	155.50	15.550	10					IC
F017	156.00	15.600	10					
F110	156.50	15.650	10					IC Dionex
F032	160.50	16.050	10	L				
F020	161.50	16.150	10	VLHLL				IC
F026	175.00	17.500	10					DIONEX
F025	177.00	17.700	10					Low Level IC
F037	180.00	18.000	10	ELLVHH				I.C. WATERS
F133	180.00	18.000	10	EHVH				I.C.
F131	185.00	18.500	10					Ion Chromatography
F015	191.00	19.100	10	EH				IC
F010	198.00	19.800	10	VH				IC
F115	201.00	20.100	10					IC
F112	216.50	21.650	10					DIONEX IC
F001	221.50	22.150	10					IC
F036	239.50	23.950	10					
F011	145.50	24.250	6	HEHELVH				EPA-375.2
F053	250.50	25.050	10					Ion Chromatography
F049	279.50	27.950	10	H	BIASED HIGH	5.21	-0.0539	IC Dionex
F060	286.00	28.600	10	VHVHH	BIASED HIGH	6.42	-0.0499	IC
F118	289.50	28.950	10	HH	BIASED HIGH*	3.18	0.0308	I.C.
F014	290.50	29.050	10	EHEH	BIASED HIGH	30.52	-0.7849	
F042	319.50	31.950	10	HHHHHHVHH	BIASED HIGH	7.10	-0.0412	IC
F068	323.00	32.300	10	HHHHVHHHHVH	BIASED HIGH	5.10	0.0307	IC, Dionex

* 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 17.803

Sulfate IC

PARAMETER: 16001 Sulfate Colour mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	2.1	2.50	1.9	5.00	6.3	3.00	2.9	4.00	2.7	4.00	4.0	5.00
F007	2.2	5.00	1.8	4.00	5.9	2.00	2.6	2.00	2.4	2.00	3.6	1.50
F008	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F010	2.1	2.50	1.6	1.00	6.4	4.50	2.7	3.00	2.4	2.00	3.8	3.00
F026	2.12	4.00	1.73	3.00	6.40	4.50	2.93	5.00	2.745	5.00	3.905	4.00
F060	1.9	1.00	1.7	2.00	5.8	1.00	2.5	1.00	2.4	2.00	3.6	1.50
MEDIAN	2.1000		1.7300		6.3000		2.7000		2.4000		3.8000	
1CRIT	0.3880		0.3584		0.7240		0.4360		0.4120		0.5240	
N	3		3		2		3		4		2	
MEAN	2.1067		1.7433		6.1000		2.7333		2.4750		3.8525	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	4.1	5.00	4.7	4.00	6.3	4.50	5.4	4.00
F007	3.6	2.00	4.2	3.00	6.0	2.00	5.0	3.00
F008	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F010	3.6	2.00	3.5 L	1.00	6.3	4.50	4.5	1.50
F026	4.055	4.00	4.75	5.00	6.295	3.00	5.64 H	5.00
F060	3.6	2.00	3.8	2.00	5.6	1.00	4.5	1.50
MEDIAN	3.6000		4.2000		6.2950		5.0000	
1CRIT	0.5080		0.5560		0.7236		0.6200	
N	4		3		2		2	
MEAN	3.7137		4.2333		6.1475		5.2000	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	41.00	4.100	10					Colorimetric
F007	26.50	2.650	10					CPQ100E2
F008	0.00	-	0					AutocolorLR/TurbHR
F010	25.00	2.500	10	L				Calmagite
F026	42.50	4.250	10	H				AUTOANALYSER
F060	15.00	1.500	10					ICP

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

OVERALL AVERAGE
RANK IS 3.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F008	0.00	-	0					AutocolorLR/TurbHR
F060	15.00	1.500	10					ICP
F010	25.00	2.500	10	L				Calmagite
F007	26.50	2.650	10					CPQ100E2
F003	41.00	4.100	10					Colorimetric
F026	42.50	4.250	10	H				AUTOANALYSER

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

OVERALL AVERAGE
RANK IS 3.000

Sulfate Colour

PARAMETER: 17000 Chloride IC mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.131	22.00	0.095	16.00	0.529	24.00	1.833	20.00	0.416	19.00	0.276	9.00
F002	0.13	20.50	0.11	20.50	0.51	15.50	1.79	13.50	0.42	22.00	0.29	20.00
F009	0.15	26.00	0.15	27.50	0.49	7.00	1.67 L	4.50	0.41	16.50	0.30	23.00
F010	0.1	4.50	0.1	18.50	0.5	10.50	2.0 H	30.00	0.4	10.50	0.3	23.00
F011	0.23 H	28.00	0.19 H	29.00	0.52	22.50	1.67 L	4.50	0.42	22.00	0.31	26.00
F012	0.24 VH	30.00	0.21 EH	30.00	0.58	31.00	1.69	7.00	0.48	30.00	0.36	29.00
F014	0.237 VH	29.00	0.128	25.00	0.554	28.00	1.88	27.50	0.443	29.00	0.371 H	30.00
F015	0.13	20.50	0.12	23.00	0.45	2.50	1.6 VL	2.00	0.38	4.50	0.28	13.00
F017	0.113	14.00	0.091	14.50	0.49	7.00	1.81	17.00	0.404	13.00	0.288	18.00
F020	0.12	17.50	0.09	10.00	0.51	15.50	1.99 H	29.00	0.39	7.00	0.28	13.00
F025	0.107	7.50	0.089	6.00	0.503	12.00	1.712	9.00	0.402	12.00	0.266	5.00
F026	0.1392	23.00	0.1160	22.00	0.5459	26.00	1.8438	23.00	0.4243	25.00	0.2859	16.00
F032	0.11	11.50	0.09	10.00	0.51	15.50	1.85	25.00	0.41	16.50	0.28	13.00
F036	0.11	11.50	0.09	10.00	0.53	25.00	1.88	27.50	0.41	16.50	0.28	13.00
F037	0.6171 EH	32.00	<0.5	0.00	<0.5	0.00	2.1353 VH	32.00	<0.5	0.00	2.4728 EH	32.00
F038	<0.5	0.00	<0.5	0.00	0.5	10.50	1.7	8.00	0.6 EH	31.00	<0.5	0.00
F042	0.10	4.50	0.09	10.00	0.51	15.50	2.02 VH	31.00	0.40	10.50	0.27	6.50
F049	0.12	17.50	0.09	10.00	0.55	27.00	1.84	21.50	0.44	27.50	0.33	28.00
F053	0.12	17.50	0.1	18.50	0.51	15.50	1.79	13.50	0.43	26.00	0.29	20.00
F060	0.15	26.00	0.15	27.50	0.56	29.00	1.8	16.00	0.44	27.50	0.32	27.00
F068	0.109	9.00	0.085	5.00	0.515	19.50	1.818	18.00	0.419	20.00	0.271	8.00
F071	0.094	2.00	0.044	1.00	0.467	5.00	1.799	15.00	0.352	2.00	0.226	1.00
F074	0.11	11.50	0.08	3.50	0.45	2.50	1.82	19.00	0.28 EL	1.00	0.25	3.00
F094	0.10	4.50	0.09	10.00	0.44	1.00	1.50 VL	1.00	0.36	3.00	0.26	4.00
F107	0.09	1.00	0.07	2.00	0.46	4.00	2.27 EH	33.00	0.39	7.00	0.24	2.00
F109	0.1452	24.00	0.1214	24.00	0.5175	21.00	1.7637	11.00	0.4202	24.00	0.3026	25.00
F110	0.12	17.50	0.11	20.50	0.52	22.50	1.87	26.00	0.42	22.00	0.30	23.00
F112	0.11	11.50	0.09	10.00	0.51	15.50	1.84	21.50	0.41	16.50	0.29	20.00
F113	0.15	26.00	0.14	26.00	0.49	7.00	1.64 L	3.00	0.38	4.50	0.28	13.00
F115	0.117	15.00	0.098	17.00	0.515	19.50	1.846	24.00	0.407	14.00	0.279	10.00
F116	0.107	7.50	0.091	14.50	0.499	9.00	1.671 L	6.00	0.395	9.00	0.287	17.00
F131	0.377 EH	31.00	0.358 EH	31.00	0.707 EH	32.00	1.758	10.00	0.616 EH	32.00	0.511 EH	31.00
F133	0.10	4.50	0.08	3.50	0.57	30.00	1.77	12.00	0.39	7.00	0.27	6.50
MEDIAN	0.1200		0.0950		0.5100		1.8100		0.4100		0.2864	
1CRIT	0.0750		0.0750		0.0859		0.1313		0.0824		0.0780	
N	30		29		30		31		30		30	
MEAN	0.1392		0.1088		0.5122		1.8097		0.4154		0.2973	
3STDEV	0.1753		0.0958		0.0947		0.3465		0.1267		0.1446	

