



Environment Canada Proficiency Testing Program Study #0094

**Major Ions and Nutrients,
Total Phosphorus and Turbidity in Water**

**Environnement Canada
Programme d'essais d'aptitude
Études #0094**

**Principaux ions et substances nutritives,
phosphore total et turbidité dans l'eau**

**June/Juin to September/Septembre 2009
C. Tinson
WSTD Contribution No. 09-064**



Environment
Canada

Environnement
Canada

Information and Quality Management

Emergencies, Operational Analytical Laboratories and Research Support Division
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September 21, 2009

To: Participants of the **Environment Canada Proficiency Testing (PT) Program**

Re: Distribution of the Final Report for PT Study 0094 (June to September 2009)

Dear Participant,

We thank you for your co-operation and punctual responses with respect to this study. It is the aim of the PT program to give prompt evaluations and reports, and effective remedial assistance. Our PT Program is accredited by the American Association for Laboratory Accreditation (A2LA) and conforms to ILAC G13:2007, Guidelines for the Requirements for the Competence of Providers of Proficiency Testing. The scope of accreditation (A2LA 2867.01) can be viewed on the A2LA website (<http://www.a2la.org/scopepdf/2867-01.pdf>).

This final report includes results and evaluations for **inorganic parameters in natural waters, total phosphorus in water and turbidity in water**. The evaluation includes systemic bias and precision, a laboratory proficiency appraisal and a summary of z-scores. The flagging criteria, stipulated in ISO 13528:2005, Annex C, are calculated separately for each study. Each laboratory is encouraged to compare its results and evaluations with others. A complete listing of all laboratory results is included.

Laboratory managers are encouraged to discuss the attached report openly with those who manage their programs and those who use their laboratory data. Systemic bias is a major fault whose root cause can be uncovered. Systemic bias and its degree are given for each parameter in the Data Summary. In the event you disagree with any of our data evaluations, please contact us and we will discuss the item with you. The matter may also be brought forward to our annual Advisory Group meeting.

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

Should you have any questions or comments regarding this study, please contact us at your earliest convenience. Your comments are an instrumental part of the improvement process to our PT program.

Sincerely,

Cheryl Tinson

Study Coordinator

Attachments (2)

- 1) Laboratory Proficiency Appraisal
- 2) Z-Score Summary



Information and Quality Management
Proficiency Testing Program
Inorganic Environmental Substances

Canada

Environment Canada Proficiency Testing Program

Final Report

for

Major Ions and Nutrients, Total Phosphorus and Turbidity in Water

PT Study 0094* – June to September 2009

Contributors

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September 2009

*companion studies: Rain and Soft Waters: WSTD Contribution No. 09-063;
Trace Elements in Water: WSTD Contribution No. 09-065;
Trace Elements in Sediment: WSTD Contribution No. 09-066



Environment Canada Proficiency Testing Program

Program Description:

Environment Canada (EC) provides accredited proficiency testing (PT) studies for a wide range of inorganic constituents in water. These PT Studies are designed to quantify laboratory performance and improve the quality of environmental data. Reports produced from the client data provide a powerful tool for the continual improvement of the quality of analytical results.

The EC PT program includes:

- all lab codes are strictly confidential
- two months to analyze and submit laboratory data
- preliminary data assessment is sent three weeks after results are due
- laboratory proficiency appraisals are sent to participants
- z-score summaries are sent to participants
- a final report is mailed to participants and concludes the study

The studies are offered twice a year and consist of six 'sample sets' per study with ten samples in each set (see Table 1). The samples are prepared in natural background waters from lakes, rivers or rainwater, and are fortified or preserved as necessary. The trace elements in water samples are generally divided to reflect both low and high concentration ranges. Participating laboratories submit results for parameters they routinely analyze. Analytical results are submitted electronically for assessment.

Table 1 'Sample Sets' offered in the Summer and Winter Studies

SUMMER STUDY	WINTER STUDY
<ol style="list-style-type: none">1. rain and soft waters (RN)2. major ions and nutrients (MI)3. trace elements in water (TE)4. total phosphorus in water (TP)5. turbidity in water (TU)6. (a)trace elements in sediment (SED)*	<ol style="list-style-type: none">1. rain and soft waters (RN)2. major ions and nutrients (MI)3. trace elements in water (TE)4. total phosphorus in water (TP)5. turbidity in water (TU)6. (b)total mercury in water (HG)

*five samples per set

PT study reports feature tabulation of all results and provide extensive evaluations. All analytical and data results are listed in the data summary. Of particular interest to laboratories, proficiency is ranked in terms of the number of biased parameters (systemic bias) and flagged results (precision measurement). Each laboratory receives a formal appraisal and z-score summary indicating the proficiency for each parameter submitted.

The Environment Canada PT program conforms to the requirements of the American Association for Laboratory Accreditation (A2LA). The program meets the ILAC G-13:2007 Guidelines for the Requirements for the Competence of Providers of Proficiency Testing. Environment Canada is the A2LA accredited Proficiency Testing Provider with scope of accreditation 2867.01.





Programme d'essais d'aptitude d'Environnement Canada

Description du programme:

Environnement Canada offre un programme accrédité d'études d'essais d'aptitude (EA) pour un large éventail de substances inorganiques présentes dans l'eau. Ces études sont conçues de façon à quantifier la performance des laboratoires et à améliorer la qualité des données sur l'environnement. Les rapports établis à partir des données des clients constituent un outil très puissant d'amélioration permanente de la qualité des résultats d'analyse.

Le programme de EA d'Environnement Canada prévoit :

- la stricte confidentialité de tous les codes de laboratoire;
- une période de deux mois pour l'analyse et la présentation des données de laboratoire;
- la communication d'une évaluation préliminaire des données trois semaines après la date prévue de présentation des résultats;
- la communication aux participants des évaluations de compétences;
- la communication aux participants des résumés des scores z;
- l'envoi par la poste d'un rapport final des données, qui met fin à l'étude.

Les études peuvent être réalisées deux fois par an et chaque étude comporte six « ensembles d'échantillons » formés de dix échantillons (voir le tableau 1). Les échantillons sont préparés à l'aide d'eau de lacs, de cours d'eau ou de pluie représentative des conditions naturelles de fond et sont au besoin enrichis ou préservés. Les éléments traces des échantillons sont généralement répartis de façon à refléter des gammes de concentrations faibles et élevées. Les laboratoires participants présentent les résultats obtenus pour les paramètres qu'ils analysent généralement. Les résultats d'analyse sont soumis par voie électronique aux fins d'évaluation.

Tableau 1 « Ensembles d'échantillons » offerts pour les études d'été et d'hiver

ÉTUDE D'ÉTÉ	ÉTUDE D'HIVER
1. eau de pluie et eau douce (EP-ED) 2. principaux ions et substances nutritives (PI) 3. éléments traces dans l'eau (ET) 4. phosphore total dans l'eau (PT) 5. turbidité dans l'eau (TU) 6. (a)éléments traces dans les sédiments (ETS)*	1. eau de pluie et eau douce (EP-ED) 2. principaux ions et substances nutritives (PI) 3. éléments traces dans l'eau (ET) 4. phosphore total dans l'eau (PT) 5. turbidité dans l'eau (TU) 6. (b)mercure total dans l'eau (MT)

*cinq échantillons par ensemble

Les rapports des études de EA présentent tous les résultats sous forme de tableaux et des évaluations détaillées. Tous les résultats obtenus pour les analyses et les données sont présentés dans l'annexe des données. Le niveau d'aptitude est indiqué en fonction du nombre de paramètres présentant un biais (biais systématique) et de résultats anormaux (mesure de l'exactitude), ce qui est particulièrement intéressant pour les laboratoires. Chaque laboratoire reçoit une évaluation formelle et un résumé du score z indiquant le niveau d'aptitude pour chacun des paramètres présentés.

Le programme EA d'Environnement Canada satisfait aux exigences du ILAC G13:2007 du l'association américaine pour l'accréditation de laboratoire (A2AL). Environnement Canada est le fournisseur de services d'essais d'aptitude avec la portée d'accréditation 2867.01.



Management Perspective

The Information and Quality Management Group of Environment Canada (EC) provides a Proficiency Testing (PT) program for inorganic substances in water at environmental levels. This program offers parameters and concentration ranges not covered by any other PT program in Canada. Participation in these PT studies assists laboratories in assuring the quality of analytical results. Quality assured analytical results are critical when providing scientific advice.

