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STUDY FP77 - RAIN & SOFT WATERS FALL 2000

J. BLUM and H. ALKEMA

NLET-TN00-014

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National Water Research Institute

National Laboratory for Environmental Testing

NLET-TN00-014

Ecosystem Performance Evaluation Quality Assurance Program Rain and Soft Waters*

Study FP 77 - Final Report

Fall 2000

by

J. Blum and H. Alkema

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

December 2000

*companion studies: Major Ions & Nutrients/Total P NLET-TN00-012 and Trace Elements/Mercury NLET-TN00-013

Management Perspective

Quality assured analytical results are critical when transforming environmental analytical data into useful scientific advice. In the area of water analysis, the NLET branch of NWRI provides a variety of QA products and services geared to assisting EC labs provide quality assured analytical results. One of the most valuable QA services provided is the performance evaluation (PE) studies. The PE studies conducted by NLET fill a parameter and concentration gap not covered by any other PE or proficiency testing (PT) program. Participant labs find the NLET PE studies very useful to improve the quality of their analytical processes, while project leaders use the results of these studies to enable them to better compare data generated from different laboratories, in both the private and public sector. These studies are provided to EC laboratories, affiliate institutions in Canada and the US, and other public and private laboratories for a cost recovery fee.

The PE studies are created using many water types of natural waters and their associated parameter groups as the raw material. The availability of so many different water types in Canada is ideally suited to the preparation of test samples spanning the complete range of available water matrices. Waters range from very soft natural rainwaters, to soft waters found in Ontario, Quebec and British Columbia and to hard surface waters found in the Prairies and Canadian groundwaters. The chemical composition of the natural waters are diverse, and include 50 different parameters for nutrients, minerals and trace elements. Special studies are provided for Total Phosphorus and ambient Mercury.

Evaluations of laboratory performance are timely and complete. Laboratories receive a preliminary report which discloses systematic bias and precision. The final reports, which are also scheduled, provide a complete listing of current and historical performance. Individual performance appraisals indicate areas and parameters where remedial action is required to improve performance. In this way, the PE studies are effective for improved performance of laboratories.

Methodologies and approaches in analytical laboratories change as research and monitoring programs evolve. The PE studies, while large in terms of the number of laboratories being assessed, are flexible enough to respond to these changing requirements. Feedback from laboratories is solicited and assessed on a regular basis, and changes to the studies are implemented to meet these new needs. One recent example of this change is the development of a customised PE study to assess trace elements in natural sediments for the Metals in the Environment (MITE) Program being conducted by Canadian universities. This study is being added to the PE program in the 2000-01 fiscal year.

Perspective de gestion

Il est crucial de disposer de résultats d'analyse ayant subi une assurance de la qualité (AQ) lorsqu'on transforme des données analytiques environnementales en conseils scientifiques utiles. Dans le domaine de l'analyse de l'eau, le LNEE de l'INRE offre une gamme de produits et de services AQ visant à aider les laboratoires d'EC à produire des données d'analyse dont la qualité est assurée. Parmi les services AQ les plus valables figurent les études d'évaluation de la performance (EP) interlaboratoires. Les études EP réalisées par le LNEE comblent une lacune. Aucun autre programme EP ou de vérification de la compétence (VC) n'avait permis de recueillir des données sur les paramètres et les concentrations. Les laboratoires participants estiment que les études EP du LNEE sont très utiles pour améliorer la qualité de leurs processus d'analyse. Les chefs de projet utilisent les résultats de ces études pour les aider à comparer des données provenant de laboratoires différents, privés ou publics. Ces études sont en effet réalisées pour des laboratoires d'EC, des institutions affiliées du Canada et des États-Unis et d'autres laboratoires publics et privés selon la formule de recouvrement des coûts.

Pour les études EP, on utilise comme échantillons bruts de nombreux types d'eau naturelle et leurs paramètres associés. Le grand nombre de types d'eau qui existent au Canada permet de préparer suffisamment d'échantillons d'essai pour couvrir l'éventail complet des matrices d'eau disponibles, allant des eaux de pluie naturelles très douces que l'on trouve en Ontario, au Québec et en Colombie-Britannique aux eaux superficielles dures des Prairies et aux eaux souterraines. La composition chimique des eaux naturelles varie et comporte 50 paramètres différents sur les nutriments, les minéraux et les éléments traces. Des études spéciales portent sur le phosphore total et le mercure ambiant.

Les évaluations de la performance des laboratoires sont exécutées au moment opportun et de façon exhaustive. Les laboratoires reçoivent un rapport provisoire indiquant le biais systématique et le niveau de précision. Les rapports finaux, dont la date de livraison est également fixée, contiennent toutes les données sur la performance tant actuelle qu'antérieure. Les évaluations individuelles de la performance indiquent les secteurs et les paramètres envers lesquels il faut prendre des mesures correctives pour améliorer la performance. Les études EP s'avèrent ainsi efficaces pour améliorer la performance des laboratoires.

À mesure que les programmes de recherche et de suivi évoluent, les méthodologies et les approches utilisées par les laboratoires d'analyse se transforment. Les études EP, bien que vastes, compte tenu du nombre de laboratoires évalués, sont suffisamment souples pour tenir compte des changements. Pour ce faire, on invite régulièrement les laboratoires à communiquer leurs commentaires et on s'en sert pour modifier les études. À titre d'exemple de changement, mentionnons la conception sur mesure d'une étude EP pour évaluer les éléments traces dans les sédiments naturels aux fins du programme Métaux dans l'environnement mis en oeuvre par des universités canadiennes. Cette étude s'ajoute au programme EP au cours de l'année financière 2000-2001.

Abstract

Performance evaluation studies are an important part of assuring the accuracy and integrity of analytic results. NLET provides these PE studies as part of its mandate. The branch provides this service to all EC laboratories and to many affiliated institutions in Canada and the US. Such a wide range of institutions and laboratories, in turn, provides a diversity of data which gives greater credibility to data analysis and laboratory performance statements.

Evaluation of the analytic results is the most visible aspect of PE studies. All results are evaluated for the two important aspects of data - systematic bias and precision. The former is extremely important for comparability of data sets from different origins and the latter, precision, is a measure of the reliability of the data. For the NLET PE studies, systematic bias is tested with the non-parametric method of Youden, and precision is tested against precision functions developed by the quality assurance staff. Both evaluations are totalled to give a performance rating for each laboratory.

Performance ratings for laboratories are given in relative terms. Laboratories are ranked from the best performance to the lowest (the least flagged results to the most flagged). In real terms, good laboratories have few flagged results and the laboratories with poor performance may have half their results flagged. These results are summarised in individual laboratory appraisals which are sent to the lab managers in a timely, expedient manner. This objective, third party performance rating is valued by the laboratory managers and data users alike.

Evaluations include historical listings of performance. With these historical listings laboratories may track their previous performance and see the effectiveness of their remedial action. This unique and highly developed tool helps many laboratories generate more reliable and accurate data.

Résumé

Les études d'évaluation de la performance (EP) constituent un volet important de l'assurance de l'exactitude et de l'intégrité des résultats d'analyse. Dans le cadre de son mandat, le LNEE offre ce service à tous les laboratoires d'EC et à ses nombreuses institutions affiliées du Canada et des États-Unis. En raison de leur grand nombre, ces institutions et laboratoires fournissent en contrepartie des données diversifiées qui ajoutent à la crédibilité des analyses et des énoncés sur la performance des laboratoires.

L'évaluation des données d'analyse est l'aspect le plus visible des études EP. Elle porte sur deux aspects importants – le biais systématique et la précision. Le premier aspect est essentiel à la comparaison d'ensembles de données de sources différentes; le second aspect permet de mesurer le degré de fiabilité des données. Aux fins des études EP du LNEE, on teste le biais systématique par la méthode non paramétrique de Youden, et la précision, au moyen de fonctions sur la précision mises au point par le personnel chargé de l'assurance de la qualité. Les deux évaluations sont combinées pour coter la performance de chaque laboratoire.

La performance des laboratoires est cotée en termes relatifs. Les laboratoires sont classés du plus performant au moins performant. En termes réels, les laboratoires performants ont un faible nombre de résultats marqués tandis que les laboratoires peu performants peuvent avoir la moitié de leurs résultats marqués. Les évaluations remises dans un délai raisonnable aux gestionnaires de laboratoire contiennent un résumé des données. Cette évaluation objective par une tierce partie est utile tant pour les gestionnaires que pour les utilisateurs des données.

Comme les évaluations contiennent des données sur les performances antérieures, les laboratoires peuvent comparer leur performance avant et après la prise de mesures correctives. Cet outil exceptionnel et perfectionné aide nombre de laboratoires à produire des données plus fiables et plus exactes.

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NWRI Performance Evaluation Quality Assurance Studies

NWRI's performance evaluation quality assurance (QA) studies support a core group of government labs and various environmental programs. The QA program also addresses health issues such as toxic metal (lead, manganese and mercury) contamination of drinking water. US government agencies as well as the Canadian Metals in the Environment (MITE) program participate in the semi-annual studies along with many global participants. More than 200 labs are invited to participate, with approximately 60 labs completing analyses of the various study matrices.

The primary feature of these studies is the quality of data produced by the participating labs. Lab 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 problem areas within labs, as well participation quantifies lab performance and data quality.

These NWRI studies are an independent client driven QA service with consulting on all aspects of the program. The format of this report has been revised by eliminating the duplication of Appendix A, which is available in any previous report. We expect this information to be on our website in the near future at www.cciw.ca/nwri/nlet/nlet.html.

NWRI studies run on a voluntary and cost recovery basis, which leads to ongoing interest in study design and sample requirements by lab and program managers. Proposals for specialised studies are welcomed.

Table 1 List of participating† laboratories in acid rain & soft water study FP 77

Adirondack Lakes Survey Corporation
ALS Chemex
CRD, Water Department Lab
Environment Canada - MSC, CAPMoN Lab
Environment Canada - ETC, AAQD
Environment Canada - ESC, Atlantic
Environment Canada - NHRC, WQL
Environment Canada - NWRI, NLET
Environment Canada - PESC
Environnement Canada - CSL, Laboratoire regional, Quebec
Enviro-Test Laboratories
ESE Inc. - Florida
Environmental Services Laboratory Inc.
Harvard School of Public Health
Illinois State Water Survey - Analytical Chemistry Unit
Laboratoire de Santé Publique du Québec
Lakehead University Centre for Analytical Services
Maxxam Analytics Inc.
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 Lab
Natural Resources Canada - CFS, Atlantic
Natural Resources Canada - CFS, Ontario
New Brunswick Department of the Environment
Ontario Ministry of the Environment - Dorset
Ontario Ministry of the Environment - Etobicoke
Ontario Ministry of Northern Development and Mines - Geosciences Lab
Pennsylvania State University - ERRI
Petroleo Brasileiro SA/CENPES/DIQUIM/SEQUIN
Philip Analytical Services
State of Vermont - Department of Environmental Conservation Lab
TAIGA Environmental Lab
US EPA, Corvallis
US GS, Troy
US GS, NWQL
University of Maine - WRI
University of Virginia - Department of Environmental Services

†Labs select their routine parameters for this study

Table 2 Laboratory Performance Scores Study 77 Rain & Soft Waters

	SYSTEMATIC BIAS			FLAGGED RESULTS			
LAB CODE	# ANALYZED PARAMETERS	# BIASES	% BIASED PARAMETERS	# RESULTS RANKED	# FLAGS ASSIGNED	% RESULTS FLAGGED	AVE. BIAS & FLAGS (%)
F017	9	0	0.00	78	0	0.00	0.00
F118	3	0	0.00	27	0	0.00	0.00
F115	12	0	0.00	120	1	0.83	0.42
F156	10	0	0.00	96	1	1.04	0.52
F068	6	0	0.00	55	1	1.82	0.91
F122	4	0	0.00	40	1	2.50	1.25
F007	15	0	0.00	133	5	3.76	1.88
F003	16	1	6.25	154	2	1.30	3.77
F117	13	1	7.69	127	7	5.51	6.60
F139	3	0	0.00	26	4	15.38	7.69
F110	11	1	9.09	109	9	8.26	8.67
F032	15	1	6.67	138	16	11.59	9.13
F053	10	2	20.00	96	0	0.00	10.00
F036	16	2	12.50	149	18	12.08	12.29
F002	13	2	15.38	115	11	9.57	12.47
F109	11	1	9.09	110	18	16.36	12.73
F026	17	3	17.65	168	16	9.52	13.59
F037	12	2	16.67	117	13	11.11	13.89
F113	16	2	12.50	160	26	16.25	14.38
F112	15	1	6.67	150	34	22.67	14.67
F107	17	2	11.76	170	31	18.24	15.00
F004	4	1	25.00	39	2	5.13	15.06
F072	16	2	12.50	137	25	18.25	15.37
F014	17	1	5.88	139	36	25.90	15.89
F042	16	4	25.00	146	14	9.59	17.29
F071	11	1	9.09	104	27	25.96	17.53
F094	19	2	10.53	171	42	24.56	17.54
F025	10	2	20.00	95	18	18.95	19.47
F133	13	2	15.38	121	29	23.97	19.68
F015	19	3	15.79	154	43	27.92	21.86
F020	15	4	26.67	138	27	19.57	23.12
F011	16	2	12.50	139	49	35.25	23.88
F094a	5	1	20.00	40	14	35.00	27.50
F009	7	2	28.57	68	19	27.94	28.26
F159	10	3	30.00	85	32	37.65	33.82
F147	15	5	33.33	136	48	35.29	34.31
F010	18	6	33.33	160	59	36.88	35.10
F012	7	4	57.14	70	32	45.71	51.43

Laboratory parameters are selected from:

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

Table 3

Summary of Study-to-Study Performance
Rain & Soft Waters

% BIASED PARAMETERS & FLAGGED RESULTS ON STUDIES

LAB	0068	0069	0070	0071	0072	0073	0074	0075	0076	0077	MEDIAN	RATING
F002	14.1	3.2	10.4	2.7	6.4	7.1	9.3	4.0	13.5	12.5	8.2	SATISFACTORY
F003	4.3	7.1	2.6	13.5	7.5	9.4	1.6	4.3	9.8	3.8	5.7	SATISFACTORY
F004	-	3.5	4.1	18.1	15.2	0.0	1.1	2.7	1.4	15.1	3.5	GOOD
F007	12.3	11.8	9.2	0.0	9.5	2.0	0.8	10.8	3.6	1.9	6.4	SATISFACTORY
F009	14.0	16.0	2.9	21.7	5.9	2.4	2.6	4.3	26.4	28.3	9.9	SATISFACTORY
F010	1.6	-	7.3	7.2	15.6	10.4	18.6	25.6	19.7	35.1	15.6	MODERATE
F011	12.3	33.6	17.4	12.5	-	-	26.2	-	18.7	23.9	18.7	MODERATE
F012	41.9	-	35.5	40.4	-	15.0	-	46.4	38.3	51.4	40.4	POOR
F014	8.7	18.1	6.0	21.7	23.2	20.1	11.7	9.9	14.2	15.0	14.6	MODERATE
F015	7.1	12.4	14.4	25.3	17.4	20.5	17.2	8.7	20.4	21.0	17.3	MODERATE
F017	9.3	1.3	1.2	0.7	0.6	0.0	8.6	1.2	4.9	0.0	1.2	GOOD
F020	-	23.9	23.7	20.3	19.0	22.5	16.3	14.6	22.9	23.1	22.5	MODERATE
F025	-	-	22.9	27.9	8.9	24.7	8.4	7.8	47.0	19.5	21.2	MODERATE
F026	5.6	6.2	15.0	3.0	4.7	10.3	5.3	11.2	10.6	13.6	8.3	SATISFACTORY
F032	16.1	13.7	17.3	10.3	6.0	11.4	8.7	9.3	4.9	8.7	9.8	SATISFACTORY
F036	11.8	4.0	3.1	5.1	1.1	0.4	3.1	4.8	10.0	12.3	4.4	GOOD
F037	35.7	18.8	37.7	47.8	31.9	25.5	24.5	20.0	9.8	13.9	25.0	MODERATE
F042	7.7	-	7.3	23.0	6.5	16.7	1.9	3.8	6.9	17.3	7.3	SATISFACTORY
F053	9.7	31.3	9.2	1.1	0.5	2.7	0.5	7.6	3.2	10.0	5.4	SATISFACTORY
F068	14.1	0.0	1.6	16.1	4.8	0.0	0.8	0.0	2.5	0.9	1.2	GOOD
F071	11.4	18.7	-	27.9	37.3	11.2	15.8	14.5	4.0	17.5	15.8	MODERATE
F072	-	-	35.5	29.1	21.9	35.9	28.7	-	19.6	15.4	28.7	MODERATE
F094	-	-	-	35.0	20.6	20.5	29.0	30.5	26.2	17.5	26.2	MODERATE
F094a	-	-	-	-	-	-	-	6.9	17.0	27.5	17.0	MODERATE
F107	-	7.0	27.1	13.9	19.4	17.5	29.1	11.0	7.3	15.0	15.0	MODERATE
F109	10.8	16.2	3.6	12.9	1.2	21.0	7.1	5.0	1.1	12.7	9.0	SATISFACTORY
F110	-	-	8.2	5.8	4.2	8.4	9.6	18.2	18.3	8.7	8.5	SATISFACTORY
F112	-	11.7	12.6	6.4	10.3	17.2	7.1	15.3	10.7	14.7	11.7	SATISFACTORY
F113	-	-	-	18.5	6.5	2.0	6.0	4.7	7.0	14.4	6.5	SATISFACTORY
F115	-	0.4	-	0.0	-	0.8	-	0.8	-	0.4	0.4	GOOD
F117	-	-	-	-	-	-	-	-	-	6.6	-	-
F118	3.8	42.0	87.2	5.2	1.3	5.0	9.0	6.8	51.5	0.0	6.0	SATISFACTORY
F122	2.6	3.9	4.2	6.1	37.3	1.4	1.4	3.8	2.6	1.2	3.2	GOOD
F133	-	-	6.2	5.8	14.4	8.5	16.1	16.0	22.4	19.7	15.2	MODERATE
F139	-	-	-	-	55.3	77.9	25.0	66.6	18.8	7.7	40.2	POOR
F147	-	-	-	-	-	-	36.0	24.6	-	34.3	34.3	POOR
F156	-	-	-	-	-	-	-	23.5	13.8	0.5	13.8	MODERATE
F159	-	-	-	-	-	-	-	18.1	28.9	33.8	28.9	MODERATE

INTERLAB MEDIAN	0068	0069	0070	0071	0072	0073	0074	0075	0076	0077
	10.8	11.8	9.2	13.5	9.5	10.4	9.0	9.3	13.5	14.7

STUDY DATES: 0068(Spring '96), 0069(Fall '96), 0070(Spring '97), 0071(Fall '97), 0072(Spring '98), 0073(Fall '98), 0074(Spring '99), 0075(Fall '99), 0076(Spring '00), 0077(Fall '00).

DEFINITION OF RATING:

Good = 0 to 4.99%
Satisfactory = 5 to 12.49%
Moderate = 12.5 to 29.99%
Poor = >30%

Table 4 Sample design for acid rain and soft waters FP 77

Sample Number	Sample Name	Source (Province/State)	Expected Conductance (μS/cm, 25° C)
FP77 SW-1	Rain-Sup-93	Lake Superior, Ontario	7.6
FP77 SW-2	Raingr-16	Greenhouse rain Grimsby, Ontario	9.2
FP77 SW-3	Beski-01	Beaverskin River, Ontario	24.1
FP77 SW-4	AES-01	CAPMoN Precip. Labs, Ontario	13.4
FP77 SW-5	Gat-99	Gatineau River, Quebec	36.9
FP77 SW-6	Mauri-Mx	Maurice/Cartier Rivers, Quebec	32.3
FP77 SW-7	Aux-98	Aux Sauble River, Ontario	36.1
FP77 SW-8	Mersey-Mx	Mersey River, Nova Scotia (diluted)	39.8
FP77 SW-9	Trky-94	Turkey Lakes, Ontario	41.2
FP77 SW-10	Trois-02A	Trois Rivieres, Quebec	31.9

Table 5 **Summary of Median Values for Rain & Soft Waters - Study 77**

PARAMETER		Rain-Sup-93 Sample 1	Raingr-16 Sample 2	Beski-01 Sample 3	AES-01 Sample 4	Gat-99 Sample 5
Alkalinity Gran Titn	mg/L CaCO3	2.9600	-0.1700	0.0280	-1.2500	9.4000
Alkalinity Fixed pH 4.5	mg/L	4.5145	1.3250	1.6000	0.5000	11.150
Aluminum	mg/L	0.0020	0.0071	0.0139	0.0033	0.0534
Ammonia	mg/L N	0.0050	0.0692	0.0090	0.1900	0.0050
Calcium	mg/L	0.9600	0.6040	0.4030	0.1745	4.5200
Chloride Colour	mg/L	0.1330	0.1660	4.2710	0.1970	1.0170
Chloride IC	mg/L	0.1032	0.1500	4.3545	0.2025	0.8230
Colour	Hazen Unit	1.0000	2.0000	3.5000	3.0000	31.900
Diss Inorg Carbon	mg/L C	1.0000	0.2900	0.3000	0.3400	2.3000
Diss Organic Carbon	mg/L C	0.1878	0.2149	0.9686	0.3550	5.3515
Magnesium	mg/L	0.2000	0.1800	0.4000	0.0330	0.8600
Nitrate + Nitrite	mg/L N	0.0220	0.3500	0.0740	0.2160	0.1390
Nitrate-IC	mg/L N	0.0220	0.3400	0.0740	0.2100	0.1375
Potassium	mg/L	0.0395	0.0200	0.2400	0.0330	0.4400
Reactive Silica	mg/L Si	0.0823	0.0200	0.3695	0.0100	2.0485
Sodium	mg/L	0.1000	0.0695	2.7820	0.1100	1.0560
Specific Conductance	µS/cm	7.5630	9.2150	24.100	13.410	36.900
Sulfate Colour	mg/L	-	1.2725	2.1525	1.4575	4.8500
Sulfate IC	mg/L	0.2521	1.3714	2.2860	1.5700	4.4125
Total Kjeldahl N	mg/L N	0.0240	0.1000	0.0690	0.2080	0.1800
pH	pH Units	6.7400	5.3100	5.5200	4.6700	7.1000

		Mauri-Mx Sample 6	Aux-98 Sample 7	Mersey-Mx Sample 8	Trky-94 Sample 9	Trois-02A Sample 10
Alkalinity Gran Titn	mg/L CaCO3	5.6500	8.0550	3.5600	7.2200	5.0200
Alkalinity Fixed pH 4.5	mg/L	7.2445	9.6500	4.9500	8.7750	6.5750
Aluminum	mg/L	0.0600	0.0081	0.0335	0.0200	0.0650
Ammonia	mg/L N	0.0050	0.0400	0.0050	0.2988	0.0380
Calcium	mg/L	2.9600	3.6540	3.5635	4.6410	2.5000
Chloride Colour	mg/L	2.2000	0.8670	3.2000	0.5590	1.8000
Chloride IC	mg/L	2.1036	0.8295	3.1045	0.5410	1.6650
Colour	Hazen Unit	24.000	11.600	20.000	7.5500	34.000
Diss Inorg Carbon	mg/L C	1.4700	2.0200	1.0000	1.8950	1.2150
Diss Organic Carbon	mg/L C	3.9250	2.5950	2.3800	1.6000	5.2500
Magnesium	mg/L	0.5600	0.9400	0.9120	0.8600	0.6200
Nitrate + Nitrite	mg/L N	0.1690	0.0285	0.8900	0.9020	0.0700
Nitrate-IC	mg/L N	0.1670	0.0280	0.8735	0.8680	0.0700
Potassium	mg/L	0.3500	0.4000	0.2540	0.2010	0.5000
Reactive Silica	mg/L Si	2.2800	1.9020	1.2380	0.7755	1.9800
Sodium	mg/L	2.0320	1.2800	1.7850	0.5800	2.2200
Specific Conductance	µS/cm	32.300	36.100	39.800	41.200	31.850
Sulfate Colour	mg/L	4.1675	5.9500	4.9000	6.0325	5.3000
Sulfate IC	mg/L	3.7900	5.8100	4.6720	5.9670	4.6800
Total Kjeldahl N	mg/L N	0.1200	0.1430	0.1200	0.4200	0.1995
pH	pH Units	6.8900	7.1100	6.7300	7.0800	6.8950

Appendix

Data & Evaluation Summary

PARAMETER: 00392 Specific Conductance uS/cm

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F002	7.96	9.25	24.1	13.1	36.9	32.4	36.5	40.7	42.6	32.7
F003	7.9	9.8	24.9	13.9	38.0	33.1	37.2	40.2	41.9	32.6
F004	7.89	9.38	24.3	14.3	37.4	32.6	36.6	40.1	41.5	32.1
F007	7.65	9.39	24.1	13.6	36.9	32.2	36.0	39.2	40.7	31.5
F009	8.	9.	24.	14.	38.	35. H	37.	41.	42.	33.
F010	7.3	8.9	23.9	12.7	36.8	32.2	36.3	39.8	41.2	31.8
F011	7.6	9.4	24.2	14.7	37.0	32.3	36.1	43.2 H	41.4	32.3
F014	8.26	8.96	24.7	12.6	36.7	33.1	36.6	40.4	41.5	31.9
F015	9.	9.	24.	9. EL	36.	31.	35.	39.	40.	31.
F020	3.925 EL	6.414 EL	21.55 L	11.56 L	35.51	30.41	34.77	38.19	39.58	30.14
F026	8.2	9.89	25.5	14.1	38.6	33.9	38.0	41.5	43.0	33.6
F032	7.12	8.52	23.0	12.5	34.6	29.9 L	33.4 L	36.9 L	38.7 L	30.5
F036	6.6	9.2	23.6	11.2 L	34.8	30.8	33.8	38.6	39.6	30.4
F037	7.5	9.53	24.5	14.25	37.	32.5	36.6	40.2	41.3	32.2
F042	6.73	8.40	22.8	13.4	35.0	30.7	34.5	37.8	39.2	30.3
F053	7.4	9.8	24.5	14.5	37.4	33.0	37.5	40.2	41.3	33.0
F071	6.75	8.93	21.9 L	12.92	32.5 EL	29.4 L	33.7 L	36.5 L	38.3 L	29.9
F072	7.63	9.25	24.3	13.9	37.1	32.7	36.5	39.8	41.2	32.0
F094	8.6	10.3	25.8	14.9	39.1	34.3	38.4	42.	43.1	33.4
F107	7.09	8.71	22.78	13.42	34.95	30.64	34.3	37.77	38.54 L	30.1
F110	6.7	9.1	25.5	12.6	39.4 H	34.5 H	38.6 H	42.3 H	43.8 H	33.8
F112	7.65	9.54	24.3	13.9	37.3	32.9	36.1	39.6	41.7	31.9
F113	7.586	9.428	24.69	14.43	37.28	32.32	37.17	43.25 H	41.98	31.99
F115	7.5	9.1	23.8	12.7	35.8	32.6	36.5	40.2	41.5	32.3
F117	7.2	9.4	24.1	14.2	37.	32.3	36.1	39.7	40.9	31.7
F122	7.54	9.23	23.7	13.7	36.5	32.	36.	39.3	40.6	31.
F133	7.5	9.2	24.2	12.8	37.0	32.3	36.1	39.9	41.2	31.8
F147	6.6	8.4	22.7	13.3	35.7	31.	34.9	38.4	39.7	30.5
F156	7.89	9.51	23.1	11.8	35.4	31.1	34.8	38.3	39.3	30.5
F159	8.	9.	24.	12.	36.	32.	35.	39.	41.	31.
MEDIAN	7.5630	9.2150	24.1000	13.4100	36.9000	32.3000	36.1000	39.8000	41.2000	31.8500
1CRIT	1.4469	1.4964	1.9430	1.6223	2.3270	2.1890	2.3030	2.4140	2.4560	2.1755
N	28	28	28	28	28	28	28	28	28	28
MEAN	7.5124	9.1864	23.9704	13.2886	36.6336	32.1704	36.0014	39.7593	40.9357	31.6868
3STDEV	1.5421	1.1425	2.4231	2.7787	3.3454	3.3716	3.5501	4.2251	3.5728	2.9767

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	199.00	19.900	10					Conductivity
F003	244.00	24.400	10		BIASED HIGH*	1.09	0.4092	US/CM
F004	213.50	21.350	10					2041
F007	146.00	14.600	10					CPQ002E2
F009	228.50	22.850	10	H				
F010	125.00	12.500	10					Conduct.meter
F011	204.50	20.450	10	H				Conductivity Meter
F014	190.50	19.050	10					
F015	110.00	11.000	10	EL				cond. Meter
F020	36.00	3.600	10	ELELL L	BIASED LOW	4.73	-3.3281	Radiometer
F026	273.50	27.350	10		BIASED HIGH	3.85	0.3353	Radiom. Wat.Syst.
F032	41.00	4.100	10	L L L L	BIASED LOW	-6.63	0.0775	potentiometry
F036	59.00	5.900	10	L	BIASED LOW*	-2.76	-0.6325	potentiometry
F037	205.00	20.500	10					V.W.R.
F042	54.50	5.450	10		BIASED LOW	-4.41	-0.1595	Cond. Meter
F053	230.00	23.000	10					cell - bridge
F071	34.00	3.400	10	L ELL L L L	BIASED LOW	-9.06	0.3038	Meter
F072	188.00	18.800	10					Conductivity Meter
F094	289.00	28.900	10		BIASED HIGH	3.17	0.8822	Cond. Meter
F107	51.00	5.100	10	L	BIASED LOW	-6.16	0.2638	Electro Po
F110	229.50	22.950	10	H H H H H				YSI meter - 25 C
F112	199.50	19.950	10					YSI COND.
F113	228.00	22.800	10	H				YSI 3200 Meter
F115	157.50	15.750	10					YSI pipet cell
F117	157.50	15.750	10					electrometric
F122	124.00	12.400	10					RADIOMETR CDM83
F133	151.50	15.150	10					COND. METER
F147	67.50	6.750	10		BIASED LOW*	-2.29	-0.5008	meter
F156	96.50	9.650	10					conductivity meter
F159	116.50	11.650	10					N-1473

* 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 15.500

PARAMETER: 00292 Colour Hazen Unit

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F002	<5.0	<5.0	<5.0	<5.0	34.	24.	11.	20.	6.0	34.
F003	1.9	2.3	4.0	3.4	32.6	25.5	12.5	20.4	8.0	34.6
F007	<4.	<4.	4.	8. EH	37.	29.	15. EH	25.	10.	40.
F010	<1.	<1.	<1.	<1.	23. L	17. L	8.	13. L	4.	24. L
F011	<5.	<5.	<5.	<5.	30.	20.	10.	20.	5.	30.
F014	0.	0.	0. EL	0.	15. EL	10. EL	5. EL	5. EL	0. EL	20. EL
F015	<2.5	<2.5	<2.5	<2.5	30.	22.	12.5	18.	8.	28.
F032	<0.2	<0.2	1.6	0.8T	34.0	25.0	11.2	18.2	5.2	34.6
F036	0.2T	1.2	2.2	1.6	31.2	23.2	10.4	19.0	5.2	32.4
F042	1.	2.	3.	3.	36.	27.	12.	22.	8.	37.
F072	1.	2.	4.	3.	36.	24.	12.	23.	8.	37.
F094	<3.	<3.	5.	5.	30.	30.	15. EH	20.	8.	35.
F113	5. H	4.	5.	3.	31.	22.	10.	17.	9.	31.
F122	1.2T	1.2T	2.7	1.9T	35.	25.	12.	20.	7.1	34.
MEDIAN	1.0000	2.0000	3.5000	3.0000	31.9000	24.0000	11.6000	20.0000	7.5500	34.0000
1CRIT	3.0000	3.0000	3.0750	3.0000	7.3350	6.1500	4.2900	5.5500	3.6825	7.6500
N	5	5	7	8	12	12	11	12	12	12
MEAN	1.0600	1.7400	3.0714	2.7125	31.9000	23.6417	11.0545	19.2167	6.7917	32.6333
3STDEV	-	-	2.6963	3.5982	10.3880	9.0973	3.9290	7.3504	4.6612	10.9840