PARAMETER: 17000 Chloride IC mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.519	18.00	2.150	25.50	0.396	22.00	3.225	26.00
F002	0.52	22.00	2.06	11.50	0.38	11.00	3.06	9.00
F009	0.49	9.50	1.97	4.50	0.38	11.00	2.99	4.00
F010	0.5	13.00	2.1	17.50	0.4	23.00	3.2	24.50
F011	0.49	9.50	2.09	14.00	0.39	19.00	3.07	10.00
F012	0.57	30.00	1.97	4.50	0.44	28.50	2.81 VL	2.00
F014	0.529	26.00	2.19	28.00	0.440	28.50	3.13	16.00
F015	0.49	9.50	1.9 L	1.50	0.36	5.00	3.1	13.00
F017	0.483	6.00	2.095	15.00	0.386	14.00	3.112	14.00
F020	0.51	16.00	2.60 EH	33.00	0.38	11.00	3.91 EH	33.00
F025	0.495	12.00	2.040	9.00	0.367	6.00	3.027	8.00
F026	0.5204	25.00	2.2028	30.00	0.4219	27.00	3.2365	28.00
F032	0.52	22.00	2.1	17.50	0.39	19.00	3.2	24.50
F036	0.52	22.00	2.15	25.50	0.38	11.00	3.65 VH	31.00
F037	1.1880 EH	33.00	2.2016	29.00	<0.5	0.00	2.9973	5.00
F038	0.6 H	31.00	2.	6.00	<0.5	0.00	3.	6.50
F042	0.51	16.00	2.38 EH	32.00	0.38	11.00	3.58 VH	30.00
F049	0.55	29.00	2.22	31.00	0.42	26.00	3.23	27.00
F053	0.52	22.00	2.14	23.00	0.39	19.00	3.12	15.00
F060	0.54	28.00	2.06	11.50	0.41	24.50	3.7 VH	32.00
F068	0.510	16.00	2.126	21.00	0.373	7.00	3.159	21.00
F071	0.441	1.00	2.114	20.00	0.387	15.00	3.152	20.00
F074	0.45	2.50	2.13	22.00	0.33	1.50	3.18	23.00
F094	0.45	2.50	1.90 L	1.50	0.33	1.50	2.75 VL	1.00
F107	0.46	4.00	2.02	8.00	0.39	19.00	3.08	12.00
F109	0.5199	19.00	2.0698	13.00	0.3874	16.00	3.0702	11.00
F110	0.53	27.00	2.18	27.00	0.41	24.50	3.24	29.00
F112	0.52	22.00	2.10	17.50	0.39	19.00	3.14	17.50
F113	0.47	5.00	2.05	10.00	0.52 EH	30.00	3.00	6.50
F115	0.502	14.00	2.148	24.00	0.376	8.00	3.171	22.00
F116	0.488	7.00	1.95 L	3.00	0.351	4.00	3.14	17.50
F131	0.697 EH	32.00	2.014	7.00	0.586 EH	31.00	2.858 VL	3.00
F133	0.49	9.50	2.10	17.50	0.35	3.00	3.15	19.00
MEDIAN	0.5100		2.1000		0.3874		3.1400	
1CRIT	0.0859		0.1415		0.0816		0.1779	
N	31		30		28		31	
MEAN	0.5149		2.1040		0.3945		3.1541	
3STDEV	0.1368		0.2620		0.0978		0.5682	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	201.50	20.150	10					IC
F002	165.50	16.550	10					I.C.
F009	133.50	13.350	10	L				Dionex
F010	175.00	17.500	10	H				Titrn conduct.
F011	184.50	18.450	10	H H L				
F012	222.00	22.200	10	VHEH VL				IC
F014	267.00	26.700	10	VH H	BIASED HIGH*	-1.11	0.0637	
F015	94.50	9.450	10	VL L				IC
F017	132.50	13.250	10					
F020	185.00	18.500	10	H EH EH				IC
F025	86.50	8.650	10					Low Level IC
F026	245.00	24.500	10					DIONEX
F032	174.50	17.450	10					
F036	193.00	19.300	10	VH				
F037	163.00	27.167	6	EH VH EHEH	BIASED HIGH	-47.16	1.2338	I.C. WATERS
F038	93.00	15.500	6	EH H				IC
F042	167.00	16.700	10	VH EH VH				IC
F049	244.50	24.450	10					IC Dionex
F053	190.00	19.000	10					Ion Chromatography
F060	249.00	24.900	10	VH				IC
F068	144.50	14.450	10					IC, Dionex
F071	82.00	8.200	10					Ion Chromatograph
F074	89.50	8.950	10	EL				IC
F094	30.00	3.000	10	VL L VL	BIASED LOW	-12.47	-0.0020	IC
F107	92.00	9.200	10	EH				IC
F109	188.00	18.800	10					DIONEX
F110	239.00	23.900	10					IC Dionex
F112	171.00	17.100	10					DIONEX IC
F113	131.00	13.100	10	L EH				Dionex IC
F115	167.50	16.750	10					IC
F116	94.50	9.450	10	L L				Dionex IC
F131	240.00	24.000	10	EHEHEH EHEHEH EHVL				Ion Chromatography
F133	112.50	11.250	10					I.C.