Laboratories receive a preliminary data assessment which discloses systemic bias and precision. The final reports provide a complete listing of current and historical performance. Individual proficiency appraisals indicate areas and parameters where remedial action is required to improve accuracy and performance. In this way, the PT studies are an effective means to improve data quality.

Participants include EC laboratories, public and private laboratories in Canada and around the world.

Perspective de gestion

Le Groupe de la gestion de l'information et de la qualité d'Environnement Canada (EC) offre un programme d'essais d'aptitude (EA) pour l'analyse des substances inorganiques présentes dans l'eau aux concentrations normales dans l'environnement. Ce programme vise des paramètres et des gammes de concentrations dont l'analyse n'est offerte par aucun autre programme du genre au Canada. La participation à ces études de EA aide les laboratoires à garantir la qualité de leurs résultats d'analyse. L'assurance de la qualité des résultats d'analyse est un élément essentiel de la prestation d'avis scientifiques.

Les laboratoires reçoivent tout d'abord une évaluation préliminaire des données qui fait état des biais systémiques et des erreurs. Les rapports finaux donnent un état détaillé de la performance actuelle et antérieure. Des évaluations individuelles de la performance précisent les secteurs et les paramètres pour lesquels des mesures correctives doivent être prises pour améliorer l'exactitude et la performance. Les études de EA constituent ainsi un moyen efficace d'améliorer la qualité des données.

Des laboratoires d'EC de même que des laboratoires publics et privés au Canada et à l'étranger participent à ce programme.

Abstract

Interlaboratory proficiency testing (PT) studies are an important part of assuring the accuracy and comparability of analytical results.

In this study, results are evaluated for systemic bias and precision. Systemic bias is tested with the non-parametric method of Youden and precision is tested with the “robust analysis algorithm A” found in Annex C of ISO 13528:2005. The total of flagged results and biased methods gives the proficiency rating for each laboratory. The former is extremely important for comparing data sets from different origins and the latter measures the reliability of the data.

Proficiency ratings for laboratories are given in relative terms. In real terms, laboratories with good performance have few flagged results and laboratories with poor performance may have many flagged results. Results are summarized in individual laboratory appraisals and z-score summaries, which are sent to the laboratory managers. The PT program provides an objective, third-party performance assessment as a tool to help laboratories generate reliable and accurate analytical measurements.

Résumé

Les programmes d'essais d'aptitude (EA) sont un élément important de l'assurance de l'exactitude et de la comparabilité des résultats d'analyse.

Dans le cadre de ces études, les résultats font l'objet d'une évaluation de leur biais systémique et de leur exactitude. Le biais systémique est testé par la méthode non paramétrique de Youden et l'exactitude par l'algorithme A d'analyse robuste présenté dans l'annexe C de la norme ISO 13528:2005. La cote des compétences, ou d'aptitude, de chaque laboratoire est donnée par le total des résultats recensés anormaux et des méthodes biaisées. Le premier élément est extrêmement important pour la comparaison des ensembles de données d'origines diverses et le second détermine la fiabilité des données.

Les cotes des compétences des laboratoires sont assignées de façon relative. Concrètement, les laboratoires dont la performance est bonne présentent peu de résultats anormaux tandis que les laboratoires dont la performance est mauvaise présentent plusieurs résultats anormaux. Les résultats de chaque laboratoire sont résumés par des évaluations individuelles et un résumé des scores z est communiqué aux gestionnaires du laboratoire. Le programme EA est un outil objectif d'évaluation de la performance par un tiers qui aide les laboratoires à effectuer des mesures d'analyse fiables et exactes.

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Program Name: FPMI

Study Code: 0094

Range of Samples: 1 to 10

Table 1a Participating Laboratories in EC PT for Major Ions & Nutrients - Study 0094

AECL, Chalk River, ON
 ALS Laboratory Group, Environmental Division, Edmonton, AB
 ALS Laboratory Group, MB Technology Centre Ltd., Winnipeg, MB
 Capital District Health Authority, QEII Lab, Halifax, NS
 Environment Canada, CWS, Atlantic Region, Moncton, NB
 Environment Canada, NLET, Burlington, ON
 Environment Canada, PYLET, Vancouver, BC
 Environment Canada, RWQL, Saskatoon, SK
 Environment Canada, WST Calibration Lab, Burlington, ON
 Environment New Brunswick, Fredericton, NB
 Environmental Laboratories, Envirolab, Lima, Peru
 Environnement Quebec, CEAEQ, Laval, QC
 Environnement Quebec, CEAEQ, Ste-Foy, QC
 JR Laboratories, Burnaby, BC
 Kinetrics Inc., Toronto, ON
 Minera Alumbrera, Tucuman, Argentina
 Minnesota Department of Health, St. Paul, MN
 Natural Resources Canada-CFS-GL, Sault Ste. Marie, ON
 NIWA, Hamilton, New Zealand
 Ontario Ministry of Environment, Dorset, ON
 Ontario Ministry of Environment, LSB, Etobicoke, ON
 P.T. International Nickel, Sorowako, Indonesia
 Santé Canada - DSPA, Longueuil, QC
 Saskatchewan Disease Control Laboratory, Regina, SK
 South Florida Water Management District, West Palm Beach, FL
 TAIGA Environmental Laboratory, Yellowknife, NT
 U.S. Environmental Protection Agency, Corvallis, OR
 U.S. Environmental Protection Agency, FOH, Chicago, IL
 U.S. Geological Survey, NWQL, Denver, CO
 Universidade da Coruña, A Coruña, Spain
 University of Alberta, Edmonton, AB
 University of Maine, Sawyer Environmental Centre, Orono, ME
 Ville de Montreal, Montreal, QC

33 Laboratories.

Program Name: FPTP

Study Code: 0094

Range of Samples: 1 to 10

Table 1b Participating Laboratories in EC PT for Total Phosphorus in Water - Study 0094

Adirondack Lakes Survey Corporation, DEC, Ray Brook, NY
 ALS Laboratory Group, MB Technology Centre Ltd., Winnipeg, MB
 Department of Fisheries & Oceans, Freshwater, Winnipeg, MB
 Environment Canada, CWS, Atlantic Region, Moncton, NB
 Environment Canada, EPL, Edmonton, AB
 Environment Canada, NLET, Burlington, ON
 Environment Canada, PYLET, Vancouver, BC
 Environment Canada, RWQL, Saskatoon, SK
 Environment New Brunswick, Fredericton, NB
 Environmental Laboratories, Envirolab, Lima, Peru
 Environnement Canada, CSL, Montreal, QC
 Environnement Quebec, CEAEQ, Ste-Foy, QC
 Kinetrics Inc., Toronto, ON
 Minnesota Department of Health, St. Paul, MN
 Natural Resources Canada-CFS-GL, Sault Ste. Marie, ON
 NIWA, Hamilton, New Zealand
 Onondaga County DEWEO, Syracuse, NY
 Ontario Ministry of Environment, Dorset, ON
 Ontario Ministry of Environment, LSB, Etobicoke, ON
 Oregon State University, Corvallis, OR
 South Florida Water Management District, West Palm Beach, FL
 TAIGA Environmental Laboratory, Yellowknife, NT
 U.S. Environmental Protection Agency, Corvallis, OR
 U.S. Environmental Protection Agency, FOH, Chicago, IL
 University of Alberta, Edmonton, AB
 University of Maine, Sawyer Environmental Centre, Orono, ME
 University of Victoria, Victoria, BC
 Ville de Montreal, Montreal, QC

28 Laboratories.

Program Name: FPTU

Study Code: 0094

Range of Samples: 1 to 10

Table 1c Participating Laboratories in EC PT for Turbidity in Water - Study 0094

Capital District Health Authority, QEII Lab, Halifax, NS
Environment Canada, NLET, Burlington, ON
Environment Canada, PYLET, Vancouver, BC
Environment Canada, RWQL, Saskatoon, SK
Environment Canada, WST Calibration Lab, Burlington, ON
Environment New Brunswick, Fredericton, NB
Environnement Canada, CSL, Montreal, QC
Environnement Quebec, CEAEQ, Ste-Foy, QC
Kinetrics Inc., Toronto, ON
Onondaga County DEWEQ, Syracuse, NY
Ontario Ministry of Environment, LSB, Etobicoke, ON
TAIGA Environmental Laboratory, Yellowknife, NT
U.S. Environmental Protection Agency, Corvallis, OR
U.S. Environmental Protection Agency, FOH, Chicago, IL