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	45.00	7.500	6					Colorimeter
F003	88.00	8.800	10					PT-CO UN
F007	99.50	12.438	8	EH EH	BIASED HIGH*	10.47	2.2826	CPQ006E0
F010	12.00	2.000	6	L L L L	BIASED LOW*	-24.59	-1.3860	Colorimetry
F011	26.00	4.333	6					Nessler
F014	10.00	1.000	10	EL ELELELELELEL	BIASED LOW	-45.13	-2.1028	
F015	37.00	6.167	6					
F032	49.00	6.125	8					colourimetry
F036	45.00	4.500	10					colourimetry
F042	87.00	8.700	10					Colorimetric PCU
F072	85.50	8.550	10					Visual Comparison
F094	79.50	9.938	8	EH				Visual Comparison
F113	64.50	6.450	10	H				Hach, Kit CO-1
F122	68.00	6.800	10					455nm,HACHDR4000

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

OVERALL AVERAGE
RANK IS 6.746

PARAMETER: 01092 pH pH Units

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F002	6.9	5.3	5.48	4.6	7.25	7.03	7.26	6.86	7.21	6.84
F003	6.72	5.32	5.53	4.68	7.19	6.89	7.26	6.60	7.16	6.86
F007	6.78	5.31	5.52	4.65	7.27	7.01	7.26	6.81	7.22	6.98
F009	6.52 L	5.03 L	5.37	4.79	7.01	6.74	7.07	6.6	7.03	6.83
F010	6.49 L	5.16	5.35	4.64	7.01	6.81	7.02	6.51 L	6.89	6.67 L
F011	6.77	5.29	5.47	4.62	7.09	6.87	7.09	6.73	7.01	6.86
F014	6.95 H	5.65 VH	5.82 EH	4.69	7.27	7.07	7.3	6.85	7.2	6.96
F015	6.53 L	5.57 H	5.72	4.88 EH	6.92	6.76	6.98	6.74	6.96	6.75
F017		5.3	5.48	4.68						
F020	6.74	5.33	5.55	4.69	7.13	6.86	7.15	6.73	7.09	6.91
F025	6.77	5.38	5.58	4.69	7.16	6.96	7.12	6.73	7.09	6.92
F026	6.74	5.32	5.51	4.72	7.04	6.94	7.07	6.67	7.04	6.79
F032	6.66	5.31	5.52	4.65	7.10	6.90	7.09	6.66	7.11	6.94
F036	6.52 L	5.12	5.34	4.53	7.00	6.72	6.96	6.52 L	6.89	6.70
F037	6.81	5.5	5.63	4.76	7.1	6.84	7.11	6.71	7.1	6.86
F042	6.71	5.27	5.49	4.67	7.11	6.85	7.07	6.69	7.04	6.84
F053	6.82	5.29	5.52	4.66	7.24	7.02	7.17	6.81	7.14	6.96
F071	6.61	5.44	5.55	4.70	6.98	6.89	7.08	6.69	7.04	6.88
F072	6.65	5.16	5.43	4.34 EL	6.82 L	6.86	7.12	6.73	6.99	6.93
F094	6.6	5.2	5.5	4.6	6.8 L	6.6 L	6.8 EL	6.5 L	6.8 L	6.6 L
F107	6.77	5.37	5.61	4.67	7.13	6.98	7.11	6.77	7.08	6.92
F110	6.75	5.32	5.52	4.68	7.16	6.92	7.16	6.82	7.14	6.97
F112	6.820	5.317	5.565	4.661	7.223	6.921	7.195	6.744	7.132	6.990
F113	6.75	5.75 EH	5.56	4.66	7.19	6.98	7.22	6.8	7.08	6.94
F115	6.68	5.31	5.53	4.66	7.	6.88	7.07	6.71	6.99	6.93
F117	6.76	5.13	5.56	4.64	7.16	6.96	7.19	6.79	7.13	6.95
F122	6.71	5.36	5.58	4.68	7.08	6.93	7.18	7.06 EH	7.13	6.96
F133	6.68	5.32	5.49	4.72	7.07	6.78	6.97	6.62	7.00	6.81
F147	6.16 EL	5.27	5.48	4.66	6.36 EL	6.29 EL	6.32 EL	6.19 EL	6.3 EL	6.29 EL
F156	6.74	5.38	5.60	4.71	7.11	6.88	7.08	6.71	7.01	6.86
F159	7.3 EH	5.3	5.7	4.7	6.9	7.2 EH	7.2	7. H	7.3 H	7.
MEDIAN	6.7400	5.3100	5.5200	4.6700	7.1000	6.8900	7.1100	6.7300	7.0800	6.8950
1CRIT	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
N	28	29	29	29	27	28	28	28	28	28
MEAN	6.7125	5.3206	5.5309	4.6711	7.0731	6.8875	7.1091	6.7180	7.0608	6.8714
3STDEV	0.3280	0.3433	0.2357	0.1445	0.3477	0.3068	0.3036	0.3284	0.2936	0.2883

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	200.00	20.000	10					pH meter
F003	181.50	18.150	10					PH 25-ELECTRO PH
F007	227.50	22.750	10					CPQ004D0
F009	84.00	8.400	10	L L				
F010	47.00	4.700	10	L L L	BIASED LOW*	-2.70	0.0236	Strirred electrode
F011	119.50	11.950	10					pH Meter
F014	279.50	27.950	10	H VHEH	BIASED HIGH*	-1.55	0.2705	
F015	139.00	13.900	10	L H EH				pH meter
F017	37.50	12.500	3		INSUFFICIENT DATA			
F020	178.50	17.850	10					pH meter
F025	207.50	20.750	10					Electrode
F026	143.50	14.350	10					Radiom. Wat.Syst.
F032	142.50	14.250	10					potentiometry
F036	33.50	3.350	10	L L	BIASED LOW*	-0.20	-0.1618	unstirred
F037	193.50	19.350	10					Accumet
F042	113.00	11.300	10					Unstirred
F053	211.00	21.100	10					unstirred
F071	149.50	14.950	10					Ionanalyzer
F072	91.00	9.100	10	ELL				Stirred
F094	38.50	3.850	10	L L ELL L L	BIASED LOW	-10.73	0.4829	pH Meter
F107	202.00	20.200	10					Electro Po
F110	208.50	20.850	10					stirred - 25 C
F112	221.00	22.100	10					STIRRED
F113	217.50	21.750	10	EH				Beck 350 unstirred
F115	123.00	12.300	10					Unstirred
F117	185.00	18.500	10					electrometric
F122	210.00	21.000	10	EH				HACH -STIRRED
F133	111.00	11.100	10					ELECTRODE
F147	33.00	3.300	10	EL ELELELELELEL	BIASED LOW	-34.56	1.7406	meter
F156	171.00	17.100	10					unstirred
F159	243.50	24.350	10	EH EH H H	BIASED HIGH*	4.92	-0.1597	N-1215

* 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 15.653

PARAMETER: 01090 Acidity to pH 8.3 mg/L CaCO3

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F014	0.555 VL	0.199 EL	0.321 EL	0.985 EL	0.377 EL	0.34 EL	0.248 EL	0.299 EL	0.272 EL	0.357 EL
F015	39. EH	40. EH	40. EH	56. EH	48. EH	43. EH	37. EH	38. EH	36. EH	42. EH
F020	1.89	2.24	2.41	4.75 H	3.36	3.7	3.1	3.3	2.98 H	4.8 EH
F032	1.30	1.50 L	1.70	3.00	1.80 VL	1.80 L	1.40 VL	1.75 VL	1.35	1.60 VL
F072	1.7	2.6	2.6		10.3 EH	6.7 EH	9.2 EH	4.6 VH	8.4 EH	6.5 EH
F107	1.49	1.81	1.70	2.62 L	2.10 VL	2.19 L	1.64 VL	1.85 L	1.69	1.91 L
F133	3. VH	3. H	3.	4.	4.	3.	3.	3.	2.	3.
MEDIAN	1.7000	2.2400	2.4100	3.5000	3.3600	3.0000	3.0000	3.0000	2.0000	3.0000
1CRIT	0.6700	0.7240	0.7410	0.8500	0.8360	0.8000	0.8000	0.8000	0.7000	0.8000
N	5	5	5	4	5	5	5	5	5	5
MEAN	1.8760	2.2300	2.2820	3.5925	4.3120	3.4780	3.6680	2.9000	3.2840	3.5620
3STDEV	-	-	-	-	-	-	-	-	-	-

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	10.00	1.000	10	VLELELELELELELELELEL				
F015	69.00	6.900	10	EHEHEHEHEHEHEHEHEHEH				auto titrator
F020	47.00	4.700	10	H H EH				Gran Electron
F032	21.50	2.150	10	L VLL VLVL VL				titration
F072	50.00	5.556	9	EHEHEHVHEHEH				NaOH Titration
F107	28.50	2.850	10	L VLL VLL L				Electro Po
F133	47.00	4.700	10	VHH				TITRIMETRIC

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

OVERALL AVERAGE
RANK IS 3.957

PARAMETER: 06193 Alkalinity Fixed End mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93 REPORTED		2= RAINGR-16 REPORTED		3= BESKI-01 REPORTED		4= AES-01 REPORTED		5= GAT-99 REPORTED		6= MAURI-MX REPORTED		7= AUX-98 REPORTED		8= MERSEY-MX REPORTED		9= TRKY-94 REPORTED		10= TROIS-02A REPORTED	
LAB NO	VALUE		VALUE		VALUE		VALUE		VALUE		VALUE		VALUE		VALUE		VALUE		VALUE	
F007	4.7		1.5		1.7		0.5		11.3		7.4		9.8		5.2		8.9		6.7	
F011	2.7	EL	0.3	VL	<0.3	EL	<0.3		8.9	VL	5.2	VL	7.6	VL	3.6	VL	6.7	VL	4.6	VL
F025	4.679		1.847	H	1.847		0.616		11.391		7.389		10.160		5.542		9.113		6.773	
F032	5.0		1.5		1.5		0.5		11.5		7.5		10.0		5.0		9.5		7.0	
F036	4.35		1.15		1.40		0.15		11.0		7.10		9.50		4.90		8.65		6.45	
F094	4.		1.		<1.	L	<1.		10.	L	6.	VL	8.	VL	3.	VL	7.	VL	5.	VL
F107	3.51	VL	0.00	VL	0.204	EL	0.00		9.29	VL	5.64	VL	8.17	VL	3.50	VL	7.34	VL	4.82	VL
F147	5.		1.7		1.9				11.9		7.6		10.3		5.4		9.1		6.9	
MEDIAN	4.5145		1.3250		1.6000		0.5000		11.1500		7.2445		9.6500		4.9500		8.7750		6.5750	
1CRIT	0.6507		0.5000		0.5050		0.5000		0.9825		0.7872		0.9075		0.6725		0.8637		0.7537	
N	5		6		4		3		6		6		6		6		6		6	
MEAN	4.2478		1.1917		1.6118		0.3833		10.7468		6.8382		9.2717		4.6000		8.3505		6.1072	
3STDEV	-		1.3868		-		-		2.4594		2.2126		2.5928		2.2782		2.5632		2.5759	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F007	51.00	5.100	10					CPQ005E0
F011	11.00	1.375	8	ELVLEL VLVLVLVLVLVL				Titrn
F025	62.00	6.200	10	H				Titration
F032	60.50	6.050	10					titration
F036	36.00	3.600	10					titration
F094	20.00	2.500	8	L L VLVLVLVLVL				Colorimetric
F107	19.00	1.900	10	VLVLEL VLVLVLVLVLVL				Electro Po
F147	64.50	7.167	9					titration

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

OVERALL AVERAGE
RANK IS 4.320

PARAMETER: 06194 Alkalinity Gran Infl mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F010	3.	<0.1	<0.1	<0.1	9.8	5.8	8.5	3.6	7.4	5.2
F020	3.95	<1.	<1.	<1.	9.99	5.90	8.23	3.66	8.80	5.40
MEDIAN										
1CRIT	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500
N	2	0	0	0	2	2	2	2	2	2
MEAN	3.4750	-	-	-	9.8950	5.8500	8.3650	3.6300	8.1000	5.3000
3STDEV	-	-	-	-	-	-	-	-	-	-

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	8.00	1.143	7					Titration-cond.
F020	13.00	1.857	7					Gran Electron

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

OVERALL AVERAGE
RANK IS 1.500

PARAMETER: 06282 Alkalinity Gran Titn mg/L CaCO3

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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= RAIN-SUP-93 REPORTED	2= RAINGR-16 REPORTED	3= BESKI-01 REPORTED	4= AES-01 REPORTED	5= GAT-99 REPORTED	6= MAURI-MX REPORTED	7= AUX-98 REPORTED	8= MERSEY-MX REPORTED	9= TRKY-94 REPORTED	10= TROIS-02A REPORTED
LAB NO	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE
F002	2.41 EL	-1.06 EL	-0.76 EL	-1.8 EL	9.38	5.65	8.05	2.88 EL	7.08	5.03
F003	2.98	<0.1	<0.1	<0.1	10.0	5.80	8.35	3.99	7.32	5.21
F007	2.96	-0.16	0.04	-1.24	9.49	5.65	8.07	3.51	7.22	5.02
F014	2.78	0.06	0.235	-1.04	8.79	5.92	7.39 EL	3.31	6.6 EL	4.77
F015	3.1	<0.5	<0.5	<0.5	9.4	5.8	8.2	3.5	7.4	5.2
F026	2.870	-0.2800	-0.0950	-1.2650	9.1000	5.3700	7.9250	3.2600	7.1550	4.4900
F036	2.56	-0.470	-0.220	-1.62 L	9.21	5.28	7.73	3.19	6.86	4.66
F042	3.20	-0.30	-0.03	-1.30	10.04	5.96	8.44	3.69	7.51	5.32
F071	2.93	-0.29	0.00	-1.36	9.79	5.82	8.32	3.60	7.47	5.10
F110	3.09	-0.10	0.06	-1.25	9.96	5.90	8.36	3.57	7.56	5.42
F112	2.94	-0.09	0.12	-0.97	9.54	5.82	7.98	3.80	7.08	5.07
F113	2.80	-0.17	0.22	-1.06	9.02	5.59	7.90	3.71	6.93	4.47
F115	3.06	-0.11	-0.03	-1.19	9.425	5.46	8.055	3.56	7.22	4.84
F117	2.975	-0.408	0.028	-1.266	9.338	5.383	7.907	3.409	7.018	4.852
F122	3.1	-0.015	0.168	-0.971	9.38	5.56	8.23	3.59	7.25	4.95
MEDIAN	2.9600	-0.1700	0.0280	-1.2500	9.4000	5.6500	8.0550	3.5600	7.2200	5.0200
1CRIT	0.4480	0.3500	0.3500	0.3500	0.7700	0.5825	0.7028	0.4780	0.6610	0.5510
N	13	11	11	11	13	13	13	13	13	13
MEAN	2.9342	-0.2175	0.0237	-1.2329	9.4641	5.6710	8.0828	3.5153	7.1933	4.9625
3STDEV	0.4446	0.4087	0.3504	0.5040	0.8630	0.5456	0.5681	0.5209	0.5755	0.6775