* 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 16.609

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F094	30.00	3.000	10	VLLVL	BIASED LOW	-12.47	-0.0020	IC
F071	82.00	8.200	10					Ion Chromatograph
F025	86.50	8.650	10					Low Level IC
F074	89.50	8.950	10	EL				IC
F107	92.00	9.200	10	EH				IC
F015	94.50	9.450	10	VLL				IC
F116	94.50	9.450	10	LL				Dionex IC
F133	112.50	11.250	10					I.C.
F113	131.00	13.100	10	LEH				Dionex IC
F017	132.50	13.250	10					
F009	133.50	13.350	10	L				Dionex
F068	144.50	14.450	10					IC, Dionex
F038	93.00	15.500	6	EHH				IC
F002	165.50	16.550	10					I.C.
F042	167.00	16.700	10	VHEHVH				IC
F115	167.50	16.750	10					IC
F112	171.00	17.100	10					DIONEX IC
F032	174.50	17.450	10					
F010	175.00	17.500	10	H				Titrn conduct.
F011	184.50	18.450	10	HHL				
F020	185.00	18.500	10	HEHEH				IC
F109	188.00	18.800	10					DIONEX
F053	190.00	19.000	10					Ion Chromatography
F036	193.00	19.300	10	VH				
F001	201.50	20.150	10					IC
F012	222.00	22.200	10	VHEHVL				IC
F110	239.00	23.900	10					IC Dionex
F131	240.00	24.000	10	EHEHEHEHEHEHEHVL				Ion Chromatography
F049	244.50	24.450	10					IC Dionex
F026	245.00	24.500	10					DIONEX
F060	249.00	24.900	10	VH				IC
F014	267.00	26.700	10	VHH	BIASED HIGH*	-1.11	0.0637	
F037	163.00	27.167	6	EHVHEHEH	BIASED HIGH	-47.16	1.2338	I.C. WATERS

* 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 16.609

PARAMETER: 17001 Chloride Colour mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.14	3.00	0.11	2.50	0.58	4.00	1.85	3.00	0.40	2.50	0.29	3.00
F007	0.11	1.00	0.10	1.00	0.44	1.00	1.73	1.00	0.34	1.00	0.25	2.00
F008	0.2	4.00	0.2	4.00	0.6	5.00	1.9	4.50	0.5	5.00	0.4	5.00
F010	<0.1	0.00	<0.1	0.00	0.5	2.00	1.9	4.50	0.4	2.50	0.1	1.00
F026	0.119	2.00	0.110	2.50	0.533	3.00	1.8325	2.00	0.4045	4.00	0.296	4.00
F060	<0.5	0.00	<0.5	0.00	0.7	7.00	2.1	7.00	0.6	6.00	<0.5	0.00
F072	<0.20	0.00	0.204	5.00	0.612	6.00	2.04	6.00	0.612	7.00	0.408	6.00
MEDIAN	0.1295		0.1100		0.5800		1.9000		0.4045		0.2930	
1CRIT	0.3000		0.3000		0.3000		0.3720		0.3000		0.3000	
N	2		3		5		5		5		4	
MEAN	0.1295		0.1400		0.5650		1.9045		0.4609		0.3090	
3STDEV	-		-		-		-		-		-	

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.52	2.00	2.29	2.00	0.38	2.00	3.25	6.00
F007	0.44	1.00	2.16	1.00	0.35	1.00	3.17	2.00
F008	0.6	5.00	2.3	4.50	0.5	6.00	3.2	3.50
F010	0.6	5.00	2.3	4.50	0.4	4.00	3.2	3.50
F026	0.522	3.00	2.2995	3.00	0.3995	3.00	3.2365	5.00
F060	0.6	5.00	2.4	6.00	0.6	7.00	3.1	1.00
F072	0.816	7.00	2.65	7.00	0.408	5.00	3.47	7.00
MEDIAN	0.6000		2.3000		0.4000		3.2000	
1CRIT	0.3000		0.4040		0.3000		0.4760	
N	5		5		5		5	
MEAN	0.5684		2.3179		0.4175		3.2113	
3STDEV	-		-		-		-	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	30.00	3.000	10					Color/HgThioCN
F007	12.00	1.200	10					CPQ101E2
F008	46.50	4.650	10					FIA
F010	27.00	3.375	8					ICP
F026	31.50	3.150	10					AUTOANALYSER
F060	39.00	5.571	7					Color/Thiocyanate
F072	56.00	6.222	9					Titration

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

OVERALL AVERAGE
RANK IS 3.781

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F007	12.00	1.200	10					CPQ101E2
F003	30.00	3.000	10					Color/HgThioCN
F026	31.50	3.150	10					AUTOANALYSER
F010	27.00	3.375	8					ICP
F008	46.50	4.650	10					FIA
F060	39.00	5.571	7					Color/Thiocyanate
F072	56.00	6.222	9					Titration