14 Laboratories.

Program Name: FPMI

Number of Labs: 38

Study Code: 0094

Range of Samples: 1 to 10

Table 2a Laboratory Performance Scores - EC PT for Major Ions & Nutrients - Study 0094

Lab Code	Systemic Bias			Flagged Results				% Score (Sum of Parameters Biased & Results Flagged)
	No. of Parameters Analyzed	No. of Parameters Biased	Parameters Biased (50%)	No. of Results Reported	No. of Flags Assigned	Results Flagged (50%)		
F004	5	0	0.00	50	0	0.00		0.00
F026b	4	0	0.00	40	0	0.00		0.00
F094	2	0	0.00	20	0	0.00		0.00
F221	6	0	0.00	60	0	0.00		0.00
F223b	6	0	0.00	53	0	0.00		0.00
F026	16	0	0.00	160	1	0.31		0.31
F099	8	0	0.00	80	1	0.63		0.63
F207	15	0	0.00	150	2	0.67		0.67
F009	11	0	0.00	110	2	0.91		0.91
F032	18	0	0.00	180	5	1.39		1.39
F223	8	0	0.00	72	2	1.39		1.39
F092	8	0	0.00	80	3	1.88		1.88
F036	16	0	0.00	160	6	1.88		1.88
F003	20	1	2.50	200	0	0.00		2.50
F015b	2	0	0.00	20	1	2.50		2.50
F183	17	0	0.00	170	16	4.71		4.71
F193	14	0	0.00	140	14	5.00		5.00
F015	19	1	2.63	190	11	2.89		5.53
F022	18	1	2.78	180	10	2.78		5.56
F090	3	0	0.00	30	4	6.67		6.67
F014	16	1	3.13	160	13	4.06		7.19
F069	17	1	2.94	170	15	4.41		7.35
F186	7	0	0.00	70	11	7.86		7.86
F310	19	1	2.63	190	20	5.26		7.89
F158	19	2	5.26	190	11	2.89		8.16
F248	8	1	6.25	80	4	2.50		8.75
F010	16	1	3.13	160	23	7.19		10.31
F113	17	2	5.88	170	17	5.00		10.88
F273	4	0	0.00	40	9	11.25		11.25
F021	15	2	6.67	150	14	4.67		11.33
F158b	8	1	6.25	80	9	5.63		11.88
F196	8	1	6.25	80	13	8.13		14.38
F006	1	0	0.00	10	3	15.00		15.00
F011	17	2	5.88	170	36	10.59		16.47
F042	17	4	11.76	170	40	11.76		23.53
F154b	1	0	0.00	10	5	25.00		25.00
F073	8	3	18.75	80	15	9.38		28.13
F154	20	8	20.00	199	52	13.07		33.07

Laboratory Performance Rating

Rating	% Score*
Good	0 - 5
Satisfactory	> 5 - 12.5
Moderate	> 12.5 - 30
Poor	> 30

*Sum of Parameters Biased & Results Flagged

Program Name: FPTP

Number of Labs: 30

Study Code: 0094

Range of Samples: 1 to 10

Table 2b Laboratory Performance Scores - EC PT for Total Phosphorus in Water - Study 0094

Lab Code	Systemic Bias			Flagged Results				% Score (Sum of Parameters Biased & Results Flagged)
	No. of Parameters Analyzed	No. of Parameters Biased	Parameters Biased (50%)	No. of Results Reported	No. of Flags Assigned	Results Flagged (50%)		
F021	1	0	0.00	10	0	0.00		0.00
F022	1	0	0.00	10	0	0.00		0.00
F026	1	0	0.00	10	0	0.00		0.00
F026b	1	0	0.00	10	0	0.00		0.00
F032	1	0	0.00	10	0	0.00		0.00
F036	1	0	0.00	10	0	0.00		0.00
F042	1	0	0.00	10	0	0.00		0.00
F003	1	0	0.00	10	0	0.00		0.00
F004	1	0	0.00	10	0	0.00		0.00
F007	1	0	0.00	10	0	0.00		0.00
F010	1	0	0.00	10	0	0.00		0.00
F074b	1	0	0.00	10	0	0.00		0.00
F014	1	0	0.00	10	0	0.00		0.00
F015	1	0	0.00	10	0	0.00		0.00
F113	1	0	0.00	10	0	0.00		0.00
F207	1	0	0.00	10	0	0.00		0.00
F221	1	0	0.00	10	0	0.00		0.00
F248	1	0	0.00	10	0	0.00		0.00
F170	1	0	0.00	10	0	0.00		0.00
F271	1	0	0.00	10	1	5.00	5.00	5.00
F310	1	0	0.00	10	1	5.00	5.00	5.00
F019	1	0	0.00	10	1	5.00	5.00	5.00
F092	1	0	0.00	10	1	5.00	5.00	5.00
F099	1	0	0.00	10	1	5.00	5.00	5.00
F112	1	0	0.00	10	1	5.00	5.00	5.00
F154	1	0	0.00	10	2	10.00	10.00	10.00
F202	1	0	0.00	10	2	10.00	10.00	10.00
F196	1	0	0.00	10	4	20.00	20.00	20.00
F074	1	0	0.00	10	4	20.00	20.00	20.00
F011	1	0	0.00	10	6	30.00	30.00	30.00

Laboratory Performance Rating

Rating	% Score*
Good	0 - 5
Satisfactory	> 5 - 12.5
Moderate	> 12.5 - 30
Poor	> 30

*Sum of Parameters Biased & Results Flagged

Program Name: FPTU

Number of Labs: 14

Study Code: 0094

Range of Samples: 1 to 10

Table 2c Laboratory Performance Scores - EC PT for Turbidity in Water - Study 0094

Lab Code	Systemic Bias			Flagged Results				% Score (Sum of Parameters Biased & Results Flagged)
	No. of Parameters Analyzed	No. of Parameters Biased	Parameters Biased (50%)	No. of Results Reported	No. of Flags Assigned	Results Flagged (50%)		
F003	1	0	0.00	10	0	0.00		0.00
F004	1	0	0.00	10	0	0.00		0.00
F007	1	0	0.00	10	0	0.00		0.00
F014	1	0	0.00	10	0	0.00		0.00
F032	1	0	0.00	10	0	0.00		0.00
F099	1	0	0.00	10	0	0.00		0.00
F113	1	0	0.00	10	0	0.00		0.00
F158	1	0	0.00	10	0	0.00		0.00
F202	1	0	0.00	10	0	0.00		0.00
F010	1	0	0.00	10	1	5.00		5.00
F090	1	0	0.00	10	8	40.00		40.00
F011	1	1	50.00	10	0	0.00		50.00
F022	1	1	50.00	10	0	0.00		50.00
F015	1	1	50.00	10	1	5.00		55.00

Laboratory Performance Rating

Rating	% Score*
Good	0 - 5
Satisfactory	> 5 - 12.5
Moderate	> 12.5 - 30
Poor	> 30

*Sum of Parameters Biased & Results Flagged

Program Name: FPMI

Study Code: 0094

Table 3a Five-Year Historical Laboratory Performance - EC PT for Major Ions & Nutrients - Study 0094