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	40.50	4.050	10	ELELELEL EL	BIASED LOW	8.38	-0.7005	H2SO4 titration
F003	85.50	12.214	7		BIASED HIGH	4.33	-0.0042	ALK-GRAN-TITRATION
F007	82.00	8.200	10					CPQ003E0
F014	65.00	6.500	10	EL EL				
F015	71.00	10.143	7					auto titrator
F026	42.00	4.200	10					Titroprocessor
F036	22.00	2.200	10	L	BIASED LOW*	0.36	-0.3437	titration
F042	112.50	11.250	10					ANC Gran plot
F071	90.50	9.050	10					Titrator
F110	117.00	11.700	10		BIASED HIGH	4.53	0.0262	End point 3.5-3.6
F112	99.00	9.900	10					TITRATION
F113	61.00	6.100	10					ManTech PC Titrate
F115	76.00	7.600	10					2 pt. titrn
F117	51.00	5.100	10					gran titration
F122	98.00	9.800	10					PH4.5-4.2

* 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 7.729

PARAMETER: 06002 Diss Organic Carbon mg/L C

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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= RAIN-SUP-93 REPORTED	2= RAINGR-16 REPORTED	3= BESKI-01 REPORTED	4= AES-01 REPORTED	5= GAT-99 REPORTED	6= MAURI-MX REPORTED	7= AUX-98 REPORTED	8= MERSEY-MX REPORTED	9= TRKY-94 REPORTED	10= TROIS-02A REPORTED
LAB NO	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE
F002	<0.5	<0.5	0.5 EL	<0.5	4.8	3.5	2.1 EL	2.1	1.2 EL	4.8
F003	0.20	0.20	1.0	0.20	5.3	3.6	2.5	2.3	1.6	5.0
F004	0.100T	0.107	0.778	0.238	5.26	3.77	2.39	2.16	1.46	5.25
F007	<0.30	<0.30	0.93	0.31	5.59	4.14	2.77	2.44	1.72	5.60
F010	<0.2	<0.2	0.8	0.2	5.2	3.8	2.5	2.1	1.4	5.1
F011	0.8 EH	0.7 EH	1.3 EH	0.8 EH	5.8	4.8 EH	3.8 EH	3.4 EH	3.1 EH	6.
F014	<1.0	<1.0	1.	<1.0	5.7	4.2	2.8	2.4	1.7	5.1
F015	<0.5	<0.5	1.0	<0.5	5.6	4.2	2.7	2.5	1.8	5.5
F026	0.137	0.122	0.778	0.1245	5.0155	3.656	2.367	2.211	1.454	5.2115
F032	0.1T	0.2T	0.9	0.3T	5.2	3.9	2.6	2.3	1.5	5.3
F036				0.2	4.7	3.4	2.3	2.0	1.2 EL	4.8
F037	0.1757	0.2198	0.9682	0.4516	5.9944	4.2236	2.7571	2.562	1.8007	5.8128
F042	0.5W	0.5W	1.1	0.5	5.8	4.2	2.8	2.5	1.8	5.7
F072	<1.	<1.	<1.	<1.	5.22	3.74	2.51	2.18	1.58	5.23
F094	<0.5	<0.5	1.	<0.5	5.2	3.8	2.7	2.4	1.9	4.9
F094a	0.6	0.5	1.1	0.6	5.4	4.1	3.	2.6	1.9	5.5
F107	0.06	0.20	0.85	0.4	5.47	3.95	2.54	2.36	1.64	5.25
F109	0.332T	0.340T	0.969	0.444T	5.303	3.875	2.512	2.323	1.605	5.234
F112	0.16	0.21	0.94	0.30	5.55	3.99	2.59	2.41	1.60	5.45
F113	0.25	0.31	0.97	0.40	5.57	4.05	2.67	2.40	1.58	5.38
F117	0.5	0.4	1.	0.6	5.7	4.1	2.7	2.5	1.6	5.7
F147			0.75		5.11	3.81	2.53	2.07	1.5	4.96
MEDIAN	0.1878	0.2149	0.9686	0.3550	5.3515	3.9250	2.5950	2.3800	1.6000	5.2500
1CRIT	0.5000	0.5000	0.5000	0.5000	0.8264	0.7194	0.6196	0.6035	0.5450	0.8188
N	10	10	18	14	20	20	20	20	19	19
MEAN	0.2555	0.2702	0.9352	0.3674	5.3894	3.9302	2.6118	2.3408	1.6389	5.3252
3STDEV	0.4887	0.3273	0.3077	0.4041	0.7975	0.6392	0.5013	0.4677	0.4349	0.7656

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	12.50	1.786	7	EL EL EL	BIASED LOW*	-1.94	-0.3775	Shimadzu TOC
F003	72.00	7.200	10					UV-DIGESTION-AAII
F004	52.50	5.250	10		BIASED LOW*	1.01	-0.1544	6104
F007	117.00	14.625	8					CPQ119E0
F010	40.00	5.000	8		BIASED LOW*	0.70	-0.1854	Conduct. meter
F011	190.50	19.050	10	EHEHEHEH EHEHEHEH	BIASED HIGH*	2.56	0.7088	
F014	106.50	15.214	7					
F015	118.00	16.857	7		BIASED HIGH*	4.20	0.0433	carbon analyzer
F026	39.50	3.950	10		BIASED LOW*	-1.63	-0.1378	Autoanalyser
F032	77.00	7.700	10					colourimetry
F036	11.00	1.571	7	EL	BIASED LOW	-7.26	-0.1856	colourimetry
F037	155.00	15.500	10					Persulfate IR
F042	145.50	18.188	8		BIASED HIGH	6.55	0.0632	Wet oxidation IR
F072	43.50	7.250	6					UV Persulfate Oxid
F094	80.00	11.429	7					Combustion IR
F094a	161.50	16.150	10		BIASED HIGH*	-2.74	0.3099	Combustion IR
F107	92.00	9.200	10					Electro Po
F109	102.00	10.200	10					UV Persulf
F112	105.50	10.550	10					DOHRMAN
F113	115.00	11.500	10					Dohrmann 8000
F117	147.00	14.700	10					persulf oxd-IR
F147	36.50	5.214	7					colourimetry

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

OVERALL AVERAGE
RANK IS 10.521

PARAMETER: 06592 Diss Inorg Carbon mg/L C

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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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	0.8 EL	<0.5	<0.5	<0.5	2.1	1.2	1.8 EL	1.	1.7	1.1
F003	1.0	0.30	0.30	0.40	2.4	1.7	2.0	1.2 EH	2.1	1.5 EH
F007	1.04	<0.40	<0.40	<0.40	2.25	1.46	2.02	0.96	1.84	1.22
F010	1.	0.3	0.3	0.2	2.4	1.4	2.1	1.	12. EH	1.2
F015	1.0	<0.5	<0.5	<0.5	2.3	1.4	2.0	0.9	1.8	1.2
F026	0.895	0.225	0.240	0.225	2.300	1.480	2.065	0.945	1.895	1.190
F036	1.08	0.32	0.34	0.34	2.32	1.50	2.02	1.06	1.94	1.22
F042	1.0	0.5W	0.5W	0.5W	2.5	1.6	2.2	1.0	2.0	1.3
F094	1.	<0.5	<0.5	<0.5	2.3	1.7	2.1	1.1	1.9	1.3
F107	0.84	0.00 EL	0.049	0.00 L	2.23	1.35	1.96	0.84	1.76	1.15
F112	0.94	0.28	0.27	0.36	2.52	1.59	2.25 EH	1.09	1.99	1.26
F113	1.02	0.34	0.35	0.35	2.26	1.47	2.03	1.05	1.83	1.21
F147	0.95	0.26			1.77 EL	1.07 EL	1.8 EL		1.24 EL	
MEDIAN	1.0000	0.2900	0.3000	0.3400	2.3000	1.4700	2.0200	1.0000	1.8950	1.2150
1CRIT	0.3375	0.3000	0.3000	0.3000	0.4350	0.3728	0.4140	0.3375	0.4046	0.3536
N	11	6	5	5	11	10	10	10	11	10
MEAN	0.9714	0.2808	0.2900	0.2950	2.3055	1.4450	2.0495	1.0105	1.8868	1.2250
3STDEV	0.1709	0.0934	-	-	0.2987	0.3331	0.1968	0.1843	0.3335	0.1370

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	15.50	2.214	7	EL EL	BIASED LOW	-8.73	-0.0354	Shimadzu TOC
F003	88.50	8.850	10	EH EH				INFRARED-DETECTION
F007	46.00	6.571	7					CPQ119E0
F010	69.00	6.900	10	EH				Conduct. meter
F015	34.50	4.929	7					carbon analyzer
F026	47.00	4.700	10					Autoanalyser
F036	80.00	8.000	10					colourimetry
F042	70.50	10.071	7		BIASED HIGH	13.96	-0.1174	Wet oxidation NDIR
F094	67.50	9.643	7					Combustion IR
F107	20.00	2.000	10	EL L	BIASED LOW	11.54	-0.3016	Electro Po
F112	82.00	8.200	10	EH				DOHRMAN
F113	70.00	7.000	10					Dohrmann 8000
F147	12.50	2.083	6	ELELEL EL	BIASED LOW	-26.31	0.0793	colourimetry

OVERALL AVERAGE
RANK IS 6.333

PARAMETER: 07093 Nitrate-IC mg/L N

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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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	0.03 H	0.34	0.08	0.21	0.14	0.17	0.03	0.89	0.88	0.07
F010	0.01 VL	0.29 EL	0.04 EL	0.19	0.09 EL	0.11 EL	0.02 L	0.77 L	0.78 L	0.05 VL
F012	0.021	0.315	0.07	0.191	0.124	0.153	0.026	0.821	0.819	0.068
F015	0.02	0.39 EH	0.08	0.24 EH	0.16 H	0.19 EH	0.03	0.97 H	0.97 H	0.09 VH
F017	0.023	0.347	0.076	0.216	0.141	0.168	0.026	0.867	0.863	0.071
F020	<0.02	0.36	0.075	0.22	0.15	0.17	0.03	0.93	0.927	0.07
F025	0.020	0.332	0.074	0.206	0.135	0.160	0.024	0.877	0.857	0.069
F037	0.0335VH	0.3035L	0.0675	0.1926	0.1231	0.1511	0.0261	0.7747L	0.775 L	0.0674
F042	0.022	0.345	0.073	0.210	0.140	0.168	0.027	0.890	0.881	0.069
F053	0.023	0.343	0.075	0.211	0.138	0.169	0.028	0.901	0.891	0.072
F068	0.027	0.336	0.0665	0.211	0.130	0.166	0.023	0.881	0.869	0.060
F071	0.046 EH	0.345	0.090 VH	0.219	0.156 H	0.173	0.038 H	0.898	0.892	0.082 H
F107	0.02	0.34	0.08	0.21	0.14	0.17	0.03	0.87	0.09 EL	0.08
F109	0.0303H	0.3303	0.0804	0.2064	0.1371	0.1619	0.0351H	0.8516	0.8520	0.0730
F110	0.03 H	0.35	0.08	0.22	0.14	0.17	0.04 VH	0.91	0.91	0.08
F112	0.02	0.29 EL	0.07	0.18 L	0.12 L	0.14 L	0.03	0.71 EL	0.75 VL	0.06
F113	0.04 VH	0.34	0.09 VH	0.21	0.15	0.17	0.05 EH	0.86	0.86	0.08
F115	0.019	0.345	0.073	0.210	0.136	0.166	0.023	0.891	0.883	0.069
F117	0.018	0.348	0.071	0.215	0.138	0.163	0.025	0.888	0.905	0.068
F118	0.02T	0.35	0.07T	0.22	0.14	0.17	0.03T	0.89	0.88	0.07T
F133	0.022	0.313	0.074	0.185 L	0.132	0.157	0.028	0.836	0.823	0.070
F147		0.318	0.055 EL	0.184 L	0.117 L	0.145 L	0.0125EL	0.838	0.829	0.052 VL
F156	0.023	0.334	0.073	0.205	0.131	0.161	0.028	0.868	0.867	0.069
F159	<0.1	0.33	<0.1	0.2	0.1 VL	0.16	<0.1	0.84	0.84	<0.1
MEDIAN	0.0220	0.3400	0.0740	0.2100	0.1375	0.1660	0.0280	0.8735	0.8650	0.0700
1CRIT	0.0064	0.0318	0.0105	0.0214	0.0156	0.0179	0.0068	0.0745	0.0738	0.0102
N	19	21	20	22	22	22	21	22	22	21
MEAN	0.0243	0.3364	0.0732	0.2065	0.1345	0.1628	0.0284	0.8656	0.8560	0.0700
3STDEV	0.0172	0.0414	0.0177	0.0332	0.0359	0.0260	0.0141	0.1173	0.1323	0.0207

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	160.00	16.000	10	H				IC
F010	18.50	1.850	10	VLELEL ELELL L L VL	BIASED LOW	-8.80	-0.0191	IC
F012	59.00	5.900	10		BIASED LOW	-5.57	-0.0023	IC Dionex
F015	208.00	20.800	10	EH EHH EH H H VH	BIASED HIGH	11.41	0.0036	IC
F017	147.00	14.700	10					
F020	176.50	19.611	9		BIASED HIGH	7.14	-0.0033	IC
F025	91.50	9.150	10					IC
F037	61.00	6.100	10	VHL L L				IC Waters
F042	135.50	13.550	10					IC
F053	157.50	15.750	10					IC
F068	100.00	10.000	10					IC, Dionex
F071	209.50	20.950	10	EH VH H H H	BIASED HIGH*	1.29	0.0117	IC
F107	136.50	13.650	10	EL				IC
F109	134.00	13.400	10	H H				Dionex IC
F110	201.00	20.100	10	H VH	BIASED HIGH*	4.08	0.0030	IC Dionex
F112	43.50	4.350	10	EL L L L ELVL	BIASED LOW	-16.52	0.0044	DIONEX IC
F113	172.50	17.250	10	VH VH EH				IC Dionex DX-500
F115	116.50	11.650	10					IC-Dionex AS14
F117	121.00	12.100	10					IC
F118	154.50	15.450	10					IC
F133	81.50	8.150	10	L				IC
F147	32.00	3.556	9	ELL L L EL VL	BIASED LOW*	-2.15	-0.0171	IC
F156	103.50	10.350	10					IC
F159	38.50	6.417	6	VL				ASTM D 4327

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

OVERALL AVERAGE
RANK IS 12.218

PARAMETER: 07092 Nitrate + Nitrite mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F003	0.018	0.361	0.076	0.222	0.143	0.171	0.023	0.896	0.920	0.067
F004	0.018	0.351	0.074	0.218	0.139	0.17	0.024	0.899	0.902	0.07
F007	<0.04	0.35	0.08	0.22	0.14	0.17	<0.04	0.86	0.89	0.07
F009	<0.02	0.33	0.05 EL	0.19 EL	0.12 L	0.14 EL	<0.02 L	0.88	0.9	0.05 EL
F010	0.02	0.29 EL	0.05 EL	0.17 EL	0.11 EL	0.13 EL	0.02 L	0.8 EL	0.81 EL	0.06
F011	0.022	0.352	0.078	0.216	0.145	0.173	0.033	0.845	0.916	0.075
F014	<0.05	0.35	0.07	0.22	0.14	0.16	<0.05	0.89	0.9	0.05 EL
F015	0.023	0.353	0.074	0.215	0.134	0.165	0.026	0.880	0.880	0.069
F020	<0.02	0.36	0.075	0.22	0.15	0.17	0.03	0.93	0.94	0.07
F026	0.027	0.335	0.074	0.205	0.130	0.159	0.029	0.898	0.897	0.068
F032	0.035 VH	0.348	0.080	0.217	0.143	0.174	0.031	0.903	0.906	0.077
F036	0.020	0.340	0.068	0.208	0.136	0.164	0.024	0.872	0.878	0.076
F071	0.038 EH	0.345	0.086 EH	0.213	0.143	0.170	0.043 EH	0.896	0.927	0.082 H
F072	0.026	0.353	0.078	0.219	0.141	0.171	0.031	0.903	0.908	0.071
F094	0.024	0.351	0.077	0.216	0.138	0.169	0.024	0.92	0.913	0.069
F113	0.018	0.35	0.072	0.214	0.133	0.164	0.029	0.885	0.916	0.069
MEDIAN	0.0225	0.3500	0.0745	0.2160	0.1395	0.1695	0.0290	0.8930	0.9040	0.0695
1CRIT	0.0064	0.0326	0.0106	0.0219	0.0158	0.0182	0.0069	0.0760	0.0769	0.0102
N	11	14	13	14	14	14	11	14	14	13
MEAN	0.0228	0.3477	0.0751	0.2136	0.1375	0.1654	0.0276	0.8876	0.9038	0.0701
3STDEV	0.0147	0.0227	0.0105	0.0235	0.0192	0.0245	0.0101	0.0558	0.0417	0.0125