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

OVERALL AVERAGE
RANK IS 3.781

PARAMETER: 19091 Potassium mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.05	0.00	0.06	24.00	0.26	30.00	0.28	25.00	0.08	24.50	0.16	27.50
F003	<0.02	0.00	0.04	19.00	0.26	30.00	0.29	27.00	0.06	9.50	0.16	27.50
F007	<0.020	0.00	0.025	4.00	0.242	25.00	0.307	32.00	0.062	12.50	0.147	20.00
F008	<0.2	0.00	<0.2	0.00	0.2	5.00	0.3	30.00	<0.2	0.00	<0.2	0.00
F009	0.01	6.50	0.04	19.00	0.23	14.00	0.26	11.00	0.07	18.50	0.15	24.50
F010	0.01	6.50	0.04	19.00	0.21	7.50	0.27	17.50	0.09	27.00	0.16	27.50
F011	0.017	12.00	0.035	11.50	0.237	19.50	0.27	17.50	0.062	12.50	0.145	17.50
F012	0.08 EH	20.00	0.12 VH	26.00	0.35 EH	34.00	0.37 EH	34.00	0.14 EH	29.00	0.28 EH	33.00
F014	<0.050	0.00	<0.050	0.00	0.159 VL	2.00	0.175 EL	1.00	<0.050	0.00	0.089 VL	1.00
F015	<0.1	0.00	<0.1	0.00	0.1 EL	1.00	0.3	30.00	<0.1	0.00	0.09 VL	2.00
F017	0.018W	0.00	0.036	13.50	0.237	19.50	0.271	21.00	0.072	21.00	0.146	19.00
F020	<0.02	0.00	<0.02	0.00	0.24	23.00	0.31 H	33.00	0.08	24.50	0.14	12.50
F025	0.009	2.50	0.026	5.00	0.213	9.00	0.251	8.00	0.051	7.00	0.135	9.50
F026	0.022	14.50	0.044	22.00	0.232	17.00	0.272	22.00	0.071	20.00	0.148	22.00
F032	0.012	10.00	0.034	10.00	0.244	26.00	0.288	26.00	0.064	15.00	0.148	22.00
F036	<0.020	0.00	0.035	11.50	0.235	18.00	0.265	14.00	0.06	9.50	0.145	17.50
F037	0.0563 H	19.00	0.1591 EH	27.00	0.3199 EH	33.00	0.2538	9.00	0.0899	26.00	0.1885 H	32.00
F038	0.01	6.50	0.03	7.50	0.23	14.00	0.27	17.50	0.05	5.00	0.14	12.50
F042	0.01W	0.00	0.03	7.50	0.23	14.00	0.27	17.50	0.06	9.50	0.14	12.50
F049	0.03	17.50	0.08 H	25.00	0.26	30.00	0.30	30.00	0.10 H	28.00	0.16	27.50
F053	0.013	11.00	0.039	16.00	0.231	16.00	0.27	17.50	0.063	14.00	0.144	16.00
F060	<0.6	0.00	<0.6	0.00	<0.6	0.00	<0.6	0.00	<0.6	0.00	<0.6	0.00
F068		0.00		0.00	0.225	11.50	0.264	13.00		0.00	0.135	9.50
F071	0.082 EH	21.00	0.038	15.00	0.285 H	32.00	0.278	24.00	0.078	22.00	0.143	15.00
F072	0.01	6.50	0.03	7.50	0.20	5.00	0.21 VL	2.00	0.05	5.00	0.12	5.00
F074	0.03	17.50	0.04	19.00	0.24	23.00	0.26	11.00	0.07	18.50	0.15	24.50
F094	0.01	6.50	0.03	7.50	0.20	5.00	0.23 L	4.00	0.05	5.00	0.12	5.00
F107	0.009	2.50	0.74 EH	28.00	0.25	27.00	0.27	17.50	0.065	16.00	0.17	31.00
F109	0.022T	14.50	0.036T	13.50	0.24	23.00	0.26	11.00	0.06	9.50	0.14	12.50
F110	0.028	16.00	0.052	23.00	0.253	28.00	0.298	28.00	0.079	23.00	0.161	30.00
F112	0.00	1.00	0.02	3.00	0.21	7.50	0.24	6.00	0.04	2.00	0.12	5.00
F115	0.021	13.00	0.040	19.00	0.239	21.00	0.274	23.00	0.066	17.00	0.148	22.00
F116	0.003W	0.00	0.005W	1.00	0.214	10.00	0.238	5.00	0.036W	0.00	0.123	7.00
F131	<0.02	0.00	<0.02	0.00	0.194 L	3.00	0.223 L	3.00	0.020 EL	1.00	0.106 L	3.00
F133	0.010	6.50	0.012	2.00	0.225	11.50	0.245	7.00	0.045	3.00	0.131	8.00
MEDIAN	0.0130		0.0370		0.2335		0.2700		0.0640		0.1450	
1CRIT	0.0300		0.0300		0.0367		0.0385		0.0300		0.0322	
N	19		26		32		32		27		31	
MEAN	0.0215		0.0450		0.2327		0.2684		0.0662		0.1424	
3STDEV	0.0538		0.0915		0.0852		0.0716		0.0424		0.0564	

PARAMETER: 19091 Potassium mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.17	28.00	0.38	26.50	0.19	30.50	0.27	30.00
F003	0.16	24.00	0.40	30.00	0.17	19.00	0.27	30.00
F007	0.159	21.50	0.384	28.00	0.176	24.50	0.269	28.00
F008	<0.2	0.00	0.4	30.00	<0.2	0.00	0.2 L	5.00
F009	0.16	24.00	0.35	13.00	0.18	27.00	0.24	12.50
F010	0.18	31.00	0.34	9.50	0.19	30.50	0.26	23.50
F011	0.152	15.50	0.362	19.00	0.17	19.00	0.255	17.00
F012	0.34 EH	33.00	0.53 EH	34.00	0.22 H	33.00	0.48 EH	34.00
F014	0.123	3.00	0.209 EL	1.00	0.106 VL	2.00	0.155 EL	2.00
F015	0.2 H	32.00	0.4	30.00	0.1 EL	1.00	0.1 EL	1.00
F017	0.152	15.50	0.358	16.00	0.17	19.00	0.26	23.50
F020	0.12 L	2.00	0.43 VH	33.00	0.18	27.00	0.18 VL	3.00
F025	0.140	7.50	0.364	20.00	0.163	15.00	0.267	26.50
F026	0.159	21.50	0.366	21.00	0.170	19.00	0.257	18.00
F032	0.156	18.50	0.372	24.00	0.176	24.50	0.274	32.00
F036	0.15	12.00	0.35	13.00	0.16	11.50	0.26	23.50
F037	0.1673	26.00	0.4044 H	32.00	0.1498	7.00	0.2252	7.00
F038	0.15	12.00	0.35	13.00	0.16	11.50	0.25	15.00
F042	0.14	7.50	0.34	9.50	0.16	11.50	0.25	15.00
F049	0.16	24.00	0.38	26.50	0.20	32.00	0.29	33.00
F053	0.154	17.00	0.359	17.00	0.168	16.00	0.258	19.50
F060	<0.6	0.00	<0.6	0.00	<0.6	0.00	<0.6	0.00
F068	0.156	18.50	0.335	8.00	0.160	11.50	0.238	11.00
F071	0.173	30.00	0.367	22.00	0.175	23.00	0.267	26.50
F072	0.15	12.00	0.30 L	3.00	0.14	4.50	0.22	6.00
F074	0.15	12.00	0.35	13.00	0.16	11.50	0.25	15.00
F094	0.13	4.50	0.33	5.00	0.15	8.00	0.23	9.50
F107	0.17	28.00	0.35	13.00	0.18	27.00	0.26	23.50
F109	0.15	12.00	0.36	18.00	0.17	19.00	0.27	30.00
F110	0.170	28.00	0.374	25.00	0.185	29.00	0.258	19.50
F112	0.13	4.50	0.33	5.00	0.14	4.50	0.24	12.50
F115	0.157	20.00	0.368	23.00	0.171	22.00	0.259	21.00
F116	0.131	6.00	0.333	7.00	0.141	6.00	0.229	8.00
F131	0.107 L	1.00	0.297 L	2.00	0.119 VL	3.00	0.199 VL	4.00
F133	0.145	9.00	0.330	5.00	0.160	11.50	0.230	9.50
MEDIAN	0.1540		0.3595		0.1700		0.2560	
1CRIT	0.0327		0.0430		0.0335		0.0378	
N	31		32		31		32	
MEAN	0.1537		0.3598		0.1642		0.2450	
3STDEV	0.0501		0.0863		0.0592		0.0860	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	246.00	27.333	9		BIASED HIGH*	-0.54	0.0189	FLAME
F003	216.00	24.000	9					Flame AA
F007	195.50	21.722	9					CPQ107E2
F008	70.00	17.500	4	L	INSUFFICIENT DATA			ICP/Flame
F009	170.00	17.000	10					ICP-MS
F010	199.50	19.950	10					ICP
F011	161.00	16.100	10					EPA-200.7
F012	310.00	31.000	10	EHVHEHEHEHEHEHEHH EH	BIASED HIGH	29.31	0.0709	ICP-MS
F014	12.00	1.714	7	VLEL VL ELVLEL	BIASED LOW	-47.82	0.0268	ICP-MS
F015	97.00	13.857	7	EL VLH ELEL				19111
F017	168.00	18.667	9					
F020	158.00	19.750	8	H L VH VL				IC
F025	110.00	11.000	10					Low Level IC
F026	197.00	19.700	10					FLAME AA
F032	208.00	20.800	10					
F036	130.50	14.500	9					
F037	218.00	21.800	10	H EHEH H H				ICP-MS
F038	114.50	11.450	10					ICPMS
F042	104.50	11.611	9					Flame AA, air
F049	273.50	27.350	10	H H	BIASED HIGH*	-1.10	0.0277	SAA Flame
F053	160.00	16.000	10					Atomic Absorption
F060	0.00	-	0		INSUFFICIENT DATA			ICP
F068	83.00	11.857	7					IC, Dionex
F071	230.50	23.050	10	EH H				Flame-AA
F072	56.50	5.650	10	VL L	BIASED LOW	-16.88	0.0015	AA air/C2H2
F074	165.00	16.500	10					AAS
F094	60.00	6.000	10	L	BIASED LOW	-8.96	-0.0070	IC
F107	213.50	21.350	10	EH				ICP
F109	163.00	16.300	10					AA- FLAME
F110	249.50	24.950	10					flame AAS
F112	51.00	5.100	10		BIASED LOW*	-3.18	-0.0178	AA2380 FLAME
F115	201.00	20.100	10					AA
F116	50.00	6.250	8		BIASED LOW*	0.57	-0.0275	AA Flame
F131	20.00	2.500	8	L L ELL L L VLVL	BIASED LOW	-5.85	-0.0363	Ion Chromatography
F133	73.00	7.300	10		BIASED LOW*	-4.05	-0.0100	FAA