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING
	0085 Winter 2004	0086 Summer 2005	0087 Winter 2005	0088 Summer 2006	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009		
F003	5.8	3.6	5.8	0.5	0.3	2.5	0.8	0.8	2.5	2.5	2.5	Good
F004	4.2	0.0	0.0	0.0	0.8	0.0	0.8	0.8	0.8	0.0	0.4	Good
F006					10.0	15.0	0.0	0.0	0.0	15.0	5.0	Good
F009	37.2	35.2	7.9	12.9	4.6	14.1	18.6	0.9	6.4	0.9	10.4	Satisfactory
F010	5.7	25.8	20.1	15.6	15.9	11.7	9.6	10.9	18.4	10.3	13.6	Moderate
F011	34.3	10.9	23.6	23.9	21.1	19.4	22.5	15.6	35.6	16.5	21.8	Moderate
F014	8.8	16.5	6.2	7.1	5.3	9.4	10.0	8.8	0.0	7.2	8.0	Satisfactory
F015	19.7	14.4	9.0	14.7	15.0	3.4	20.5	2.4	12.4	5.5	13.4	Moderate
F015b						0.0	100.0	27.5	2.5	15.0	15.0	Moderate
F021	3.2	4.7	10.7	6.3	11.3	12.0	8.3	5.3	1.3	11.3	7.3	Satisfactory
F022	14.7	16.1	8.1	8.6	11.4	6.7	1.9	1.4	1.4	5.6	7.4	Satisfactory
F026	2.0	1.7	0.9	22.6	3.8	7.5	5.3	0.3	8.8	0.3	2.9	Good
F026b		5.0	1.7		0.0	37.5	0.0	27.5	17.5	0.0	3.3	Good
F032	3.9	0.0	3.0	2.9	12.8	9.2	23.0	6.1	0.0	1.4	3.4	Good
F036	23.0	50.0	6.9	4.1	2.5	8.1	4.4	15.9	16.6	1.9	7.5	Satisfactory
F042	9.6	11.7	20.3	5.3	6.1	13.7	21.5	23.6	8.4	23.5	12.7	Moderate
F069		11.7		12.4		4.7		19.4		7.4	11.7	Satisfactory
F073		36.5				9.3		49.4		28.1	32.3	Poor
F090								25.0	0.0	6.7	6.7	Satisfactory
F092										1.9	1.9	Good
F094	9.1	2.7	12.1	2.1	9.5	9.3	15.5	14.3	11.0	0.0	9.4	Satisfactory
F099			14.2	5.2		1.4		6.9		0.6	5.2	Satisfactory
F113	5.9	2.2	11.4	8.3	10.0	9.4	13.8	11.7	5.0	10.9	9.7	Satisfactory
F154										33.1	33.1	Poor
F154b										25.0	25.0	Moderate
F158	6.8	9.6	6.3	8.3	3.0	2.4	3.8	7.9	8.7	8.2	7.4	Satisfactory
F158b			8.0	5.0	15.0	2.0	0.0	16.3	12.1	11.9	9.9	Satisfactory

Program Name: FPMI

Study Code: 0094

Table 3a Five-Year Historical Laboratory Performance - EC PT for Major Ions & Nutrients -Study 0094

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING
	0085 Winter 2004	0086 Summer 2005	0087 Winter 2005	0088 Summer 2006	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009		
F183	10.8		30.8	17.3	11.9	15.4	9.1	13.2	2.2	4.7	11.9	Satisfactory
F186										7.9	7.9	Satisfactory
F193	9.4	24.8	5.7	10.7	8.9	0.7	1.4	27.1	3.6	5.0	7.3	Satisfactory
F196										14.4	14.4	Moderate
F207		5.8	0.6	5.1	5.3	7.7		2.1	5.6	0.7	5.2	Satisfactory
F221			17.5	23.1	0.0	23.8	1.0	0.0	1.0	0.0	1.0	Good
F223	27.1			14.5		2.2		23.4		1.4	14.5	Moderate
F223b										0.0	0.0	Good
F248								17.7	7.8	8.8	8.8	Satisfactory
F273									46.7	11.3	29.0	Moderate
F310										7.9	7.9	Satisfactory
Interlab Median	9.1	10.9	8.0	8.3	8.9	9.2	5.3	11.3	6.4	6.1		

Laboratory Performance Rating

Rating	% Score
Good	0 - 5
Satisfactory	> 5 - 12.5
Moderate	> 12.5 - 30
Poor	> 30

Program Name: FPTP

Study Code: 0094

Table 3b Five-Year Historical Laboratory Performance - EC PT for Total Phosphorus in Water - Study 0094

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING	
	0085 Winter 2004	0086 Summer 2005	0087 Winter 2005	0088 Summer 2006	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009			
F003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Good	
F004	0.0	6.3	15.0	0.0	10.0	15.0	15.0	25.0	60.0	0.0	12.5	Satisfactory	
F007		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Good	
F010	12.5	16.7	10.0	75.0	0.0	10.0	65.0	20.0	0.0	0.0	11.3	Satisfactory	
F011	72.2	75.0	90.0	5.0	10.0	55.0	85.0	15.0	10.0	30.0	42.5	Poor	
F014	5.6	0.0	0.0	0.0	5.0	0.0		5.0		0.0	0.0	Good	
F015	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	Good	
F019	35.7		16.7	40.0	85.0					5.0	35.7	Poor	
F021	10.0	25.0	0.0	0.0	60.0	5.0	0.0	0.0	0.0	0.0	0.0	Good	
F022	20.0	0.0	0.0	0.0	5.0	20.0	10.0	50.0	15.0	0.0	7.5	Satisfactory	
F026	0.0	0.0	5.0	0.0	65.0	0.0	10.0	0.0	0.0	0.0	0.0	Good	
F026b			10.0		5.0	0.0	0.0	70.0	0.0	0.0	0.0	Good	
F032	0.0	0.0	0.0	0.0	0.0	10.0	15.0	10.0	0.0	0.0	0.0	Good	
F036	0.0	5.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	Good	
F042	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	10.0	0.0	0.0	Good	
F074	25.0	0.0	10.0	10.0	0.0	20.0	0.0	15.0	10.0	20.0	10.0	Satisfactory	
F074b	50.0	0.0		5.0	25.0	80.0	80.0	0.0		0.0	15.0	Moderate	
F092										5.0	5.0	Good	
F099			0.0	0.0		0.0		0.0		5.0	0.0	Good	
F112										5.0	5.0	Good	
F113	5.0		20.0	0.0	5.0	15.0	25.0	10.0	5.0	0.0	5.0	Good	
F154										10.0	10.0	Satisfactory	
F170	0.0	6.3	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	Good	
F196										20.0	20.0	Moderate	
F202			0.0	0.0	80.0	0.0	10.0	5.0	10.0	5.0	10.0	5.0	Good
F207			0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	Good	
F221				0.0	0.0		0.0	0.0	0.0	0.0	0.0	Good	

Program Name: FPTP

Study Code: 0094

Table 3b Five-Year Historical Laboratory Performance - EC PT for Total Phosphorus in Water - Study 0094

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING
	0085 Winter 2004	0086 Summer 2005	0087 Winter 2005	0088 Summer 2006	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009		
F248									0.0	0.0	0.0	Good
F271										5.0	5.0	Good
F310										5.0	5.0	Good
Interlab Median	5.0	0.0	0.0	0.0	0.0	5.0	5.0	2.5	0.0	0.0		

Laboratory Performance Rating

Rating	% Score
Good	0 - 5
Satisfactory	> 5 - 12.5
Moderate	> 12.5 - 30
Poor	> 30

Program Name: FPTU

Study Code: 0094

Table 3c Five-Year Historical Laboratory Performance - EC PT for Turbidity in Water - Study 0094

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING
	0085 Winter 2004	0086 Summer 2005	0087 Winter 2005	0088 Summer 2006	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009		
F003								0.0		0.0	0.0	Good
F004								0.0		0.0	0.0	Good
F007										0.0	0.0	Good
F010								0.0		5.0	2.5	Good
F011								5.0		50.0	27.5	Moderate
F014										0.0	0.0	Good
F015								10.0		55.0	32.5	Poor
F022								0.0		50.0	25.0	Moderate
F032								0.0		0.0	0.0	Good
F090								0.0		40.0	20.0	Moderate
F099										0.0	0.0	Good
F113								0.0		0.0	0.0	Good
F158								0.0		0.0	0.0	Good
F202								0.0		0.0	0.0	Good
Interlab Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Laboratory Performance Rating

Rating	% Score
Good	0 - 5
Satisfactory	> 5 - 12.5
Moderate	> 12.5 - 30
Poor	> 30

Program Name: FPMI

2009-09-02

Study Code: 0094

Table 4a Sample Design - EC PT for Major Ions & Nutrients - Study 0094

Sample Number	Sample Name	Source	Conductivity ($\mu\text{S}/\text{cm}$)
1	QUETAP-MX	Quebec	164
2	ION-915	Ontario	101
3	RAISIN-99	Ontario	454
4	BURTAP-05	Ontario	350
5	HURON-98	Ontario	212
6	ONTARIO-99	Ontario	309
7	LETHBRIDG-03	Alberta	339
8	SWIFT-05	Saskatchewan	871
9	SWIFT-01D	Saskatchewan	632
10	SOURIS-05	Manitoba	912

Program Name: FPTP

2009-09-02

Study Code: 0094

Table 4b Sample Design - EC PT for Total Phosphorus in Water - Study 0094

Sample Number	Sample Name	Spike	Phosphorus (mg/L)
1	TP94-1	n/a	0.0910
2	TP94-2	n/a	0.0080
3	TP94-3	n/a	0.345
4	TP94-4	n/a	0.0550
5	TP94-5	n/a	0.225
6	TP94-6	n/a	0.0040
7	TP94-7	n/a	0.0015
8	TP94-8	organic spike	0.696
9	TP94-9	inorganic spike	0.0200
10	TP94-10	inorganic spike	0.158

Samples are prepared in natural lake and river waters and preserved with 0.2% sulfuric acid. Standard phosphate solutions are prepared with potassium dihydrogen phosphate and sodium β -glycerophosphate for inorganic and organic spikes respectively.