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	100.00	10.000	10					CD-REDUCTION
F004	83.00	8.300	10					7110
F007	73.50	9.188	8					CPQ103E2
F009	23.00	2.875	8	ELELL ELL EL	BIASED LOW*	1.90	-0.0262	
F010	16.00	1.600	10	ELELELELELL ELEL	BIASED LOW	-9.37	-0.0139	Colorimetry
F011	108.50	10.850	10					Auto Colourimetric
F014	55.50	6.938	8	EL				
F015	68.00	6.800	10					colorimetric
F020	115.50	12.833	9		BIASED HIGH*	4.24	-0.0023	TrAACs
F026	57.50	5.750	10					Autoanalyser
F032	118.50	11.850	10	VH				colourimetry
F036	51.00	5.100	10					colourimetry
F071	115.00	11.500	10	EH EH EH H				Colorimetric
F072	117.50	11.750	10					Lachat Flow Inj
F094	90.00	9.000	10					Colorimetric
F113	64.50	6.450	10					FIA Lachat 8000

* 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 8.216

PARAMETER: 07192 Ammonia mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F003	<0.005	0.068	0.007	0.190	0.002	<0.005	0.040	<0.005	0.294	0.038
F004	0.005W	0.053 L	0.007	0.149 L	0.005T	0.005T	0.035	0.005T	0.264	0.034
F007	<0.010	0.0645	<0.010	0.185	<0.010	<0.010	0.0375	<0.010	0.293	0.0305
F010	<0.02	0.07	<0.02	0.2	<0.02	<0.02	0.03	<0.02	0.33	0.03
F011	<0.005	0.054 L	<0.005	0.170	<0.005	<0.005	0.027 L	<0.005		0.263 EH
F014	<0.010	0.066	<0.010	0.187	<0.010	<0.010	0.037	<0.010	0.29	0.036
F015	<0.005	0.068	0.009	0.195	0.009	<0.005	0.041	<0.005	0.295	0.039
F017	0.006W	0.066	0.006W	0.182	0.006W	0.006W	0.037	0.006W	0.29	0.034
F020	<0.005	0.069	0.006	0.186	<0.005	<0.005	0.039	<0.005	0.298	0.037
F025	<0.01	0.071	<0.01	0.190	<0.01	<0.01	0.034	<0.01	0.291	0.024 L
F026	0.0000	0.0692	0.0055	0.1866	0.0027	0.0013	0.0390	0.0009	0.2996	0.0377
F032	0.016 VH	0.078	0.010	0.198	0.008T	0.006T	0.044	0.004T	0.300	0.044
F036	0.002T	0.072	0.008T	0.188	0.004T	0.002T	0.040	0.004T	0.288	0.044
F042	0.02 VH	0.08	0.02 VH	0.21	0.01	0.02 VH	0.05	0.01	0.33	0.05 H
F053	0.020W	0.064	0.004T	0.171	0.020W	0.020W	0.036	0.020W	0.272	0.034
F068		0.076		0.219			0.039		0.338	0.034
F071	<0.013	0.091 VH	<0.013	0.202	<0.013	0.016 VH	0.370 EH	<0.013	0.297	0.028
F072	<0.01	0.068	<0.01	0.180	<0.01	<0.01	0.041	<0.01	0.288	0.040
F094	0.014 VH	0.095 VH	0.021 VH	0.236 VH	0.014 VH	0.015 VH	0.061 VH	0.015 VH	0.332	0.056 VH
F107	0.00	0.08	0.01	0.23 H	0.01	0.00	0.05	0.00	0.37 EH	0.04
F109	0.0078T	0.0818	0.0140T	0.1945	0.0076T	0.0081T	0.0515H	0.0051T	0.3337	0.0542VH
F112	0.06 EH	0.13 EH	0.07 EH	0.24 EH	0.06 EH	0.06 EH	0.10 EH	0.05 EH	0.07 EL	0.33 EH
F113	0.005	0.068	0.009	0.191	0.007	0.006	0.046	0.005	0.303	0.042
F115	0.004	0.071	0.008	0.193	0.000	0.000	0.048	0.002	0.304	0.030
F117	<0.007	0.072	0.048 EH	0.189	0.007	<0.007	0.053 H	<0.007	0.31	0.047
F118	0.002W	0.065	0.006T	0.182	0.002W	0.002T	0.036T	0.002W	0.297	0.037T
F133	<0.05	0.08	<0.05	0.18	<0.05	<0.05	0.05	<0.05	0.35 H	0.06 VH
F147		0.069	0.028 VH	0.191			0.053 H		0.31	0.06 VH
F156	0.01W	0.069	0.010	0.187	0.01W	0.01W	0.040	0.01W	0.303	0.036
MEDIAN OR CONC.	*TARGET *0.0050	0.0692	0.0090	0.1900	*0.0050	*0.0050	0.0400	*0.0050	0.2988	0.0380
1CRIT	0.0060	0.0139	0.0064	0.0290	0.0062	0.0060	0.0103	0.0060	0.0426	0.0100
N	7	27	17	27	12	10	27	9	26	27
MEAN	0.0098	0.0721	0.0133	0.1931	0.0072	0.0081	0.0447	0.0057	0.3039	0.0487
3STDEV	0.0190	0.0252	0.0317	0.0456	0.0098	0.0188	0.0389	0.0122	0.0604	0.1288

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	71.50	10.214	7					ALK-PHENOL
F004	38.50	4.278	9	L L	BIASED LOW	-14.04	-0.0015	7540
F007	35.00	7.000	5					CPQ117E0
F010	67.00	13.400	5					Colorimetry
F011	33.00	8.250	4	L L EH	INSUFFICIENT DATA			Auto Colourimetric
F014	42.50	8.500	5					
F015	93.50	13.357	7					colorimetric
F017	34.50	6.900	5					
F020	63.00	10.500	6					TrAACs
F025	45.00	9.000	5	L				IC
F026	76.50	7.650	10					Autoanalyser
F032	139.50	13.950	10	VH				colourimetry
F036	95.00	9.500	10					colourimetry
F042	173.00	17.300	10	VH VH VH H				Colorimetric
F053	23.00	3.833	6		BIASED LOW	-8.53	-0.0015	FIA phenate method
F068	91.50	18.300	5					IC, Dionex
F071	105.50	17.583	6	VH VHEH				Colorimetric
F072	52.50	10.500	5					Lachat Flow Inj
F094	188.00	18.800	10	VHVHVHVHVHVHVHVH VH				Colorimetric
F107	146.00	14.600	10	H EH				COLORIMETRY
F109	164.00	16.400	10	H VH				FIA phenate
F112	183.00	18.300	10	EHEHEHEHEHEHEHEHELEH				TECHNICON
F113	117.50	11.750	10					FIA Lachat 8000
F115	96.00	9.600	10					Auto. Colorimetric
F117	126.00	18.000	7	EH H				IC
F118	50.00	7.143	7					IC
F133	104.00	20.800	5	H VH	BIASED HIGH	8.98	0.0054	I.S.E.
F147	120.00	20.000	6	VH H VH				IC
F156	78.50	13.083	6					colorimetric

OVERALL AVERAGE RANK IS 12.573

PARAMETER: 07392 Total Kjeldahl N mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F003	0.024	0.077	0.069	0.208	0.173	0.119	0.143	0.114	0.431	0.194
F014	<0.20	<0.20	<0.20	0.21	<0.20	<0.20	<0.20	<0.20	0.42	<0.20
F032	0.02T	0.10	0.08	0.20	0.20	0.12	0.16	0.12	0.42	0.20
F072	<0.100	<0.100	<0.100	0.192	0.187	<0.100	<0.100 L	<0.100	0.370	0.207
F094	0.11 EH	0.2 EH	0.15 EH	0.27 H	0.24 H	0.23 EH	0.22 VH	0.17 H	0.54 H	0.33 EH
F107	0.00	0.049 L	0.00 EL	0.177	0.049 EL	0.009 EL	0.066 VL	0.078 L	0.351	0.079 EL
F147	0.038	0.139 H	0.069	0.265 H	0.171	0.127	0.118	0.193 VH	0.343	0.199
MEDIAN	0.0240	0.1000	0.0690	0.2080	0.1800	0.1200	0.1430	0.1200	0.4200	0.1995
1CRIT	0.0250	0.0363	0.0316	0.0525	0.0483	0.0393	0.0427	0.0393	0.0843	0.0512
N	3	3	3	5	4	3	3	3	5	4
MEAN	0.0273	0.1053	0.0727	0.2150	0.1828	0.1220	0.1403	0.1347	0.3984	0.2000
3STDEV	-	-	-	-	-	-	-	-	-	-

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	29.50	2.950	10					BLOCK DIG ALK PHEN
F014	9.50	4.750	2					
F032	35.50	3.550	10					colourimetry
F072	14.00	3.500	4	L				Lachat Flow Inj
F094	55.00	5.500	10	EHEHEHH H EHVHH H EH				Colorimetric
F107	11.00	1.100	10	L EL ELELVLL EL				COLORIMETRY
F147	33.50	3.350	10	H H VH				dig. colour

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

OVERALL AVERAGE
RANK IS 3.357

PARAMETER: 11091 Sodium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F002	0.07	<0.05	2.86	0.08	1.08	2.11	1.32	1.85	0.61	2.31
F003	0.09	0.06	2.75	0.10	1.04	2.02	1.26	1.77	0.56	2.18
F007	0.095	0.064	2.51 VL	0.109	1.08	2.05	1.28	1.79	0.588	2.26
F009	0.11	0.08	3.17 VH	0.12	1.18 VH	2.34 EH	1.44 VH	2.02 VH	0.64 H	2.47 VH
F010	0.06 L	0.04 EL	2.4 VL	0.07	0.89 VL	1.74 EL	1.07 EL	1.54 VL	0.47 VL	1.91 EL
F011	0.12	0.08	2.92	0.12	1.05	2.12	1.32	1.87	0.6	2.31
F012	0.115	0.079	3.133 VH	0.129	1.198 VH	2.244 VH	1.441 VH	2.048 VH	0.631	2.483 VH
F014	0.102	0.074	2.79	0.114	1.06	2.	1.26	1.76	0.558	2.35 H
F015	0.10	0.07	3.0 H	0.10	1.1	2.0	1.3	1.9 H	0.59	2.3
F017	0.098	0.068	2.842	0.113	1.065	2.042	1.29	1.796	0.574	2.187
F020	0.107	0.068	2.96 H	0.118	1.13	2.24 VH	1.41 H	1.98 VH	0.63	2.44 VH
F025	0.096	0.072	2.923	0.106	1.083	2.135	1.317	1.892	0.584	2.303
F026	0.110	0.079	2.759	0.124	1.003	1.997	1.223	1.742	0.555	2.174
F032	0.100	0.070	2.82	0.110	1.08	2.06	1.28	1.78	0.580	2.20
F036	0.105	0.070	2.78	0.110	1.13	2.10	1.34		0.640 H	2.24
F037	0.1	0.0679	2.805	0.111	1.027	1.995	1.225	1.755	0.56	2.217
F042	0.09	0.06	3.07 VH	0.10	1.05	2.26 VH	1.32	1.89	0.58	2.34
F053	0.101	0.069	2.785	0.111	1.074	2.076	1.291	1.806	0.584	2.231
F068	0.076	0.063	2.769	0.085	1.034	2.032	1.257	1.779	0.55	2.203
F071	0.056 L	0.032 EL	2.668	0.067 L	0.942 L	1.964	1.148 VL	1.692	0.491 VL	2.084 L
F072	0.10	0.07	2.74	0.11	1.13	2.03	1.31	1.73	0.58	2.21
F094	<0.1	<0.1	2.7	0.1	1.	2.	1.2	1.7	0.5 L	2.1
F094a	<0.5	<0.5	0.8 EL	<0.5	0.8 EL	2.	1.8 EH	0.8 EL	<0.5 L	2. VL
F107	0.10	0.07	2.63 L	0.11	1.05	2.06	1.28	1.82	0.58	2.23
F109	0.12	0.09	2.73	0.13	1.08	2.02	1.27	1.76	0.60	2.13
F110	0.09	0.06	2.72	0.10	1.05	2.04	1.27	1.78	0.56	2.24
F112	0.09	0.06	2.79	0.10	1.05	2.09	1.24	1.81	0.57	2.25
F113	0.085	0.057	2.782	0.097	1.024	1.959	1.243	1.723	0.557	2.214
F115	0.102	0.074	2.734	0.116	1.056	2.022	1.267	1.757	0.569	2.179
F117	0.099	0.067	2.808	0.108	1.061	2.08	1.281	1.813	0.574	2.229
F133	0.05 EL	<0.05	2.60 L	0.05 EL	1.00	2.00	1.25	1.80	0.50 L	2.20
F139			2.746		0.96 L	1.96	1.16 L	1.75	0.53	2.22
F147	0.12	0.08	2.97 H	0.13	1.15 H	2.23 VH	1.37 H	1.94 H	0.65 H	2.37 H
F156	0.089	0.062	2.952 H	0.103	1.097	1.947	1.262	1.826	0.581	2.117
F159	0.12	0.081	2.7	0.12	1.	2.	1.2	1.7	0.73 EH	2.1
MEDIAN	0.1000	0.0695	2.7820	0.1100	1.0560	2.0320	1.2800	1.7850	0.5800	2.2200
1CRIT	0.0400	0.0400	0.1473	0.0404	0.0782	0.1173	0.0872	0.1074	0.0592	0.1248
N	31	28	33	30	33	33	33	32	32	33
MEAN	0.0973	0.0684	2.7923	0.1054	1.0547	2.0571	1.2826	1.7975	0.5767	2.2299
3STDEV	0.0472	0.0265	0.4412	0.0430	0.1751	0.2498	0.1984	0.2709	0.1138	0.2939

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	197.00	21.889	9					Flame AE
F003	112.50	11.250	10					AA
F007	172.50	17.250	10	VL				CPQ116E0
F009	317.00	31.700	10	VH VHEHVHVHH VH	BIASED HIGH	13.67	-0.0087	
F010	18.00	1.800	10	L ELVL VLELELVLVLEL	BIASED LOW	-12.79	-0.0288	ICP-OES
F011	266.50	26.650	10					Flame Emission
F012	318.50	31.850	10	VH VHVHVHVH VH	BIASED HIGH	12.28	0.0011	IC Dionex
F014	184.00	18.400	10	H				ICP-MS
F015	222.00	22.200	10	H H				IC
F017	184.00	18.400	10					
F020	283.50	28.350	10	H VHH VH VH	BIASED HIGH	8.60	0.0035	ICP-AES
F025	237.50	23.750	10					IC
F026	140.00	14.000	10					AAS
F032	192.00	19.200	10					AAS
F036	219.50	24.389	9	H				AAS
F037	134.50	13.450	10					ICP-MS
F042	211.00	21.100	10	VH VH				ICP-OES
F053	210.00	21.000	10					AAS
F068	110.00	11.000	10					IC, Dionex
F071	29.00	2.900	10	L EL L L VL VLL	BIASED LOW*	-2.66	-0.0551	AAS
F072	180.00	18.000	10					AAS
F094	50.50	6.312	8	L	BIASED LOW*	-2.04	-0.0379	ICP-MS
F094a	50.50	8.417	6	EL EL EHELL VL				ICP-OES
F107	178.50	17.850	10	L				ICP
F109	204.50	20.450	10					AA flame
F110	134.00	13.400	10					AAS
F112	154.00	15.400	10					AAS
F113	84.00	8.400	10					FAAS PE5100
F115	163.00	16.300	10					AAS
F117	187.50	18.750	10					IC
F133	68.50	7.611	9	EL L EL L	BIASED LOW*	-1.21	-0.0390	ICP-MS
F139	56.00	8.000	7	L L				ICP-AES
F147	312.00	31.200	10	H H VHH H H H	BIASED HIGH	6.91	0.0165	IC
F156	153.00	15.300	10	H				ICP
F159	159.00	15.900	10	EH				ASTM D 4191