* 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 16.406

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F060	0.00	-	0		INSUFFICIENT DATA			ICP
F014	12.00	1.714	7	VLELVLELVLEL	BIASED LOW	-47.82	0.0268	ICP-MS
F131	20.00	2.500	8	LLELLLLVLVL	BIASED LOW	-5.85	-0.0363	Ion Chromatography
F112	51.00	5.100	10		BIASED LOW*	-3.18	-0.0178	AA2380 FLAME
F072	56.50	5.650	10	VLL	BIASED LOW	-16.88	0.0015	AA air/C2H2
F094	60.00	6.000	10	L	BIASED LOW	-8.96	-0.0070	IC
F116	50.00	6.250	8		BIASED LOW*	0.57	-0.0275	AA Flame
F133	73.00	7.300	10		BIASED LOW*	-4.05	-0.0100	FAA
F025	110.00	11.000	10					Low Level IC
F038	114.50	11.450	10					ICPMS
F042	104.50	11.611	9					Flame AA, air
F068	83.00	11.857	7					IC, Dionex
F015	97.00	13.857	7	ELVLHELEL				19111
F036	130.50	14.500	9					
F053	160.00	16.000	10					Atomic Absorption
F011	161.00	16.100	10					EPA-200.7
F109	163.00	16.300	10					AA- FLAME
F074	165.00	16.500	10					AAS
F009	170.00	17.000	10					ICP-MS
F008	70.00	17.500	4	L	INSUFFICIENT DATA			ICP/Flame
F017	168.00	18.667	9					
F026	197.00	19.700	10					FLAME AA
F020	158.00	19.750	8	HLVHVL				IC
F010	199.50	19.950	10					ICP
F115	201.00	20.100	10					AA
F032	208.00	20.800	10					
F107	213.50	21.350	10	EH				ICP
F007	195.50	21.722	9					CPQ107E2
F037	218.00	21.800	10	HEHEHHH				ICP-MS
F071	230.50	23.050	10	EHH				Flame-AA
F003	216.00	24.000	9					Flame AA
F110	249.50	24.950	10					flame AAS
F002	246.00	27.333	9		BIASED HIGH*	-0.54	0.0189	FLAME
F049	273.50	27.350	10	HH	BIASED HIGH*	-1.10	0.0277	SAA Flame
F012	310.00	31.000	10	EHVHEHEHEHEHEHEHHEH	BIASED HIGH	29.31	0.0709	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 16.406

PARAMETER: 20091 Calcium mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.68	10.00	0.86	7.50	1.91	9.00	2.06	8.00	1.83	8.00	4.65	12.00
F002	0.73	26.00	0.86	7.50	1.89	6.50	2.03	7.00	1.84	10.00	4.65	12.00
F003	0.72	23.50	0.92	22.50	2.02	28.00	2.19	28.50	1.93	24.00	4.82	25.00
F007	0.733	28.00	0.936	28.00	2.01	26.50	2.17	25.00	1.91	16.50	4.85	26.00
F008	0.69	12.50	0.88	11.00	2.	22.00	2.19	28.50	1.88	14.00	4.79	17.50
F009	0.76	32.00	0.99	33.00	2.10	32.00	2.30	33.00	2.12 H	33.50	5.00	31.00
F010	0.61	5.50	0.89	13.00	1.89	6.50	2.10	11.50	1.91	16.50	4.80	21.00
F011	0.69	12.50	0.88	11.00	2.04	29.00	2.17	25.00	1.93	24.00	4.74	15.00
F012	0.45 VL	3.00	0.61 VL	4.00	1.38 EL	2.00	1.42 EL	2.00	1.35 EL	2.00	3.51 EL	2.00
F014	0.61	5.50	0.75 L	5.00	1.90	8.00	2.11	14.00	1.81	6.00	4.65	12.00
F015	0.7	16.00	0.9	15.50	2.	22.00	2.1	11.50	1.9	15.00	4.9	30.00
F017	0.714	22.00	0.917	20.50	1.99	17.50	2.144	19.00	1.915	18.00	5.033	32.00
F020	0.70	16.00	0.88	11.00	1.95	13.00	2.13	16.00	1.87	13.00	4.76	16.00
F025	0.710	20.00	0.911	19.00	2.005	25.00	2.243	32.00	1.94	26.50	5.245 VH	34.00
F026	0.773	33.00	0.997	34.00	2.091	31.00	2.235	31.00	2.035	32.00	4.794	19.00
F032	0.73	26.00	0.93	26.00	1.99	17.50	2.16	22.00	1.92	20.00	4.32 VL	4.00
F036	0.7	16.00	0.92	22.50	2.	22.00	2.16	22.00	1.92	20.00	4.8	21.00
F037	0.6326	7.00	0.139 EL	1.00	2.225 H	34.00	1.960 L	6.00	1.987	31.00	4.866	27.00
F038	0.7	16.00	0.91	17.50	1.94	11.50	2.1	11.50	1.84	10.00	4.62	9.50
F042	0.85 VH	35.00	0.93	26.00	1.94	11.50	2.16	22.00	1.82	7.00	4.55	7.00
F049	0.70	16.00	0.91	17.50	2.00	22.00	2.15	20.00	1.92	20.00	4.79	17.50
F053	0.684	11.00	0.892	14.00	1.938	10.00	2.087	9.00	1.868	12.00	4.61	8.00
F060	0.1 EL	2.00	0.6 VL	3.00	1.4 EL	3.00	1.7 VL	4.00	1.5 VL	3.00	4.0 VL	3.00
F071	0.459 VL	4.00	0.586 VL	2.00	1.266 EL	1.00	1.350 EL	1.00	1.182 EL	1.00	3.022 EL	1.00
F072	0.67	8.50	0.82	6.00	1.76 L	4.00	1.56 VL	3.00	1.74 L	4.00	4.54	6.00
F074	0.73	26.00	0.93	26.00	1.99	17.50	2.14	17.50	1.94	26.50	4.81	24.00
F094	0.75	30.50	0.96	31.50	2.16 H	33.00	2.33 H	34.00	2.12 H	33.50	5.17 H	33.00
F107	0.036 EL	1.00	0.95	29.50	1.99	17.50	2.12	15.00	1.97	29.00	4.89	28.50
F109	0.74	29.00	0.96	31.50	2.06	30.00	2.22	30.00	1.98	30.00	4.89	28.50
F110	0.72	23.50	0.90	15.50	1.97	14.00	2.10	11.50	1.84	10.00	4.62	9.50
F112	0.67	8.50	0.87	9.00	1.83	5.00	1.95 L	5.00	1.77	5.00	4.43 L	5.00
F115	0.712	21.00	0.925	24.00	1.971	15.00	2.140	17.50	1.925	22.00	4.806	23.00
F116	0.703	19.00	0.917	20.50	2.01	26.50	2.18	27.00	1.93	24.00	4.70	14.00
F131	0.829 H	34.00	1.111 VH	35.00	2.409 VH	35.00	2.571 VH	35.00	2.330 EH	35.00	5.335 VH	35.00
F133	0.750	30.50	0.950	29.50	2.000	22.00	2.170	25.00	1.950	28.00	4.800	21.00
MEDIAN	0.7000		0.9100		1.9900		2.1400		1.9150		4.7900	
1CRIT	0.0975		0.1080		0.1620		0.1695		0.1583		0.3020	
N	33		33		33		33		33		33	
MEAN	0.6742		0.8800		1.9500		2.0903		1.8821		4.7092	
3STDEV	0.3763		0.3000		0.4973		0.5631		0.4280		0.9307	