Program Name: FPTU

2009-09-02

Study Code: 0094

Table 4c Sample Design - EC PT for Turbidity in Water - Study 0094

Sample Number	Sample Name	Turbidity (NTU/JTU)
1	TU94 -1	105
2	TU94 -2	7.04
3	TU94 -3	0.932
4	TU94 -4	0.540
5	TU94 -5	2.50
6	TU94 -6	612
7	TU94 -7	151
8	TU94 -8	3.59
9	TU94 -9	19.0
10	TU94 -10	16.7

Program Name: FPMI

Range of Samples: 1 to 10

2009-09-02

Study Code: 0094

Table 5a Summary of Interlaboratory Median Values - EC PT for Major Ions & Nutrients - Study 0094

Parameters	QUETAP-MX Sample 1	ION-915 Sample 2	RAISIN-99 Sample 3	BURTAP-05 Sample 4	HURON-98 Sample 5	ONTARIO-99 Sample 6	LETHBRIDG-03 Sample 7	SWIFT-05 Sample 8	SWIFT-01D Sample 9	SOURIS-05 Sample 10
Ammonia (mg/L N)	0.011	0.0240	0.009	0.0115	0.0175	0.012	0.380	0.012	0.113	0.010
Boron (mg/L)	0.0050	0.0070	0.0180	0.0270	0.0145	0.0240	0.0115	0.0680	0.0560	0.124
Calcium (mg/L)	14.1	14.1	77.3	36.0	26.8	35.6	38.6	69.6	48.5	59.7
Chloride (mg/L)	24.4	1.46	15.2	29.6	6.43	21.1	12.8	7.30	8.46	22.9
Colour (Units)	2.22	2.41	93.4	0.80	1.50	1.20	1.45	16.0	3.20	60.0
Conductivity @ 25C (uS/cm)	164	101	454	350	212	309	339	871	632	912
Diss Inorg Carbon (mg/L C)	4.56	10.50	46.8	19.3	19.5	22.4	27.9	54.8	34.6	60.6
Diss Organic Carbon (mg/L C)	1.200	1.32	17.4	1.60	1.46	1.50	1.58	7.50	3.17	15.2
Fluoride (mg/L)	1.18	0.030	0.100	0.544	0.080	0.605	0.680	0.226	0.630	0.140
Magnesium (mg/L)	1.58	2.94	10.40	8.92	7.58	8.64	13.5	38.0	26.9	42.5
Nitrate + Nitrite (mg/L N)	0.3790	0.363	0.371	0.437	0.272	0.480	0.180	0.150	0.210	0.441
pH (pH Units)	7.48	7.85	8.36	8.11	8.13	8.15	8.22	8.31	8.27	8.45
Potassium (mg/L)	1.020	0.520	1.40	1.74	0.942	1.52	1.50	10.50	8.66	14.9
Silicates (mg/L SiO2)	7.06	2.55	2.99	0.649	1.095	1.13	2.73	4.01	9.00	17.0
Sodium (mg/L)	13.2	1.44	9.59	18.9	3.90	12.7	9.44	67.0	42.8	78.8
Sulfate (mg/L)	13.2	3.50	19.6	42.3	16.0	26.5	35.3	229	166	197
Total Alkalinity (mg/L CaCO3)	19.2	44.0	203	81.2	81.0	93.5	118	233	145	263
Total Hardness (mg/L)	41.8	47.4	234	127	98.6	124	152	329	232	324
Total Kjeldahl N (mg/L N)	0.054	0.100	0.686	0.118	0.120	0.127	0.500	0.525	0.333	1.020
Total N (mg/L N)	0.422	0.460	1.040	0.569	0.378	0.603	0.684	0.686	0.554	1.51
Turbidity (JTU/NTU)	0.085	0.060	0.135	0.095	0.070	0.060	0.075	0.100	0.073	0.160

Program Name: FPTP

Range of Samples: 1 to 10

2009-09-02

Study Code: 0094

Table 5b Summary of Interlaboratory Median Values - EC PT for Total Phosphorus in Water - Study 0094

Parameters	TP94-1 Sample 1	TP94-2 Sample 2	TP94-3 Sample 3	TP94-4 Sample 4	TP94-5 Sample 5	TP94-6 Sample 6	TP94-7 Sample 7	TP94-8 Sample 8	TP94-9 Sample 9	TP94-10 Sample 10
Total Phosphorus (mg/L P)	0.0910	0.0080	0.345	0.0550	0.225	0.0040	0.0015	0.696	0.0200	0.158

Program Name: FPTU

Study Code: 0094

Range of Samples: 1 to 10

2009-09-02

Table 5c Summary of Interlaboratory Median Values - EC PT for Turbidity in Water - Study 0094

Parameters	TU94 -1 Sample 1	TU94 -2 Sample 2	TU94 -3 Sample 3	TU94 -4 Sample 4	TU94 -5 Sample 5	TU94 -6 Sample 6	TU94 -7 Sample 7	TU94 -8 Sample 8	TU94 -9 Sample 9	TU94 -10 Sample 10
Turbidity (JTU/NTU)	105	7.04	0.932	0.540	2.50	612	151	3.59	19.0	16.7

Appendix A

Glossary of Terms and Definitions

Environment Canada Proficiency Testing Program

Glossary of Terms and Definitions

A. Statistics listed in Data Summary (Appendix B)

- | | |
|----------------------|--|
| 1. Assigned Value | The <u>median</u> value of test results for a parameter and sample |
| 2. R-Std Dev | Robust Standard Deviation [1] |
| 3. Acceptable Limits | See 'Limits & Flags' and Table 1 |
| 4. Warning Limits | See 'Limits & Flags' and Table 1 |
| 5. Action Limits | See 'Limits & Flags' and Table 1 |
| 6. N | The number of usable test results for calculating the assigned value |

B. Calculation of Performance Statistics (Appendix B)

Laboratory Bias: Laboratory Bias [2] $D = x - X$, where D is the deviation, x is the test result and X is the assigned value. This deviation is normalized with the robust standard deviation (R-Std Dev) and evaluated by the z-score [3] (see attachment).

Limits & Flags: Acceptable Limits/No Flags: When a test result is within 2 R-Std Dev of the assigned value, flags are not assigned (see Table 1).

Warning Limits/Warning Flags: When a test result is between 2 and 3 R-Std Dev, the flags 'WH' or 'WL' indicate a WARNING flag, for a high or low result respectively (see Table 1).

Action Limits/Action Flags: When a test result deviates by more than 3 R-Std Dev from the assigned value, the flags 'AH' or 'AL' indicate an ACTION flag, high or low respectively (see Table 1).

Table 1 Evaluating test results, determining limits and assigning flags [2]

Criteria	Limits	Flags
$\hat{\text{Assigned value}} \pm 2 \hat{\sigma}$	Acceptable Limits	No Flag
$\hat{\sigma} - 3 \hat{\sigma}$ from assigned value	Warning Limits	Warning Flag (W)
$> 3 \hat{\sigma}$ from assigned value	Action Limits	Action Flag (A)

* $\hat{\sigma}$ is the R-Std Dev

Systemic Bias: Systemic bias is indicated when a laboratory's test results for an individual parameter are ranked, by the Youden non-parametric analysis [4], to be consistently and significantly higher or lower than the assigned value. Ranks are assigned to each test result for each sample, from 1 for the lowest, to N for the highest, where N is the number of usable test results. These ranks are totalled for each laboratory (Total Rank), and divided by the number of samples ranked (No. Samples Ranked). **Total Rank** and **Average Rank** for each laboratory, are displayed on page 2 of the Data Summary. The **Overall Average Rank** for each parameter is shown at the bottom of the same page. Systemic bias may be indicated by the Youden rankings even when the test results have not been flagged (W or A) for deviation from the assigned value.