* 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 17.438

PARAMETER: 19091 Potassium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	<0.05	<0.05	0.24	<0.05	0.41	0.35	0.38	0.25	0.20	0.49
F003	0.04	0.02	0.24	0.03	0.45	0.35	0.41	0.25	0.20	0.51
F007	0.035	<0.020	0.238	0.030	0.466	0.371	0.401	0.256	0.204	0.545
F009	0.05	0.03	0.26	0.06	0.45	0.38	0.42	0.25	0.19	0.49
F010	0.03	<0.01	0.2 L	0.02	0.37 L	0.29 L	0.33 VL	0.21 L	0.16 L	0.42 VL
F011	0.04	<0.03	0.24	0.03	0.46	0.36	0.41	0.26	0.21	0.50
F012	0.029	0.014	0.215	0.033	0.422	0.333	0.381	0.239	0.197	0.495
F014	0.063 EH	<0.05	0.21	0.063	0.49 H	0.278 VL	0.315 EL	0.214 L	0.189	0.57 H
F015	0.03	0.01	0.23	0.03	0.42	0.34	0.39	0.25	0.20	0.50
F017	0.041	0.018	0.243	0.039	0.45	0.362	0.408	0.263	0.206	0.509
F020	0.06	0.08 EH	0.26	0.03	0.46	0.42 VH	0.41	0.33 EH	0.22	0.53
F025	0.034	0.025	0.229	0.032	0.437	0.356	0.411	0.259	0.205	0.519
F026	0.041	0.026	0.243	0.048	0.426	0.344	0.385	0.256	0.202	0.488
F032	0.042	0.020	0.250	0.038	0.498 H	0.366	0.420	0.264	0.210	0.530
F036	0.040	0.025	0.250	0.040	0.470	0.330	0.370		0.220	0.495
F037	0.0360	<0.015	0.232	0.0290	0.433	0.343	0.384	0.242	0.206	0.495
F042	0.05W	0.05W	0.23	0.05W	0.42	0.34	0.38	0.24	0.18	0.50
F053	0.039	0.017	0.245	0.037	0.450	0.369	0.416	0.262	0.204	0.510
F068	0.035	0.045 EH	0.223	0.031	0.416	0.329	0.378	0.239	0.184	0.481
F071	0.032	0.012	0.254	0.029	0.414	0.354	0.386	0.254	0.178	0.507
F072	0.04	0.02	0.28 H	0.04	0.44	0.37	0.40	0.27	0.21	0.57 H
F094	0.02	<0.01	0.23	0.02	0.43	0.33	0.39	0.25	0.19	0.48
F094a	<0.1	<0.1	0.2 L	<0.1	0.4	0.3 L	0.4	0.2 L	0.2	0.4 EL
F107	0.04	0.02	0.24	0.03	0.44	0.35	0.41	0.27	0.20	0.50
F109	0.01T EL	-0.01T EL	0.24	0.01T	0.46	0.36	0.41	0.25	0.21	0.54
F110	0.036	0.016	0.241	0.036	0.450	0.364	0.419	0.275	0.211	0.528
F112	0.03	0.01	0.23	0.03	0.44	0.35	0.40	0.25	0.19	0.49
F113	0.043	0.028	0.186 L	0.039	0.332 EL	0.270 EL	0.306 EL	0.198 EL	0.158 L	0.376 EL
F115	0.044	0.020	0.236	0.043	0.440	0.348	0.399	0.256	0.196	0.499
F117	0.039	0.017	0.241	0.042	0.444	0.355	0.404	0.255	0.21	0.506
F133	<0.05	<0.05	0.20 L	<0.05	0.40	0.35	0.35 L	0.25	0.15 EL	0.45
F147	0.04	0.02	0.26	0.04	0.47	0.39	0.43	0.27	0.24 H	0.54
F156	0.036	0.015	0.253	0.033	0.466	0.379	0.424	0.276	0.211	0.532
F159	0.046	0.026	0.41 EH	0.11 EH	0.52 EH	0.42 VH	0.47 VH	0.27	0.23	0.54
MEDIAN	0.0395	0.0200	0.2400	0.0330	0.4400	0.3500	0.4000	0.2540	0.2010	0.5000
1CRIT	0.0300	0.0300	0.0370	0.0300	0.0470	0.0425	0.0450	0.0377	0.0351	0.0500
N	28	22	32	28	32	31	32	31	32	31
MEAN	0.0381	0.0206	0.2370	0.0358	0.4404	0.3481	0.3944	0.2516	0.1994	0.5006
3STDEV	0.0219	0.0227	0.0539	0.0285	0.0795	0.0731	0.0762	0.0524	0.0460	0.0954

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	83.00	11.857	7					Flame AE
F003	171.00	17.100	10					AA
F007	181.50	20.167	9					CPQ107E2
F009	223.00	22.300	10					
F010	27.50	3.056	9	L L L VLL L VL	BIASED LOW	-14.93	-0.0067	ICP-OES
F011	183.50	20.389	9					Flame Emission
F012	86.00	8.600	10					IC Dionex
F014	144.50	16.056	9	EH H VLELL H				ICP-MS
F015	102.50	10.250	10					IC
F017	212.00	21.200	10					
F020	267.50	26.750	10	EH VH EH	BIASED HIGH*	0.80	0.0303	ICP-AES
F025	176.50	17.650	10					IC
F026	171.50	17.150	10					AAS
F032	251.00	25.100	10	H				AAS
F036	171.00	19.000	9					AAS
F037	106.00	11.778	9					ICP-MS
F042	64.50	9.214	7					ICP-OES
F053	209.00	20.900	10					AAS
F068	88.00	8.800	10	EH				IC, Dionex
F071	122.50	12.250	10					AAS
F072	237.50	23.750	10	H H				AAS
F094	73.50	8.167	9					ICP-MS
F094a	46.50	6.643	7	L L L EL	BIASED LOW	-15.15	0.0109	ICP-OES
F107	175.50	17.550	10					ICP
F109	162.00	16.200	10	ELEL				AA flame
F110	219.00	21.900	10					AAS
F112	107.00	10.700	10					AAS
F113	74.50	7.450	10	L ELELELELL EL	BIASED LOW	-27.46	0.0139	AAS PE5100
F115	169.00	16.900	10					AAS
F117	191.50	19.150	10					IC
F133	44.00	6.286	7	L L EL	BIASED LOW*	-4.47	-0.0183	ICP-MS
F147	274.00	27.400	10	H	BIASED HIGH	7.57	0.0035	IC
F156	241.50	24.150	10					ICP
F159	303.50	30.350	10	EHEHEHVHVH	BIASED HIGH	7.72	0.0373	ASTM D 4192

* 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 16.701

PARAMETER: 14092 Reactive Silica mg/L Si

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F003	0.08	0.02	0.38	0.01	2.03	2.24	1.89	1.23	0.78	1.94
F010	0.09	<0.02	0.33	<0.02	2.05	0.37 EL	1.87	1.21	0.75	1.98
F011	0.10	0.02	0.43 H	<0.02	2.24 H	4.02 EH	2.42 EH	1.59 EH	0.87 H	2.29 EH
F015	<0.1	<0.1	0.3 VL	<0.1	2.4 EH	2.7 VH	2.2 VH	1.4 VH	0.8	2.3 EH
F020	0.08	<0.05	0.38	<0.05	2.06	2.3	1.93	1.26	0.8	1.99
F026	0.0964	0.0338	0.3798	0.0226	2.0704	2.3119	1.9214	1.2281	0.7689	1.9895
F032	0.06T	0.02T	0.36	0.02T	2.06	2.30	1.92	1.24	0.76	1.98
F036	<0.05 EL	<0.05	0.36	<0.05	2.04	2.28	1.94		0.76	1.94
F037	0.0846	0.0231	0.352	<0.02	1.763 VL	1.923 VL	1.602 EL	1.056 VL	0.771	1.684 EL
F042	0.07	0.00	0.33	0.00	1.82 VL	2.01 VL	1.75 L	1.10 L	0.71	1.88
F071	0.092	<0.029	0.369	<0.029	2.007	2.250	1.880	1.238	0.767	1.933
F072	0.098	0.01	0.40	0.01	2.2 H	2.3	2.1 H	1.3	0.84	2.1
F094	0.06	<0.05	0.34	<0.05	2.04	2.28	1.83	1.21	0.75	1.95
F107	0.08	0.04	0.39	0.03	2.02	2.23	1.88	1.24	0.77	1.95
F109	0.08T	0.02T	0.37	0.00T	2.09	2.28	1.90	1.24	0.83	1.99
F112	0.09	0.01	0.39	0.01	2.20 H	2.42	2.06 H	1.38 H	0.86 H	2.16 H
F113	0.089	0.018	0.402	0.009	2.126	2.348	1.966	1.293	0.818	2.042
F115	0.071	0.007	0.017 EL	0.006	2.047	2.271	1.904	1.232	0.764	1.962
F117	0.12 EH	0.084 EH	0.376	0.042 EH	1.986	2.205	1.89	1.207	0.88 H	1.921
F147	0.08	0.05 H	0.36		1.85 L	2.24	1.88	1.21	0.82	2.
MEDIAN	0.0823	0.0200	0.3695	0.0100	2.0485	2.2800	1.9020	1.2380	0.7755	1.9800
1CRIT	0.0284	0.0250	0.0457	0.0250	0.1464	0.1603	0.1376	0.0978	0.0700	0.1423
N	15	12	18	8	18	18	18	17	18	18
MEAN	0.0854	0.0227	0.3649	0.0147	2.0520	2.2716	1.9284	1.2481	0.7933	1.9999
3STDEV	0.0266	0.0366	0.0782	0.0237	0.3077	0.4551	0.2988	0.1987	0.1109	0.2840

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	81.50	8.150	10					HETEROPOLY BLUE
F010	50.00	6.250	8	EL				Colorimetry
F011	160.50	17.833	9	H H EHEHEHH EH	BIASED HIGH	39.82	-0.1084	Auto Colourimetric
F015	110.50	15.786	7	VL EHVHVHVH EH	BIASED HIGH	24.97	-0.1627	IC
F020	102.00	12.750	8					TrAACs
F026	118.00	11.800	10					Autoanalyser
F032	90.50	9.050	10					colourimetry
F036	52.50	8.750	6	EL				colourimetry
F037	42.00	4.667	9	VLVLELVL EL	BIASED LOW	-16.66	0.0383	ICP-MS
F042	21.00	2.100	10	VLVLL L	BIASED LOW	-9.03	-0.0069	Colorimetric
F071	64.00	8.000	8					Colorimetric
F072	143.00	14.300	10	H H				
F094	44.00	5.500	8					Colorimetric
F107	91.00	9.100	10					COLORIMETRY
F109	104.50	10.450	10					ICP
F112	144.00	14.400	10	H H H H H				TECHNICON
F113	133.00	13.300	10					FIA Lachat 8000
F115	64.00	6.400	10	EL				Auto. Colorimetric
F117	97.50	9.750	10	EHEH EH H				ICP-AES
F147	78.50	8.722	9	H L				colourimetry

OVERALL AVERAGE RANK IS 9.846

PARAMETER: 16000 Sulfate IC mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	0.27	1.39	2.29	1.6	4.41	3.79	5.81	4.66	5.93	4.67
F010	0.16 VL	1.34	1.8 EL	1.66	3.84 EL	2.81 EL	5.25 EL	3.72 EL	5.12 EL	4.08 EL
F012	0.238	1.338	2.253	1.502	4.426	3.821	5.878	4.674	6.072	4.737
F014	0.358 VH	1.56 VH	2.32	1.55	4.33	3.95	5.74	4.53	5.82	4.62
F015	0.23	1.44	2.4	1.64	4.7 H	3.7	4.5 EL	4.6	5.8	5.1 EH
F017	0.255	1.413	2.282	1.597	4.361	3.751	5.775	4.628	5.919	4.631
F020	0.21	1.21 VL	2.15 L	1.55	4.69 H	4.13 EH	6.52 EH	5.11 EH	6.63 EH	5.2 EH
F025	0.252	1.425	2.300	1.735 VH	4.482	3.845	5.613	4.737	5.822	4.763
F026	0.2521	1.3349	2.3139	1.5484	4.5113	3.8805	6.0088	4.7732	6.1038	4.8107
F036	0.30	1.25 L	2.10 VL	1.40 VL	4.30	3.70	6.05	4.55	6.10	4.65
F037	0.3016	1.2299VL	2.2931	1.6504	4.3525	3.7893	5.6566	4.7294	6.0149	4.6273
F042	0.23	1.39	2.31	1.63	4.44	3.84	5.83	4.70	5.97	4.71
F053	0.247	1.373	2.321	1.572	4.495	3.888	5.897	4.764	6.040	4.767
F068	0.255	1.35	2.262	1.535	4.388	3.792	5.82	4.732	5.964	4.725
F071	0.299	1.392	2.186	1.547	4.330	3.685	5.678	4.501	5.820	4.568
F072	<1.	1.47 H	2.28	1.68 H	4.29	3.68	5.72	4.58	5.88	4.56
F094	0.32 H	1.44	2.44 H	3.25 EH	4.39	3.7	5.8	4.48	5.96	4.58
F107	0.24	1.36	2.28	1.55	4.45	3.84	5.89	4.71	6.02	4.73
F109	0.3326VH	1.3728	2.1758	1.5392	4.1962L	3.6029L	5.553 L	4.4450L	5.6524L	4.4490L
F110	0.42 EH	1.47 H	2.32	1.66	4.39	3.82	5.75	4.66	5.92	4.67
F112	0.29	1.36	2.24	1.58	4.47	3.80	5.98	4.71	6.12	4.73
F113	0.33 VH	1.37	2.31	1.56	4.38	3.77	5.8	4.64	5.94	4.62
F115	0.235	1.330	2.246	1.511	4.415	3.779	5.810	4.693	6.001	4.720
F117	0.231	1.37	2.3	1.568	4.599	3.877	5.878	4.731	6.018	4.77
F118	0.27T	1.42	2.38	1.63	4.56	3.95	5.98	4.85	6.18	4.84
F133	0.215	1.765 EH	2.795 EH	3.495 EH	4.370	3.735	5.730	4.625	5.860	4.665
F147	0.16 VL	1.285	2.24	1.48	4.44	3.77	5.88	4.67	6.01	4.66
F156	0.246	1.35	2.25	1.56	4.43	3.79	5.85	4.68	6.04	4.69
MEDIAN	0.2521	1.3714	2.2860	1.5700	4.4125	3.7900	5.8100	4.6720	5.9670	4.6800
1CRIT	0.0501	0.0892	0.1213	0.0962	0.1957	0.1739	0.2446	0.2048	0.2501	0.2051
N	24	26	26	26	26	26	26	26	26	26
MEAN	0.2670	1.3778	2.2786	1.6494	4.4191	3.7902	5.7934	4.6559	5.9607	4.6947
3STDEV	0.1184	0.2038	0.2155	0.9765	0.2996	0.2459	0.4786	0.2848	0.3498	0.3497