PARAMETER: 20091 Calcium mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.53	10.00	2.90	12.00	2.61	12.50	3.45	15.50
F002	2.49	8.00	2.85	9.50	2.53	9.00	3.29	8.00
F003	2.64	24.00	2.99	20.50	2.69	20.00	3.54	20.50
F007	2.65	27.00	3.00	23.50	2.74	25.00	3.59	26.00
F008	2.58	15.00	3.03	27.00	2.65	15.50	3.58	24.50
F009	2.85 H	33.00	3.22 H	34.00	2.93 H	33.00	3.79 H	31.00
F010	2.65	27.00	3.01	26.00	2.78	29.00	3.66	29.00
F011	2.6	19.00	2.96	18.00	2.66	17.00	3.42	12.50
F012	1.8 EL	2.00	2.02 EL	3.00	1.93 EL	2.00	2.61 EL	2.00
F014	2.86 H	34.00	2.58 VL	5.50	2.56	11.00	3.34	9.00
F015	2.6	19.00	3.1	29.00	2.7	22.50	3.5	17.50
F017	2.595	17.00	3.008	25.00	2.818	30.00	3.763 H	30.00
F020	2.56	13.50	2.94	17.00	2.64	14.00	3.50	17.50
F025	2.734	31.00	3.160	30.50	2.872	31.00	3.898 VH	33.00
F026	2.646	25.00	2.932	16.00	2.769	28.00	3.611	27.00
F032	2.28 VL	3.00	2.58 VL	5.50	2.43 L	6.00	3.24 L	6.00
F036	2.62	23.00	2.98	19.00	2.68	18.00	3.54	20.50
F037	2.544	11.00	3.175 H	32.00	2.272 VL	3.00	3.166 L	5.00
F038	2.56	13.50	2.93	14.50	2.61	12.50	3.44	14.00
F042	2.44	6.50	2.88	11.00	2.49	7.00	3.42	12.50
F049	2.60	19.00	2.99	20.50	2.70	22.50	3.53	19.00
F053	2.5	9.00	2.84	8.00	2.554	10.00	3.389	11.00
F060	2.3 VL	4.00	2.5 VL	4.00	2.4 L	4.00	3.1 VL	4.00
F071	1.614 EL	1.00	1.805 EL	1.00	1.616 EL	1.00	2.180 EL	1.00
F072	2.34 L	5.00	1.97 EL	2.00	2.42 L	5.00	2.74 VL	3.00
F074	2.61	22.00	2.93	14.50	2.69	20.00	3.58	24.50
F094	2.84 H	32.00	3.20 H	33.00	2.91 H	32.00	3.85 H	32.00
F107	2.59	16.00	2.85	9.50	2.69	20.00	3.38	10.00
F109	2.73	30.00	3.16	30.50	3.01 VH	34.00	4.32 EH	35.00
F110	2.55	12.00	2.91	13.00	2.65	15.50	3.45	15.50
F112	2.44	6.50	2.70 L	7.00	2.51	8.00	3.25 L	7.00
F115	2.604	21.00	2.994	22.00	2.721	24.00	3.572	23.00
F116	2.65	27.00	3.04	28.00	2.76	27.00	3.63	28.00
F131	3.121 VH	35.00	3.535 VH	35.00	3.049 VH	35.00	3.989 VH	34.00
F133	2.700	29.00	3.000	23.50	2.750	26.00	3.550	22.00
MEDIAN	2.6000		2.9600		2.6800		3.5000	
1CRIT	0.1925		0.2105		0.1965		0.2375	
N	33		33		33		33	
MEAN	2.5662		2.8888		2.6402		3.4654	
3STDEV	0.5707		0.8440		0.6028		0.8438	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	104.50	10.450	10					ICP
F002	103.50	10.350	10					A.A.
F003	236.50	23.650	10					Flame AA
F007	251.50	25.150	10					CPQ106E3
F008	187.50	18.750	10					ICP/Flame
F009	325.50	32.550	10	H H H H H	BIASED HIGH*	4.98	0.0670	ICP-MS
F010	185.00	18.500	10					ICP
F011	183.00	18.300	10					EPA-200.7
F012	24.00	2.400	10	VLVLELELELELELELELEL	BIASED LOW	-24.90	-0.1083	ICP-MS
F014	110.00	11.000	10	L H VL				ICP-MS
F015	198.00	19.800	10					20111
F017	231.00	23.100	10	H				
F020	147.00	14.700	10					ICP
F025	282.00	28.200	10	VH VH	BIASED HIGH	12.57	-0.1508	Low Level IC
F026	276.00	27.600	10					FLAME AA
F032	136.00	13.600	10	VLVLVLL L				
F036	204.00	20.400	10					
F037	157.00	15.700	10	ELH L H VLL				ICP-MS
F038	130.50	13.050	10					ICPOES
F042	145.50	14.550	10	VH				Flame AA, nitrous
F049	194.00	19.400	10					ICP
F053	102.00	10.200	10					Atomic Absorption
F060	34.00	3.400	10	ELVLELVLVLVLVLVLL VL	BIASED LOW*	-4.64	-0.3463	ICP
F071	14.00	1.400	10	VLVLELELELELELELELEL	BIASED LOW	-37.90	0.0061	Flame-AA
F072	46.50	4.650	10	L VLL L ELL VL	BIASED LOW	-11.84	-0.0763	AA air/C2H2
F074	218.50	21.850	10					AA
F094	324.50	32.450	10	H H H H H H H H	BIASED HIGH	8.68	0.0005	IC
F107	176.00	17.600	10	EL				ICP
F109	308.50	30.850	10	VHEH	BIASED HIGH	8.61	-0.0197	AA- FLAME
F110	140.00	14.000	10					flame AAS
F112	66.00	6.600	10	L L L L	BIASED LOW	-7.98	0.0165	AA2380 FLAME
F115	212.50	21.250	10					AA
F116	241.00	24.100	10					ICP
F131	348.00	34.800	10	H VHVHVHEHVHVHVHVHVH	BIASED HIGH	9.98	0.1681	Ion Chromatography
F133	256.50	25.650	10					FAA