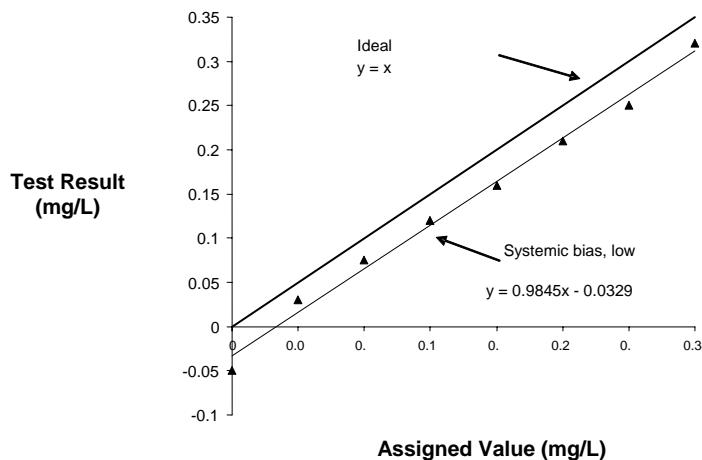
No. Samples Ranked: This is the number of test results used to calculate systemic bias. A laboratory must report five or more test results (not including '<') and there must be ten or more participating laboratories.

The two measured components of 'systemic' bias are 1) Bias Blank and 2) Bias % Slope. These components are illustrated in Figure 1: Parameter Performance. All 'systemic' biases are correctable with the investigation of the following two analytical components.

1) Bias Blank: The first component is the y-intercept of the linear regression plot (-0.0329 in Figure 1). These bias blanks are stated in the Data Summary and Evaluations for each parameter.

2) Bias % Slope: The second measured component is the % deviation of the laboratory test results versus the assigned values for a parameter. This is calculated as [$(m-1) \times 100$], where 1 is the slope of the "ideal" line (assigned values) and m is the slope of the linear regression plot (laboratory test results). The Bias % Slope in Figure 1 is minus 1.55 per cent (-1.55%). For most parameters, a Bias % Slope greater than the absolute value of 5 is considered unacceptable and requires action.

Figure 1: Parameter Performance



Bias Statement: Systemic bias is noted with the 'BIASED HIGH' or 'BIASED LOW' notations. An asterisk with the statement indicates that the bias is considered minor, yet worthy of evaluation. The minor biases are not recorded in the database and are not noted in the laboratory proficiency appraisal (see attachment). In Table 2 of the Final Report (Laboratory Performance Scores), systemic biases are calculated as the equivalent of five flagged values.

Method Coding: Method codes are an important part of quality assurance. These definitions are provided on the Data Reporting Forms to assist with uniform descriptions.

C. Attachments included with the Final Report

1. Z-Score Summaries [3]
2. Laboratory Proficiency Appraisal (see Table 2 for definitions)

References:

- [1] ISO 13528:2005(E), Statistical Methods for the use in Proficiency Testing by Interlaboratory Comparisons, Annex C, Robust Analysis, Section C.1: Algorithm A, p64.
- [2] ISO 13528:2005(E), Statistical Methods for the use in Proficiency Testing by Interlaboratory Comparisons, Calculation of Performance Statistics, Section 7.1.1 and 7.1.2, p18-19.
- [3] ISO 13528:2005(E), Statistical Methods for the use in Proficiency Testing by Interlaboratory Comparisons, z-scores, Section 7.4.1 and 7.4.2, p25-26.
- [4] Ranking Laboratories by Round-Robin Tests, W.J. Youden, Precision Measurement and Calibration, H.H. Ku, Editor, NBS Special Publication 300-Volume 1, U.S. Government Printing Office, Washington, D.C., 1969.

Appendix B

Data Summary

a) Major Ions and Nutrients

PARAMETER: 07192 Ammonia

mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT	
F003	<0.005	0.021	<0.005	0.011	0.016	<0.005	0.345	0.023	0.112	0.005	
F004	<0.005	0.026	0.009	0.016	0.020	0.006	0.374	0.005	0.108	0.008	
F010	<0.02	<0.02	<0.02	<0.02	<0.02	0.38	<0.02 AL	0.11 AH	<0.02 AL	<0.02	
F011	<0.01	0.01 AL	<0.01	<0.01	0.01 WL	<0.01	0.38	<0.01	0.10	<0.01	
F014	0.017	0.026	<0.010	0.012	0.014	<0.010	0.38	<0.010	0.106	<0.010	
F015	<0.002	0.021	<0.002	0.009	0.015	<0.002	0.392	<0.002	0.114	<0.002	
F022	<0.01	0.027	<0.01	0.011	0.020	<0.01	0.504 AH	<0.01	0.145 AH	<0.01	
F026	<0.01	0.022	<0.01	0.011	0.017	<0.01	0.368	<0.01	0.107	<0.01	
F032	<0.002	0.025	<0.003	0.014	0.020	<0.004	0.382	<0.005	0.114	<0.006	
F036	0.010	0.026	0.010	0.018	0.022	<0.010	0.420	0.014	0.132 WH	0.010	
F042	<0.079	<0.079	<0.079	<0.079	<0.079	<0.079	0.564 AH	<0.079	0.137 WH	<0.079	
F069	<0.020	0.023	<0.020	<0.020	<0.020	<0.020	0.373	<0.020	0.112	<0.020	
F092	0.012	0.027	0.039 AH	0.016	0.024	0.012	0.368	0.014	0.118	0.025	
F113	0.002	0.022	0.014	0.013	0.017	0.017	0.362	0.010	0.111	0.020	
F154	<0.003	0.0200	<0.003	0.0085	0.0140	<0.003	0.314 WL	<0.003	0.100	<0.003	
F158	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.38	<0.05	0.11	<0.05	
F158b	<0.01	0.03 WH	<0.01	0.02 WH	0.02	<0.01	0.41	<0.01	0.12	<0.01	
F183	<0.019	0.026	<0.019	<0.019	0.021	<0.019	0.399	<0.019	0.120	<0.019	
F207	<0.005	0.023	0.008	0.011	0.018	<0.005	0.382	0.006	0.115	0.011	
F221	<0.001	0.022	0.002	0.010	0.016	<0.001	0.400	<0.001	0.114	0.002	
F248	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.378	<0.020	0.114	<0.020	
F310	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.39	<0.05	0.11	<0.05	
ASSIGNED VALUE *	0.011	0.0240	0.009	0.0115	0.0175	0.012	0.380	0.012	0.113	0.010	
R-STD DEV *	0.0071	0.00322	0.0078	0.00362	0.00358	0.0310	0.0242	0.0103	0.0079	0.0093	
ACCEPTABLE LIMITS(+-) *	-	0.00644	0.0156	0.00724	0.00716	-	0.0484	0.0206	0.0158	0.0186	
WARNING LIMITS(+-) *	-	.00644-	.009.0156-	.0234.00724-	.010.00716-	.010	.0484-	.0726.0206-	.0309.0158-	.0237.0186-	.0279
ACTION LIMITS(<>) *	-	0.00966	0.0234	0.01086	0.01074	-	0.0726	0.0309	0.0237	0.0279	
N *	4	17	6	14	16	4	21	7	21	7	

* NOTE: SEE GLOSSARY FOR DEFINITIONS

PARAMETER: 07192 Ammonia

mg/L N

2009-09-02

PAGE 2

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	34.0	4.8		BIASED LOW	7	-9.4	0.0023	Phenate
F004	55.5	6.1			9			Salicylate/nitropruss
F010	11.0	5.5	ALAHAL	INSUFFICIENT DATA	2			Skalar
F011	13.5	3.3	AL WL	INSUFFICIENT DATA	4			
F014	40.0	6.6			6			Colorimetry
F015	37.0	7.4			5			Colorimetry
F022	73.5	14.7	AH AH	BIASED HIGH	5	33.5	-0.0045	Colorimetry
F026	27.5	5.5			5			Phenate
F032	56.5	11.3			5			Colourimetry
F036	93.0	10.3	WH		9			Colorimetry
F042	41.0	20.5	AH WH	INSUFFICIENT DATA	2			Colorimetry
F069	24.0	8.0		INSUFFICIENT DATA	3			
F092	86.0	8.6	AH		10			Flow injection
F113	51.5	5.1		BIASED LOW*	10	-5.0	0.0012	Flow injection
F154	8.0	1.6	WL	BIASED LOW	5	-17.3	0.0010	Flow injection
F158	16.5	8.2		INSUFFICIENT DATA	2			Colorimetry
F158b	78.0	15.6	WH WH	BIASED HIGH*	5	6.5	0.0036	Colorimetry
F183	60.0	15.0		INSUFFICIENT DATA	4			Colorimetry
F207	59.5	7.4			8			Colorimetry
F221	46.0	6.5			7			
F248	20.5	10.2		INSUFFICIENT DATA	2			ISE
F310	20.5	10.2		INSUFFICIENT DATA	2			Flow injection