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	148.00	14.800	10					IC
F010	41.00	4.100	10	VL EL ELELELELELEL	BIASED LOW	-15.05	0.0210	IC
F012	142.50	14.250	10					IC Dionex
F014	142.50	14.250	10	VHVH				
F015	149.00	14.900	10	H EL EH				IC
F017	122.50	12.250	10					
F020	184.00	18.400	10	VLL H EHEHEHEHEH				IC
F025	178.50	17.850	10	VH				IC
F026	199.00	19.900	10					DIONEX I.C.
F036	104.00	10.400	10	L VLVL				IC
F037	134.00	13.400	10	VL				IC Waters
F042	167.00	16.700	10					IC
F053	207.50	20.750	10					IC
F068	139.00	13.900	10					IC, Dionex
F071	79.00	7.900	10					IC
F072	94.00	10.444	9	H H				IC
F094	152.50	15.250	10	H H EH				IC
F107	165.50	16.550	10					IC
F109	63.00	6.300	10	VH L L L L L L	BIASED LOW	-6.39	0.0731	Dionex IC
F110	175.00	17.500	10	EHH				IC Dionex
F112	180.50	18.050	10					IC DIONEX
F113	132.00	13.200	10	VH				IC Dionex DX-500
F115	116.50	11.650	10					IC-Dionex AS14
F117	185.50	18.550	10					IC
F118	239.00	23.900	10		BIASED HIGH*	3.19	0.0138	IC
F133	141.00	14.100	10	EHEHEH				I.C.
F147	106.00	10.600	10	VL				IC
F156	144.00	14.400	10					IC

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

OVERALL AVERAGE
RANK IS 14.452

PARAMETER: 16001 Sulfate Colour mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F003	0.50	1.5	2.4	1.7	4.9	4.4	5.9	4.9	5.8	5.2
F007	<0.8	0.9 L	2.0	1.1 L	4.8	4.1	6.2	5.1	6.6	5.4
F011	6.	5. EH	3. EH	4. EH	5.	7. EH	6.	<3. EL	11. EH	9. EH
F026	0.295	1.345	2.305	1.555	5.04	4.235	6.035	5.055	6.065	5.42
F094	<0.5	1.1	1.9	1.3	4.7	3.8	5.8	4.7	6.	4.8
F159	<0.5	1.2	1.99	1.36	4.18 L	3.59 L	5.59	4.44	5.72	4.43 L
MEDIAN		1.2725	2.1525	1.4575	4.8500	4.1675	5.9500	4.9000	6.0325	5.3000
1CRIT	0.3000	0.3218	0.3922	0.3366	0.6080	0.5534	0.6960	0.6120	0.7026	0.6440
N	1	4	4	4	4	4	4	3	4	4
MEAN	0.5000	1.2863	2.1737	1.4787	4.8500	4.1337	5.9338	4.8850	6.1163	5.2050
3STDEV	-	-	-	-	-	-	-	-	-	-

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	37.00	3.700	10					METHYLTHYMOL BLUE
F007	31.00	3.444	9	L L				CPQ100E2
F011	48.00	5.333	9	EHEHEH EH ELEHEH				Auto Colourimetric
F026	41.00	4.100	10					Autoanalyser
F094	18.00	2.000	9					ICP-OES
F159	14.00	1.556	9	L L L				ASTM D 4327

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

OVERALL AVERAGE
RANK IS 3.375

PARAMETER: 17000 Chloride IC mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	0.10	0.15	4.39	0.2	0.82	2.12	0.82	3.11	0.54	1.66
F010	0.1	0.1	4. VL	0.1 EL	0.7 L	2.	0.7 EL	2.9 L	0.4 VL	1.4 VL
F012	0.082	0.141	4.063 L	0.158	0.697 L	1.801 EL	0.755	2.846 L	0.442 L	1.48 L
F014	0.107	0.161	4.2	0.211	0.839	2.06	0.841	3.11	0.552	1.62
F015	0.11	0.16	4.3	0.22	0.87	2.5 EH	0.89	3.3 H	0.63 H	1.92 VH
F017	0.105	0.154	4.4	0.209	0.826	2.083	0.828	3.109	0.565	1.638
F020	0.081	0.131	4.67 H	0.179	0.87	2.49 EH	0.88	3.57 EH	0.51	2.01 EH
F025	0.106	0.164	4.399	0.206	0.819	2.149	0.836	3.193	0.531	1.704
F026	0.1023	0.1421	4.4041	0.2066	0.839	2.1868	0.8554	3.2148	0.5657	1.7627
F036	0.10	0.13	4.54	0.23	0.85	2.15	0.87	3.21	0.56	1.63
F037	0.1423	0.1137	4.4225	0.2182	0.8088	2.1072	0.785	3.0875	0.5456	1.6106
F042	0.14W	0.15	4.47	0.20	0.77	2.10	0.77	3.16	0.485	1.16 EL
F053	0.104	0.150	4.431	0.205	0.854	2.161	0.853	3.164	0.552	1.689
F068	0.1165	0.188	4.319	0.208	0.816	2.079	0.807	3.083	0.534	1.645
F071	0.102	0.154	4.705 VH	0.196	0.856	2.152	0.829	3.296 H	0.542	1.715
F072	<0.2	<0.2	4.27	0.25	0.768	1.96 L	0.769	2.95	0.784 EH	1.53 L
F094	0.18 EH	0.22 EH	4.1 L	0.29 EH	0.92 H	2.18	0.89	2.99	0.6	1.71
F107	0.10	0.14	4.02 VL	0.20	0.87	2.02	0.87	2.91 L	0.55	1.73
F109	0.1097	0.1496	4.2578	0.1956	0.7069L	2.0005	0.8230	2.8763L	0.5650	1.4781L
F110	0.12	0.15	4.19	0.20	0.82	2.09	0.83	3.10	0.54	1.69
F112	0.11	0.15	4.18	0.21	0.85	2.12	0.85	3.08	0.54	1.69
F113	0.21 EH	0.23 EH	4.52	0.26	0.85	2.09	0.86	3.15	0.58	1.67
F115	0.064	0.114	4.430	0.167	0.807	2.084	0.799	3.175	0.493	1.670
F117	0.1	0.143	4.304	0.196	0.851	2.142	0.851	3.116	0.533	1.693
F133	0.090	0.134	4.120 L	0.183	0.798	2.002	0.774	3.085	0.533	1.580
F147	0.06	0.11	4.43	0.16	0.77	2.05	0.76	3.08	0.48	1.59
F156	0.107	0.155	4.43	0.209	0.841	2.14	0.847	3.07	0.547	1.71
F159	0.04	0.09	4.19	0.15	0.79	2.13	0.75	2.96	0.33 EL	1.63
MEDIAN	0.1032	0.1500	4.3545	0.2025	0.8230	2.1036	0.8295	3.1045	0.5410	1.6650
1CRIT	0.0750	0.0750	0.2204	0.0751	0.0968	0.1416	0.0970	0.1767	0.0869	0.1263
N	24	25	26	26	26	26	25	26	26	26
MEAN	0.1041	0.1462	4.3250	0.2011	0.8177	2.1095	0.8205	3.0954	0.5352	1.6479
3STDEV	0.0688	0.0722	0.4691	0.0744	0.1332	0.2888	0.1167	0.3280	0.1375	0.3006

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	137.00	13.700	10					IC
F010	26.00	2.600	10	VLELL ELL VLVL	BIASED LOW	-6.03	-0.0640	IC
F012	34.00	3.400	10	L L EL L L L	BIASED LOW	-7.05	-0.0433	IC Dionex
F014	158.00	15.800	10					
F015	241.00	24.100	10	EH H H VH	BIASED HIGH*	1.92	0.0757	IC
F017	158.50	15.850	10					
F020	186.00	18.600	10	H EH EH EH				IC
F025	173.00	17.300	10					IC
F026	198.50	19.850	10					DIONEX I.C.
F036	188.00	18.800	10					IC
F037	140.00	14.000	10					IC Waters
F042	104.00	11.556	9	EL				IC
F053	193.50	19.350	10					IC
F068	144.00	14.400	10					IC, Dionex
F071	195.00	19.500	10	VH H				IC
F072	86.00	10.750	8	L EHL				IC
F094	219.00	21.900	10	EHEHL EHH				IC
F107	136.00	13.600	10	VL L				IC
F109	96.50	9.650	10	L L L				Dionex IC
F110	145.50	14.550	10					IC Dionex
F112	160.00	16.000	10					IC DIONEX
F113	220.00	22.000	10	EHEH	BIASED HIGH*	1.05	0.0398	IC Dionex DX-500
F115	106.50	10.650	10					IC-Dionex AS14
F117	153.00	15.300	10					IC
F133	73.50	7.350	10	L				I.C.
F147	67.00	6.700	10		BIASED LOW*	2.18	-0.0689	IC
F156	181.50	18.150	10					IC
F159	56.00	5.600	10	EL	BIASED LOW*	-1.46	-0.0613	ASTM D 4327

* 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 14.357

PARAMETER: 17001 Chloride Colour mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F003	0.14	0.16	4.21	0.21	1.02	2.16	0.87	3.09	0.57	1.80
F007	<0.10	0.12	4.12	0.15	0.95	2.10	0.81	2.98	0.50	1.64
F010	0.1	0.2	4.4	0.1	0.8	2.2	0.8	3.2	0.5	1.7
F011	0.3	0.5 H	4.9 H	0.5 H	1.2	2.5	1.1	3.5	0.9 H	2.0
F026	0.126	0.166	4.271	0.197	1.017	2.263	0.867	3.214	0.559	1.890
MEDIAN	0.1330	0.1660	4.2710	0.1970	1.0170	2.2000	0.8670	3.2000	0.5590	1.8000
1CRIT	0.3000	0.3000	0.5617	0.3000	0.3014	0.3960	0.3000	0.4760	0.3000	0.3640
N	2	3	3	3	3	3	3	3	2	3
MEAN	0.1330	0.1753	4.2937	0.1857	0.9957	2.2077	0.8490	3.1680	0.5645	1.7967
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					THIOCYANATE
F007	12.50	1.389	9					CPQ121E0
F010	21.50	2.150	10					Titration-cond.
F011	49.00	4.900	10	H H H	H			Auto Colourimetric
F026	32.00	3.200	10					Autoanalyser

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

OVERALL AVERAGE RANK IS 2.959

PARAMETER: 20091 Calcium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	0.93	0.61	0.40	0.18	4.6	3.	3.7	3.6	4.7	2.5
F003	0.96	0.63	0.41	0.17	4.52	2.97	3.68	3.58	4.64	2.53
F007	0.954	0.607	0.403	0.176	4.54	3.00	3.69	3.61	4.75	2.56
F009	0.92	0.61	0.39	0.16	4.44	2.93	3.66	3.48	4.61	2.47
F010	0.64 VL	0.59	0.36	0.16	4.44	2.75	3.53	3.47	4.6	2.39
F011	0.74 VL	0.49 L	0.33	0.17	2.39 EL	1.72 VL	2.15 EL	2.12 EL	2.6 EL	1.44 VL
F012	1.63 EH	1.016 EH	0.578 EH	0.371 EH	5.658 VH	4.033 VH	4.83 VH	4.505 VH	5.892 VH	3.492 VH
F014	0.982	0.576	0.346	0.143	4.38	2.83	3.57	3.38	4.63	2.52
F015	1.22 VH	0.65	0.42	0.18	6.3 EH	4.1 VH	4.8 VH	4.6 VH	6.0 VH	3.5 VH
F017	0.997	0.627	0.418	0.177	4.591	2.986	3.712	3.588	4.742	2.51
F020	0.99	0.67	0.45	0.23	4.61	2.9	3.68	3.44	4.63	2.52
F025	1.336 VH	0.738 H	0.467	0.189	6.161 VH	4.424 EH	5.070 EH	4.822 EH	6.238 VH	3.719 EH
F026	0.623 VL	0.485 L	0.294 L	0.146	3.913 VL	2.537 VL	3.178 VL	3.086 VL	4.122 VL	2.134 VL
F032	0.920	0.590	0.420	0.170	4.29	2.70 L	3.37 L	3.41	4.37	2.28 L
F036	1.08 H	0.546	0.344	0.144	5.02 VH	3.44 VH	3.06 VL		3.78 VL	2.36
F037	0.969	0.604	0.407	0.177	4.575	2.933	3.623	3.577	4.641	2.533
F042	1.07	0.70 H	0.50 H	0.28 H	4.59	3.03	3.70	3.61	4.78	2.54
F053	0.984	0.620	0.411	0.178	4.462	2.976	3.654	3.520	4.700	2.474
F072	0.915	0.593	0.385	0.177	3.68 VL	2.26 VL	2.98 VL	3.03 VL	4.11 VL	1.96 VL
F094	0.96	0.58	0.39	0.17	4.33	2.81	3.49	3.42	4.44	2.43
F094a	1.	0.6	<0.5	<0.5	4.5	2.9	3.5	3.5	4.7	2.5
F107	0.94	0.59	0.39	0.17	4.45	2.98	3.66	3.61	4.75	2.52
F109	0.93	0.58	0.36	0.14	4.62	2.95	3.62	3.53	4.70	2.48
F110	0.95	0.59	0.39	0.17	4.48	2.96	3.65	3.55	4.55	2.49
F112	0.93	0.59	0.39	0.18	4.17 L	2.68 L	3.31 L	3.24 L	4.41	2.29 L
F113	0.364 EL	0.228 EL	0.170 EL	0.071 L	2.044 EL	1.324 EL	1.625 EL	1.560 EL	1.981 EL	1.071 EL
F115	0.994	0.641	0.403	0.196	4.620	3.01	3.706	3.607	4.743	2.553
F117	1.017	0.632	0.417	0.179	4.734	3.127	3.814	3.756	4.963 H	2.647
F133	0.95	0.60	0.40	0.15	4.50	2.95	3.50	3.60	4.55	2.45
F139	1.03	0.63	0.41	0.18	4.64	3.03	3.76	3.69	4.96 H	2.59
F147	1.27 VH	0.66	0.42	0.13	4.67	3.22 H	3.91 H	3.9 H	4.98 H	2.84 VH
F156	0.908	0.596	0.413	0.173	4.419	2.871	3.547	3.513	4.532	2.398
F159	1.2 VH	0.77 VH	1. EH	0.31 EH	5.1 VH	3.4 VH	4. H	4. VH	5.2 VH	3. VH
MEDIAN	0.9600	0.6040	0.4030	0.1745	4.5200	2.9600	3.6540	3.5635	4.6410	2.5000
1CRIT	0.1105	0.0927	0.0827	0.0750	0.2885	0.2105	0.2452	0.2407	0.2946	0.1875
N	31	31	30	30	31	31	31	30	31	31
MEAN	0.9777	0.6127	0.4039	0.1785	4.5191	2.9672	3.6140	3.5507	4.6379	2.5129
3STDEV	0.4408	0.1704	0.1517	0.1095	1.7526	1.2566	1.3723	1.2423	1.6850	1.0882

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	193.00	19.300	10					AAS
F003	183.50	18.350	10					AA
F007	203.50	20.350	10					CPQ106E3
F009	124.50	12.450	10					
F010	86.50	8.650	10	VL				ICP-OES
F011	34.50	3.450	10	VLL ELVLELELELVL	BIASED LOW	-47.39	0.1534	AAS
F012	315.00	31.500	10	EHEHEHEHVHVHVHVHVHVH	BIASED HIGH	22.26	0.2688	IC Dionex
F014	103.50	10.350	10					ICP-MS
F015	298.50	29.850	10	VH EHVHVHVHVHVH	BIASED HIGH	35.97	-0.0834	IC
F017	215.00	21.500	10					
F020	205.50	20.550	10					ICP-AES
F025	315.00	31.500	10	VHH VHEHEHEHVHEH	BIASED HIGH	38.20	0.0024	IC
F026	38.00	3.800	10	VLL L VLVLVLVLVLVL	BIASED LOW	-10.75	-0.0885	AAS
F032	93.00	9.300	10	L L L				AAS
F036	114.00	12.667	9	H VHVHVL VL				AAS
F037	177.00	17.700	10					ICP-MS
F042	260.00	26.000	10	H H H	BIASED HIGH*	-0.53	0.0947	ICP-OES
F053	178.50	17.850	10					AAS
F072	65.00	6.500	10	VLVLVLVLVLVL	BIASED LOW	-17.68	0.0350	AAS
F094	95.50	9.550	10					ICP-MS
F094a	124.00	15.500	8					ICP-OES
F107	164.50	16.450	10					ICP
F109	128.50	12.850	10					ICP
F110	135.50	13.550	10					AAS
F112	89.50	8.950	10	L L L L L				AAS
F113	10.00	1.000	10	ELELELL ELELELELELEL	BIASED LOW	-55.33	-0.0274	AAS PE5100
F115	236.00	23.600	10					AAS
F117	261.00	26.100	10	H	BIASED HIGH	5.70	-0.0062	ICP-AES
F133	133.00	13.300	10					ICP-MS
F139	252.00	25.200	10	H				ICP-AES
F147	257.00	25.700	10	VH H H H H VH				IC
F156	119.00	11.900	10					ICP
F159	302.00	30.200	10	VHVHEHEHVHVHH VHVHVH	BIASED HIGH	5.89	0.2587	ASTM D 511