* 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 18.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F071	14.00	1.400	10	VLVLELELELELELELELEL	BIASED LOW	-37.90	0.0061	Flame-AA
F012	24.00	2.400	10	VLVLELELELELELELELEL	BIASED LOW	-24.90	-0.1083	ICP-MS
F060	34.00	3.400	10	ELVLELVLVLVLVLVLLVL	BIASED LOW*	-4.64	-0.3463	ICP
F072	46.50	4.650	10	LVLLLELLVL	BIASED LOW	-11.84	-0.0763	AA air/C2H2
F112	66.00	6.600	10	LLLL	BIASED LOW	-7.98	0.0165	AA2380 FLAME
F053	102.00	10.200	10					Atomic Absorption
F002	103.50	10.350	10					A.A.
F001	104.50	10.450	10					ICP
F014	110.00	11.000	10	LHVL				ICP-MS
F038	130.50	13.050	10					ICPOES
F032	136.00	13.600	10	VLVLVLLL				
F110	140.00	14.000	10					flame AAS
F042	145.50	14.550	10	VH				Flame AA, nitrous
F020	147.00	14.700	10					ICP
F037	157.00	15.700	10	ELHLHVLL				ICP-MS
F107	176.00	17.600	10	EL				ICP
F011	183.00	18.300	10					EPA-200.7
F010	185.00	18.500	10					ICP
F008	187.50	18.750	10					ICP/Flame
F049	194.00	19.400	10					ICP
F015	198.00	19.800	10					20111
F036	204.00	20.400	10					
F115	212.50	21.250	10					AA
F074	218.50	21.850	10					AA
F017	231.00	23.100	10	H				
F003	236.50	23.650	10					Flame AA
F116	241.00	24.100	10					ICP
F007	251.50	25.150	10					CPQ106E3
F133	256.50	25.650	10					FAA
F026	276.00	27.600	10					FLAME AA
F025	282.00	28.200	10	VHVH	BIASED HIGH	12.57	-0.1508	Low Level IC
F109	308.50	30.850	10	VHEH	BIASED HIGH	8.61	-0.0197	AA- FLAME
F094	324.50	32.450	10	HHHHHHHH	BIASED HIGH	8.68	0.0005	IC
F009	325.50	32.550	10	HHHHH	BIASED HIGH*	4.98	0.0670	ICP-MS
F131	348.00	34.800	10	HVHVHVHEHVHVHVHVHVH	BIASED HIGH	9.98	0.1681	Ion Chromatography

* 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 18.000

PARAMETER: 13091 Aluminum mg/L

NATIONAL WATER RESEARCH INSTITUTE
NATIONAL LAB FOR ENVIRONMENTAL TESTING
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 = RAINGR-17		2 = RAINGR-03		3 = PLASTIC-94		4 = VANTAP-01		5 = RAINGR-06		6 = RAINGR-15	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.0076	7.00	0.0058	5.00	0.0124	10.00	0.0400	4.50	0.0016	1.00	0.0030	4.50
F008	<0.01	0.00	<0.01	0.00	0.016	13.00	0.046	11.50	<0.01	0.00	<0.01	0.00
F009	0.004	1.00	0.005	3.50	0.007	1.00	0.033 L	2.00	0.002	3.00	0.002	2.50
F010	0.005	2.00	0.002	1.00	0.009	2.00	0.056	17.00	0.017 VH	9.00	0.009	9.00
F011	8.7 EH	17.00	5.1 EH	16.00	11.6 EH	19.00	40.7 EH	21.00	<0.5	0.00	0.9 EH	15.00
F012	<0.02	0.00	<0.02	0.00	<0.02	0.00	0.04	4.50	<0.02	0.00	<0.02	0.00
F014	0.0090	8.50	0.0065	8.00	0.0135	12.00	0.0435	8.00	0.0021	5.00	0.0011	1.00
F015	0.007	5.00	0.006	6.50	0.012	8.00	0.046	11.50	<0.002	0.00	0.002	2.50
F025	0.04 VH	13.00	0.01	10.50	0.01	3.50	0.06 H	19.00	0.02 VH	10.00	0.02 VH	13.00
F026	0.0179 H	11.00	0.0150 H	12.00	0.0176	14.00	0.0575 H	18.00	<0.005	0.00	0.0105	12.00
F037	0.1065 VH	15.00	0.3144 EH	15.00	0.1472 VH	17.00	0.0521	16.00	0.0505 EH	12.00	0.1438 EH	14.00
F038	0.009	8.50	0.007	9.00	0.013	11.00	0.043	7.00	<0.005	0.00	<0.005	0.00
F049	0.007	5.00	0.005	3.50	0.012	8.00	0.041	6.00	0.002	3.00	0.003	4.50
F060	<0.008	0.00	<0.008	0.00	<0.008	0.00	0.031 L	1.00	<0.008	0.00	<0.008	0.00
F071	0.045 VH	14.00	0.028 VH	14.00	0.254 EH	18.00	0.066 VH	20.00	0.005	7.00	0.004	7.00
F072	<0.01	0.00	<0.01	0.00	0.01	3.50	0.05	14.00	<0.01	0.00	<0.01	0.00
F094	0.0215 VH	12.00	0.0226 VH	13.00	0.0215 H	16.00	0.0514	15.00	0.0404 VH	11.00	0.0092	10.00
F107	0.007	5.00	0.006	6.50	0.011	5.50	0.045	9.50	0.002	3.00	0.004	7.00
F110	0.010T	10.00	0.010T	10.50	0.012	8.00	0.045	9.50	0.010T	8.00	0.010T	11.00
F112	0.006	3.00	0.003	2.00	0.011	5.50	0.039	3.00	0.004	6.00	0.004	7.00
F116	0.183T EH	16.00	0.0132W	0.00	0.0214T H	15.00	0.0474T	13.00	0.0075W	0.00	0.0096W	0.00
MEDIAN OR *TARGET CONC.	0.0090		0.0068		0.0124		0.0460		0.0045		*0.0050	
1CRIT	0.0081		0.0080		0.0084		0.0110		0.0080		0.0080	
N	15		14		17		19		10		13	
MEAN	0.0321		0.0317		0.0355		0.0475		0.0104		0.0173	
3STDEV	0.1435		0.2361		0.1893		0.0239		0.0353		0.1105	