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 7.5

OVERALL AVERAGE RANK IS 8.1

PARAMETER: 05091 Boron mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F010	0.005	0.007	0.020	0.029	0.016	0.027	0.014	0.075	0.061	0.132
F014	<0.010	<0.010	0.017	0.027	0.014	0.024	0.012	0.068	0.056	0.123
F015	<0.01	<0.01	0.02	0.03	0.02 WH	0.03 WH	0.01	0.07	0.06	0.13
F022	0.004	0.007	0.018	0.027	0.013	0.023	0.01	0.069	0.054	0.125
F026	<0.02	<0.02	<0.02	0.027	<0.02	0.024	<0.02	0.068	0.056	0.124
F069	0.006	0.007	0.018	0.028	0.015	0.026	0.012	0.073	0.058	0.133
F154	0.045	<0.020	<0.020	0.026	<0.020	0.021	<0.020	0.062	0.051	0.117
F158	<0.005	0.008	0.018	0.027	0.014	0.024	0.011	0.069	0.056	0.124
F183	0.0050	0.0070	0.0180	0.0290	0.0160	0.0240	0.0120	0.0660	0.0570	0.122
F186	<0.002	0.002	0.012 AL	0.020 WL	0.009 WL	0.021	0.007 WL	0.054 WL	0.049	0.112
F310	<0.02	<0.02	<0.02	0.023	<0.02	0.0213	<0.02	0.0674	0.0537	0.127
ASSIGNED VALUE *	0.0050	0.0070	0.0180	0.0270	0.0145	0.0240	0.0115	0.0680	0.0560	0.124
R-STD DEV *	0.00209	0.00000	0.00164	0.00239	0.00271	0.00264	0.00202	0.00465	0.00387	0.0064
ACCEPTABLE LIMITS(+-) *	-	-	0.00328	0.00478	0.00542	0.00528	0.00404	0.00930	0.00774	0.0128
WARNING LIMITS(+-) *	-	-	.00328- .004.00478- .007.00542- .008.00528- .007.00404- .006.00930- .013.00774- .011.0128- .0192							
ACTION LIMITS(<>) *	-	-	0.00492	0.00717	0.00813	0.00792	0.00606	0.01395	0.01161	0.0192
N *	5	6	8	11	8	11	8	11	11	11

* NOTE: SEE GLOSSARY FOR DEFINITIONS

PARAMETER: 05091 Boron

mg/L

2009-09-02

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LAB NO.	TOTAL RANK	AVERAGE RANK	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F010	79.5	7.9			10			ICP-AES
F014	39.0	4.8			8			ICP-AES
F015	68.0	8.5	WHWH	BIASED HIGH*	8	2.9	0.0023	ICP-AES
F022	41.5	4.1			10			ICP-AES
F026	29.0	5.8			5			ICP-AES
F069	70.0	7.0			10			ICP-AES
F154	15.5	2.5		BIASED LOW	6	-25.6	0.0163	ICP-MS
F158	49.0	5.4			9			ICP-MS
F183	53.0	5.3			10			ICP-MS
F186	9.5	1.0	ALWLWL WLWL	BIASED LOW*	9	-7.7	-0.0041	ICP-MS
F310	20.0	4.0			5			ICP-AES

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS

PERCENT SLOPE USED FOR CAUTION COMPARISON = 10

OVERALL AVERAGE RANK IS 5.2

PARAMETER: 20091 Calcium mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	14.2	14.	77.3	36.3	27.1	35.7	38.8	69.9	49.4	59.8
F009	13.7	14.1	77.0	35.5	25.7	34.0	36.9 WL	67.5	46.1	59.0
F010	14.2	14.2	84. AH	35.5	27.	35.	38.	74.	50.	64. WH
F011	13.5	13.7	70.6 AL	34.6	26.4	34.0	38.1	72.5	50.0	65.0 WH
F014	14.2	14.0	76.1	35.9	27.1	35.4	38.2	68.2	47.5	58.0
F015	14.6	14.6	76.2	34.6	25.3 WL	34.0	37.1	68.5	48.0	60.0
F021	14.4	14.2	77.7	36.7	27.5	36.5	39.0	70.6	48.5	59.0
F022	14.1	14.1	76.8	36.1	27.3	35.7	38.6	67.2	47.7	57.8
F026	14.5	14.4	77.3	36.0	27.1	35.5	38.9	68.8	48.8	59.9
F032	14.0	13.6	71.3 AL	36.7	26.6	36.0	39.1	66.9	47.2	59.4
F036	14.0	13.9	77.7	35.8	26.8	35.7	38.7	70.4	49.0	59.9
F042	14.2	13.6	78.7	34.6	26.4	33.8	36.6 WL	72.9	48.9	59.4
F069	14.4	14.7	78.5	37.3	28.0	36.9	39.1	70.5	49.6	60.1
F113	13.8	13.6	75.4	35.8	26.4	34.9	38.5	69.2	48.5	58.2
F154	13.8	13.8	72.9 WL	34.6	26.1	35.2	38.3	68.0	47.6	59.1
F158	13.6	13.6	77.0	36.0	26.9	35.3	37.6	68.5	47.1	57.1
F183	14.4	14.3	80.2	38.1	29.4 AH	36.9	39.8	69.5	49.9	61.6
F186	15.0 WH	14.5	80.8	41.9 AH	26.0	35.6	43.0 AH	70.5	49.4	61.2
F193	13.6	13.8	75.7	35.1	26.3	34.8	38.3	73.1	45.9 WL	65.1 WH
F196	14.6	14.5	78.4	36.8	27.5	36.5	39.7	69.7	49.1	59.7
F207	14.1	14.3	77.8	36.8	27.2	35.8	38.7	69.6	48.4	59.6
F223	14.5	14.4	78.8	36.6	27.3	36.3	38.7	72.5	50.1	61.6
F223b	14.1	14.1	78.1	36.5	27.2	36.3	39.2	71.4	49.8	61.8
F273	14.0	14.0	75.7	36.4	26.6	36.0	38.6	65.6	47.6	56.3
F310	13.9	14.2	76.8	36.2	26.8	34.4	37.8	69.3	47.8	58.9
ASSIGNED VALUE *	14.1	14.1	77.3	36.0	26.8	35.6	38.6	69.6	48.5	59.7
R-STD DEV *	0.38	0.37	1.96	1.01	0.65	1.02	0.83	2.24	1.24	1.85
ACCEPTABLE LIMITS(+-) *	0.76	0.74	3.92	2.02	1.30	2.04	1.66	4.48	2.48	3.70
WARNING LIMITS(+-) *	.76- 1.14	.74- 1.11	3.92- 5.88	2.02- 3.03	1.30- 1.95	2.04- 3.06	1.66- 2.49	4.48- 6.72	2.48- 3.72	3.70- 5.55
ACTION LIMITS(<>) *	1.14	1.11	5.88	3.03	1.95	3.06	2.49	6.72	3.72	5.55
N *	25	25	25	25	25	25	25	25	25	25

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	149.5	14.9			10			AAS absorption
F009	55.5	5.5		WL BIASED LOW*	10	-1.1	-0.6319	ICP-MS
F010	162.5	16.2	AH	WH	10			ICP-AES
F011	95.5	9.5	AL	WH	10			
F014	92.5	9.2			10			ICP-AES
F015	99.5	9.9	WL		10			ICP-AES
F021	173.0	17.3			10			ICP-AES
F022	109.5	10.9			10			ICP-AES
F026	151.5	15.1			10			ICP-AES
F032	98.0	9.8	AL		10			AAS absorption
F036	130.0	13.0			10			AAS absorption
F042	99.0	9.9		WL	10			ICP-AES
F069	211.5	21.1			BIASED HIGH*	10	0.5	ICP-AES
F113	73.0	7.3			10			ICP-AES
F154	60.5	6.0	WL		BIASED LOW*	10	-4.1	0.6189
F158	67.5	6.7			10			ICP-MS
F183	212.5	21.2		AH	BIASED HIGH*	10	1.6	0.7071
F186	192.5	19.2	WH	AH AH		10		ICP-MS
F193	90.0	9.0		WLWH		10		ICP-MS
F196	198.5	19.8				10		ICP-AES
F207	155.5	15.5				10		ICP-AES
F223	205.0	20.5			BIASED HIGH*	10	3.4	-0.3913
F223b	184.0	18.4				10		AAS absorption
F273	89.5	8.9				10		ICP-AES
F310	94.0	9.4				10		ICP-AES