* 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 16.853

PARAMETER: 12091 Magnesium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA

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 LAB NO	1= RAIN-SUP-93 REPORTED VALUE	2= RAINGR-16 REPORTED VALUE	3= BESKI-01 REPORTED VALUE	4= AES-01 REPORTED VALUE	5= GAT-99 REPORTED VALUE	6= MAURI-MX REPORTED VALUE	7= AUX-98 REPORTED VALUE	8= MERSEY-MX REPORTED VALUE	9= TRKY-94 REPORTED VALUE	10= TROIS-02A REPORTED VALUE
F002	0.20	0.18	0.40	<0.05	0.86	0.55	0.93	0.90	0.85	0.61
F003	0.21	0.19	0.40	0.04	0.86	0.56	0.94	0.91	0.85	0.62
F007	0.196	0.173	0.392	0.032	0.852	0.557	0.938	0.913	0.855	0.626
F009	0.22	0.2	0.44 H	0.04	0.9	0.61 H	1.01 H	0.97	0.91	0.66
F010	0.17 L	0.18	0.4	0.03	0.88	0.56	0.98	0.93	0.88	0.63
F011	0.25 VH	0.19	0.42	0.04	0.88	0.56	0.96	0.94	0.86	0.63
F012	0.299 EH	0.253 EH	0.502 EH	0.072 EH	0.952 VH	0.63 VH	1.062 VH	0.999 H	0.938 H	0.719 VH
F014	0.207	0.187	0.385	<0.05	0.784 L	0.52	0.875 L	0.823 L	0.779 L	0.607
F015	0.21	0.18	0.41	0.03	0.89	0.59	0.98	0.92	0.87	0.65
F017	0.2	0.175	0.388	0.034	0.833	0.539	0.918	0.878	0.823	0.595
F020	0.216	0.186	0.416	0.04	0.87	0.544	0.97	0.914	0.858	0.617
F025	0.239 VH	0.187	0.428	0.033	0.955 VH	0.633 VH	1.077 VH	1.015 VH	0.958 VH	0.713 VH
F026	0.164 L	0.164	0.345 VL	0.037	0.797 L	0.504 L	0.877 L	0.844 L	0.803	0.554 L
F032	0.197	0.182	0.410	0.033	0.830	0.557	0.920	0.890	0.850	0.580
F036	0.185	0.165	0.365	0.030	0.800 L	0.566	0.855 L		0.800 L	0.590
F037	0.218	0.186	0.435	0.0347	0.93 H	0.593	1.009 H	0.971	0.915	0.674 H
F042	0.20	0.17	0.39	0.05W	0.82	0.54	0.91	0.86	0.82	0.60
F053	0.196	0.169	0.380	0.032	0.811	0.530	0.898	0.866	0.821	0.586
F072	0.22	0.19	0.44 H	0.02	0.86	0.60	0.93	0.89	0.86	0.66
F094	0.22	0.18	0.41	0.04	0.87	0.57	0.96	0.92	0.86	0.62
F094a	0.14 VL	0.13 VL	0.35 L	<0.01 EL	0.85	0.55	0.92	0.87	0.83	0.6
F107	0.20	0.17	0.38	0.03	0.84	0.56	0.94	0.92	0.86	0.62
F109	0.20	0.17	0.39	0.03	0.85	0.54	0.92	0.89	0.85	0.61
F110	0.206	0.179	0.401	0.031	0.874	0.564	0.960	0.920	0.880	0.628
F112	0.20	0.17	0.40	0.02	0.87	0.56	0.95	0.91	0.86	0.62
F113	0.185	0.163	0.374	0.028	0.815	0.526	0.899	0.863	0.809	0.583
F115	0.209	0.182	0.409	0.034	0.884	0.571	0.970	0.936	0.882	0.634
F117	0.214	0.186	0.415	0.036	0.891	0.579	0.979	0.947	0.896	0.643
F133	0.155 VL	0.136 VL	0.310 EL	0.021	0.808	0.530	0.932	0.911	0.830	0.600
F139	0.18	0.46 EH	0.39		0.83	0.53	0.92	0.88	0.86	0.59
F147	0.25 VH	0.2	0.45 H	0.04	0.94 H	0.62 H	1.05 VH	1.02 VH	0.94 H	0.7 VH
F156	0.189	0.170	0.401	0.033	0.854	0.557	0.943	0.909	0.852	0.610
F159	0.25 VH	0.22 VH	0.41	0.027	0.96 VH	0.66 EH	1.	1. H	0.94 H	0.71 VH
MEDIAN	0.2000	0.1800	0.4000	0.0330	0.8600	0.5600	0.9400	0.9120	0.8600	0.6200
1CRIT	0.0250	0.0240	0.0350	0.0200	0.0580	0.0430	0.0620	0.0606	0.0580	0.0460
N	31	31	31	25	31	31	31	30	31	31
MEAN	0.2050	0.1817	0.4008	0.0334	0.8631	0.5644	0.9500	0.9162	0.8617	0.6263
3STDEV	0.0678	0.0579	0.0723	0.0144	0.1245	0.0888	0.1318	0.1259	0.1120	0.1053

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	124.00	13.778	9					AAS
F003	183.50	18.350	10					AA
F007	142.00	14.200	10					CPQ106E3
F009	281.00	28.100	10	H H H	BIASED HIGH	5.14	0.0109	
F010	182.00	18.200	10	L				ICP-OES
F011	239.00	23.900	10	VH				AAS
F012	312.00	31.200	10	EHEHEHEHVHVHVHH H VH	BIASED HIGH*	3.56	0.0663	IC Dionex
F014	69.50	7.722	9	L L L L				ICP-MS
F015	216.50	21.650	10					IC
F017	99.00	9.900	10					
F020	199.00	19.900	10					ICP-AES
F025	289.50	28.950	10	VH VHVHVHVHVHVH	BIASED HIGH	12.92	-0.0046	IC
F026	42.00	4.200	10	L VL L L L L L	BIASED LOW	-6.20	-0.0131	AAS
F032	123.50	12.350	10					AAS
F036	57.00	6.333	9	L L L	BIASED LOW	-7.27	0.0046	AAS
F037	266.00	26.600	10	H H H	BIASED HIGH	7.18	0.0001	ICP-MS
F042	73.00	8.111	9					ICP-OES
F053	63.50	6.350	10		BIASED LOW	-5.07	0.0006	AAS
F072	200.50	20.050	10	H				AAS
F094	212.00	21.200	10					ICP-MS
F094a	62.00	6.889	9	VLVLL EL	BIASED LOW*	4.00	-0.0570	ICP-OES
F107	141.00	14.100	10					ICP
F109	107.50	10.750	10					ICP
F110	191.50	19.150	10					AAS
F112	149.00	14.900	10					AAS
F113	44.50	4.450	10		BIASED LOW*	-4.50	-0.0070	FAAS PE5100
F115	223.50	22.350	10					AAS
F117	245.00	24.500	10					ICP-AES
F133	64.50	6.450	10	VLVLEL	BIASED LOW*	2.26	-0.0458	ICP-MS
F139	105.00	11.667	9	EH				ICP-AES
F147	301.50	30.150	10	VH H H H VHVHH VH	BIASED HIGH	9.48	0.0117	IC
F156	137.50	13.750	10					ICP
F159	275.00	27.500	10	VHVH VHEH H H VH	BIASED HIGH	8.13	0.0159	ASTM D 511

* 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 16.735

PARAMETER: 13091 Aluminum mg/L

NATIONAL WATER RESEARCH INSTITUTE
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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= RAIN-SUP-93	2= RAINGR-16	3= BESKI-01	4= AES-01	5= GAT-99	6= MAURI-MX	7= AUX-98	8= MERSEY-MX	9= TRKY-94	10= TROIS-02A
LAB NO	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE	REPORTED VALUE
F010	<0.007	<0.007	0.011	<0.007	0.049	0.056	0.007	0.033	0.014	0.061
F011	<0.030	<0.030	<0.030	<0.030	0.049	0.050	<0.030	0.031	<0.030	0.052 L
F014	<0.001	0.0072	0.013	0.0033	0.052	0.057	0.0077	0.033	0.019	0.065
F015	<0.05	<0.05	<0.05	<0.05	0.05	0.07	<0.05	<0.05	<0.05	0.07
F020	<0.0002	0.006	0.0113	0.0029	0.0467	0.0513	0.0008	0.0309	0.0116	0.0541
F026	<0.005	0.0063	0.0140	<0.005	0.0575	0.0617	0.0104	0.0361	0.0213	0.0680
F037	<0.001	0.0071	0.0140	0.0033	0.0560	0.0602	0.0081	0.0365	0.0196	0.0664
F042	0.010W	0.010W	0.012	0.010W	0.053	0.058	0.010W	0.034	0.016	0.064
F072	<0.01	<0.01	0.014	<0.01	0.061	0.065	<0.01	0.043	0.023	0.068
F094	<0.01	<0.01	0.02	<0.01	0.06	0.06	0.01	0.04	0.02	0.07
F107	0.00	0.01	0.01	0.00	0.06	0.06	0.01	0.03	0.02	0.07
F109	0.00T	0.00T EL	0.01T	0.00T	0.05	0.06	0.00T L	0.03	0.02T	0.06
F110	<0.010	0.0078	0.0139	0.0037	0.0534	0.0602	0.0087	0.0354	0.0190	0.0636
F112	0.004	0.000 EL	0.016	0.005	0.066 H	0.000 EL	0.000 L	0.000 EL	0.031 H	0.000 EL
F133	0.037 EH	0.025 EH	0.030 EH	0.028 EH	0.061	0.065	0.035 EH	0.048 EH	0.036 EH	0.067
F159	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MEDIAN	0.0020	0.0071	0.0139	0.0033	0.0534	0.0600	0.0081	0.0335	0.0200	0.0650
1CRIT	0.0080	0.0080	0.0085	0.0080	0.0116	0.0122	0.0080	0.0100	0.0090	0.0126
N	1	6	10	5	13	13	8	12	11	14
MEAN	0.0040	0.0074	0.0139	0.0036	0.0548	0.0588	0.0078	0.0344	0.0203	0.0642
3STDEV	-	0.0039	0.0074	-	0.0136	0.0129	0.0087	0.0116	0.0123	0.0165

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING		BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	27.00	3.857	7			BIASED LOW*	-2.78	-0.0023	ICP-OES
F011	11.50	2.875	4		L	INSUFFICIENT DATA			ICP-MS
F014	51.50	5.722	9						ICP-MS
F015	33.50	11.167	3			INSUFFICIENT DATA			ICP
F020	25.00	2.778	9			BIASED LOW	-10.88	-0.0022	ICP-MS
F026	76.50	9.562	8						ICP
F037	70.00	7.778	9						ICP-MS
F042	36.00	6.000	6						ICP-OES
F072	71.50	11.917	6			BIASED HIGH	5.39	0.0025	GFAAS
F094	74.00	10.571	7			BIASED HIGH*	1.50	0.0032	ICP-MS
F107	65.00	6.500	10						ICP
F109	34.50	3.450	10	EL	L	BIASED LOW*	2.90	-0.0044	ICP
F110	65.00	7.222	9						GFAAS
F112	54.00	5.400	10	EL	H ELL ELH EL				GFAAS
F133	109.00	10.900	10	EHEHEHEH	EHEHEH	BIASED HIGH	-37.76	0.0266	ICP-MS
F159	0.00	-	0			INSUFFICIENT DATA			ASTM D 857

* 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 6.872

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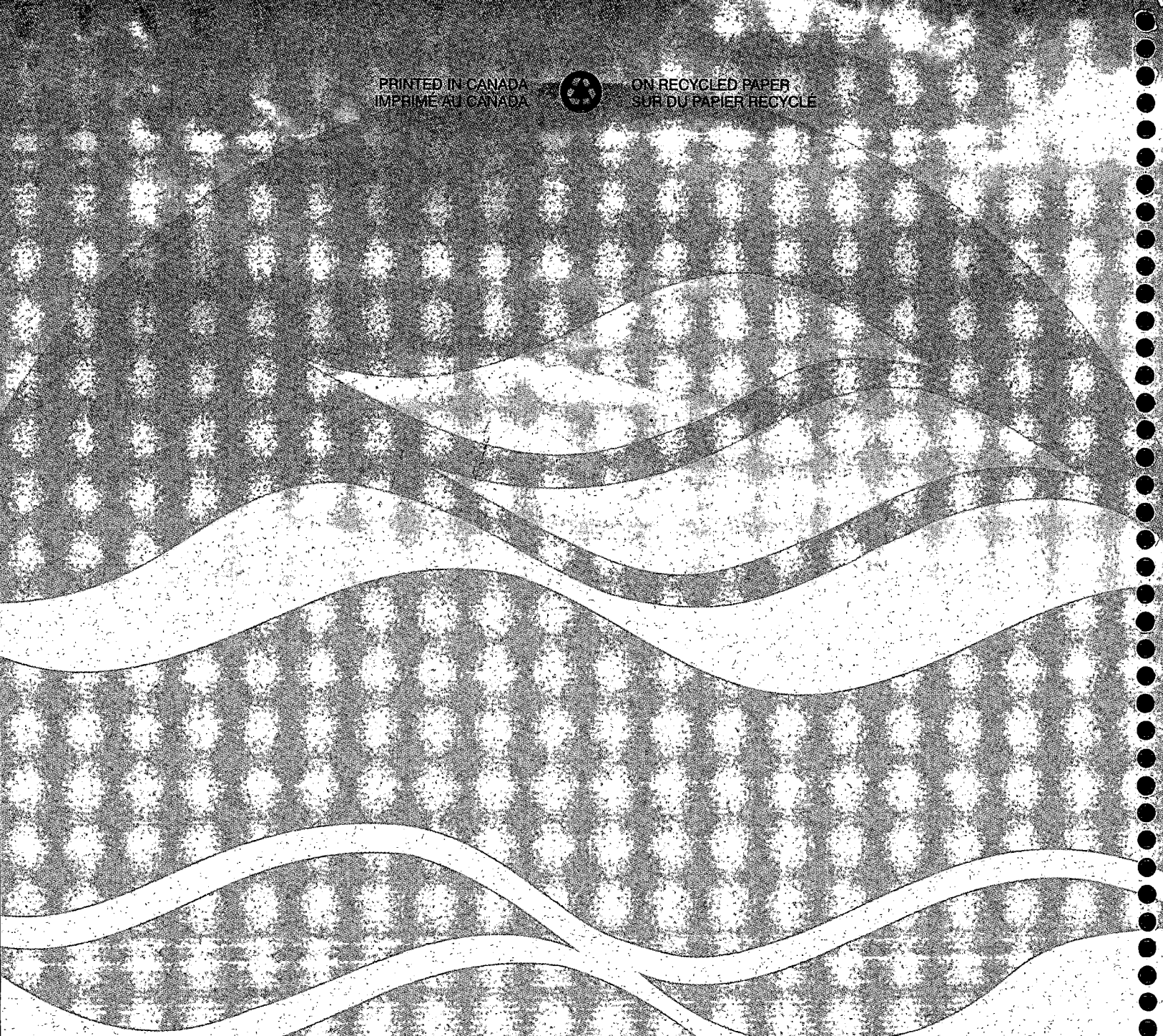

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