PARAMETER: 13091 Aluminum mg/L

SAMPLE	7 = RAIN-97M		8 = MAURI-MX		9 = GRM-03		10 = MERSEY-MX	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	0.0185	4.00	0.0628	5.00	0.0029	2.00	0.0484	5.00
F008	0.022	11.00	0.07	11.00	<0.01	0.00	0.058	12.50
F009	0.014	2.00	0.050 VL	1.50	0.008	9.00	0.036 VL	1.00
F010	0.036 VH	17.00	0.083 H	16.00	0.021 VH	13.00	0.071 H	17.00
F011	20.4 EH	20.00	60.9 EH	21.00	2.4 EH	17.00	46.1 EH	21.00
F012	<0.02	0.00	0.06	4.00	<0.02	0.00	0.04 L	3.00
F014	0.0220	11.00	0.0644	6.00	0.0035	5.00	0.0511	7.00
F015	0.019	5.00	0.072	12.50	0.004	6.00	0.055	10.00
F025	0.07 VH	18.00	0.09 VH	18.00	0.04 VH	16.00	0.08 VH	19.00
F026	0.0253	13.00	0.0847 H	17.00	0.0066	8.00	0.0583	14.00
F037	0.0910 EH	19.00	0.1888 VH	20.00	0.0299 VH	15.00	0.0567	11.00
F038	0.021	9.00	0.066	7.50	0.005	7.00	0.051	6.00
F049	0.020	7.00	0.072	12.50	0.003	3.50	0.058	12.50
F060	0.012 L	1.00	0.050 VL	1.50	<0.008	0.00	0.039 L	2.00
F071	0.026	14.00	0.171 VH	19.00	0.016 H	12.00	0.122 EH	20.00
F072	0.02	7.00	0.08	15.00	<0.01	0.00	0.06	16.00
F094	0.0298	15.00	0.0697	10.00	0.0104	11.00	0.0584	15.00
F107	0.022	11.00	0.059	3.00	0.002	1.00	0.046	4.00
F110	0.020	7.00	0.069	9.00	0.010T	10.00	0.052	8.50
F112	0.017	3.00	0.066	7.50	0.003	3.50	0.052	8.50
F116	0.0325T H	16.00	0.0732	14.00	0.0243T VH	14.00	0.0730 H	18.00
MEDIAN OR *TARGET CONC.	0.0220		0.0700		*0.0050		0.0567	
1CRIT	0.0091		0.0130		0.0080		0.0119	
N	18		18		15		19	
MEAN	0.0292		0.0834		0.0125		0.0595	
3STDEV	0.0576		0.1056		0.0331		0.0535	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	48.00	4.800	10		BIASED LOW	-9.96	-0.0013	ICPMS
F008	59.00	11.800	5					GF/ICP
F009	26.50	2.650	10	L VL VL	BIASED LOW	-30.10	-0.0006	ICP-MS
F010	103.00	10.300	10	VH VHH VHH				ICP
F011	167.00	18.556	9	EHEHEHEH EHEHEHEHEH	BIASED HIGH	-	-1.0360	EPA-200.8
F012	11.50	3.833	3	L	INSUFFICIENT DATA			ICP-MS
F014	71.50	7.150	10					ICP-MS
F015	67.00	7.444	9					GFAA
F025	140.00	14.000	10	VH H VHVHVHVHVHVH				ICP-AES
F026	119.00	13.222	9	H H H H				I.C.P.
F037	154.00	15.400	10	VHEHVH EHEHEHVHVH	BIASED HIGH	-127.72	0.1247	ICP-MS
F038	65.00	8.125	8					ICPMS
F049	65.50	6.550	10					SAA FG
F060	5.50	1.375	4	L L VL L	INSUFFICIENT DATA			ICP
F071	145.00	14.500	10	VHVHEHVH VHH EH				Furnace-AA
F072	55.50	11.100	5					GFAA
F094	128.00	12.800	10	VHVHH VH				ICP
F107	55.50	5.550	10					ICP
F110	91.50	9.150	10					furnace
F112	49.00	4.900	10		BIASED LOW*	-5.00	-0.0022	HGA 300 FURNACE
F116	106.00	15.143	7	EH H H VHH				ICP

* 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
F060	5.50	1.375	4	LLVLL	INSUFFICIENT DATA			ICP
F009	26.50	2.650	10	LVLVL	BIASED LOW	-30.10	-0.0006	ICP-MS
F012	11.50	3.833	3	L	INSUFFICIENT DATA			ICP-MS
F001	48.00	4.800	10		BIASED LOW	-9.96	-0.0013	ICPMS
F112	49.00	4.900	10		BIASED LOW*	-5.00	-0.0022	HGA 300 FURNACE
F107	55.50	5.550	10					ICP
F049	65.50	6.550	10					SAA FG
F014	71.50	7.150	10					ICP-MS
F015	67.00	7.444	9					GFAA
F038	65.00	8.125	8					ICPMS
F110	91.50	9.150	10					furnace
F010	103.00	10.300	10	VHVHHVHH				ICP
F072	55.50	11.100	5					GFAA
F008	59.00	11.800	5					GF/ICP
F094	128.00	12.800	10	VHVHHVH				ICP
F026	119.00	13.222	9	HHHH				I.C.P.
F025	140.00	14.000	10	VHHVHVHVHVHVHVH				ICP-AES
F071	145.00	14.500	10	VHVHEHVHVHHEH				Furnace-AA
F116	106.00	15.143	7	EHHHVHH				ICP
F037	154.00	15.400	10	VHEHVHEHEHEHVHVH	BIASED HIGH	-127.72	0.1247	ICP-MS
F011	167.00	18.556	9	EHEHEHEHEHEHEHEHEH	BIASED HIGH	-	-1.0360	EPA-200.8

* 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 9.682

National Water Research Institute
Environment Canada
Canada Centre for Inland Waters

P.O. Box 5050
867 Lakeshore Road
Burlington, Ontario
Canada L7R 4A6

Institut national de recherche sur les eaux
Environnement Canada
Centre canadien des eaux intérieures

Case postale 5050
867, chemin Lakeshore
Burlington, Ontario
Canada L7R 4A6

Environment Canada Environnement Canada

Canada