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 13.0

PARAMETER: 17092 Chloride mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	24.5	1.33	15.1	29.4	6.2	21.1	12.7	7.04	8.28	22.6
F009	25.4	1.43	15.5	30.6	6.57	21.7	13.2	7.41	8.66	23.4
F010	24.	1.55	15.5	29.7	6.3	22.5 WH	12.5	7.4	8.5	23.
F011	25.0	1.4	15.3	30.2	6.4	21.3	12.9	7.3	8.5	23.1
F014	24.2	1.46	14.3	29.6	6.66	20.4	11.7 WL	7.67	8.81	22.6
F015	24.	1.5	14.	28.	6.5	20.	12.0 WL	8.4 AH	8.7	22.
F021	24.3	1.43	15.4	29.5	6.41	21.5	12.9	7.37	8.53	22.7
F022	24.7	1.47	15.2	29.8	6.47	21.1	12.9	7.31	8.50	23.0
F026	25.5	1.50	15.6	31.1	6.64	21.8	13.2	7.35	8.40	23.4
F032	24.7	1.4	16.6 WH	29.8	6.4	21.2	12.8	7.3	8.4	23.2
F036	24.6	1.48	15.4	30.3	6.52	21.2	12.8	7.56	8.75	23.6
F042	25.	1.5	15.	31.	6.5	22.	13.	7.3	8.5	24.
F069	23.1	1.5	14.9	27.8	6.33	20.0	12.7	7.18	8.38	21.5 WL
F073	24.5	1.4	14.9	29.9	6.64	20.9	12.4	7.1	8.2	22.8
F099	23.7	1.44	16.6 WH	28.4	6.49	21.1	13.1	7.6	8.6	23.2
F113	24.8	1.43	15.1	29.9	6.45	21.2	12.8	7.31	8.50	22.8
F154	25.7	1.61	15.8	31.5	6.66	21.9	13.3	7.67	8.66	24.2 WH
F158	24.0	1.2 AL	16.0	30.0	6.0 WL	21.0	13.0	7.3	8.0	23.0
F158b	23.4	1.5	14.8	28.0	6.2	20.6	12.6	7.2	8.4	22.0
F183	24.4	1.51	15.0	29.5	6.45	20.9	12.7	7.27	8.43	22.6
F193	24.5	<2.00	14.7	29.4	6.2	20.9	12.5	6.93	7.99	23.0
F207	23.4	1.4	14.4	28.4	6.2	20.2	12.2	6.9	8.	21.8
F223	24.1	15.4 AH	15.4	29.1	6.4	20.6	12.6	7.3	8.4	22.7
F310	24.3	1.36	14.7	29.2	6.14	20.6	12.4	6.96	8.09	22.3
ASSIGNED VALUE *	24.4	1.46	15.2	29.6	6.43	21.1	12.8	7.30	8.46	22.9
R-STD DEV *	0.69	0.076	0.59	1.06	0.190	0.65	0.36	0.251	0.246	0.63
ACCEPTABLE LIMITS(+-) *	1.38	0.152	1.18	2.12	0.380	1.30	0.72	0.502	0.492	1.26
WARNING LIMITS(+-) *	1.38- 2.07	.152- .228	1.18- 1.77	2.12- 3.18	.380- .570	1.30- 1.95	.72- 1.08	.502- .753	.492- .738	1.26- 1.89
ACTION LIMITS(<>) *	2.07	0.228	1.77	3.18	0.570	1.95	1.08	0.753	0.738	1.89
N *	24	23	24	24	24	24	24	24	24	24

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	81.5	8.1			10			IC Dionex
F009	193.0	19.3		BIASED HIGH*	10	3.3	-0.1004	IC Dionex
F010	143.5	14.3	WH		10			IC Dionex
F011	147.0	14.7			10			
F014	117.0	11.7	WL		10			IC Dionex
F015	97.0	9.7	WLAH		10			IC
F021	138.5	13.8			10			IC Dionex
F022	147.0	14.7			10			IC Dionex
F026	194.0	19.4		BIASED HIGH*	10	4.6	-0.2243	IC
F032	140.0	14.0	WH		10			Colourimetry
F036	180.0	18.0			10			IC
F042	178.0	17.8			10			IC Dionex
F069	61.0	6.1	WL		10			IC
F073	100.0	10.0			10			IC Dionex
F099	151.5	15.1	WH		10			Flow injection
F113	140.5	14.0			10			IC Dionex
F154	227.5	22.7	WH	BIASED HIGH	10	5.7	-0.1436	Colorimetry
F158	106.5	10.6	AL WL		10			Colorimetry
F158b	67.0	6.7			10			IC
F183	112.5	11.2			10			IC
F193	64.5	7.1			9			IC Dionex
F207	31.5	3.1		BIASED LOW*	10	-4.4	-0.0389	IC Dionex
F223	107.5	10.7	AH		10			Titration
F310	49.5	4.9		BIASED LOW*	10	-1.0	-0.2374	IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 12.4

PARAMETER: 00292 Colour

Units

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	0.9	1.1	85.5	0.8	0.7	1.4	0.8	14.5	3.1	58.7
F011	<2.	<2.	105.	<2.	<2.	<2.	<2.	16.	2.	71.
F015	<2.5	<2.5	90.	<2.5	<2.5	<2.5	<2.5	15.	<2.5	60.
F021	<5.	<5.	83.	<5.	<5.	<5.	<5.	14.	<5.	60.
F032	1.1	1.1	107.	0.3	0.2	1.0	0.4	17.3	3.4	71.3
F036	1.43	2.41	110.	0.32	0.51	1.12	0.65	16.7	3.23	76.4
F042	3.	4.	105.	2.	1.	3.	2.	18.	4.	73.
F094	<2.	<2.	103.	<2.	<2.	<2.	<2.	16.0	4.0	71.0
F113	5.	4.	88.	0.	2.	3.	9. WH	11.	3.	59.
F154	10.0 WH	5.0	100.	5.0	5.0	10.0 AH	5.0	25.0 WH	10.0 AH	100. AH
F154b	10.0 WH	5.0	100.	5.0	5.0	10.0 AH	5.0	25.0 WH	10.0 AH	100. AH
F158	<5.0	<5.0	86.0	<5.0	<5.0	<5.0	<5.0	13.0	<5.0	60.0
F183	<4.96	<4.96	93.4	<4.96	<4.96	<4.96	<4.96	16.3	<4.96	62.0
F193	0.80	0.70	79.9	0.70	<0.3	0.70	0.40	12.9	2.50	53.6
F207	<1.	1.	86.	<1.	<1.	1.	<1.	14.	3.	60.
F248	1.0	1.2	87.6	<0.8	<0.8	1.2	0.9	14.7	3.2	59.3
F310	5.	5.	120. WH	5.	5.	5.	5.	20.	5.	80.
ASSIGNED VALUE *	2.22	2.41	93.4	0.80	1.50	1.20	1.45	16.0	3.20	60.0
R-STD DEV *	3.786	2.077	11.93	2.526	2.488	2.553	2.831	3.05	1.263	10.93
ACCEPTABLE LIMITS(+-) *	7.572	4.154	23.86	5.052	4.976	5.106	5.662	6.10	2.526	21.86
WARNING LIMITS(+-) *	7.572- 11.354.154-	6.23123.86-	35.795.052-	7.5784.976-	7.4645.106-	7.6595.662-	8.4936.10-	9.15	2.526-	3.78921.86- 32.79
ACTION LIMITS(<>) *	11.358	6.231	35.79	7.578	7.464	7.659	8.493	9.15	3.789	32.79
N *	10	11	17	9	8	11	10	17	13	17

* NOTE: SEE GLOSSARY FOR DEFINITIONS

PARAMETER: 00292 Colour

Units

2009-09-02

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LAB NO.	TOTAL RANK	AVERAGE RANK	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	39.5	3.9		BIASED LOW*	10	-7.0	-0.3968	Auto Analyser
F011	34.5	8.6		INSUFFICIENT DATA	4			True
F015	22.5	7.5		INSUFFICIENT DATA	3			Apparent
F021	13.0	4.3		INSUFFICIENT DATA	3			Colourimetry
F032	62.5	6.2			10			Colorimetry
F036	72.0	7.2			10			Apparent
F042	87.0	8.7			10			True
F094	41.5	10.3		INSUFFICIENT DATA	4			Visual Comparison
F113	53.0	5.3	WH		10			True
F154	109.0	10.9	WH	AH WHAHAH	BIASED HIGH*	10	16.1	Apparent
F154b	109.0	10.9	WH	AH WHAHAH	BIASED HIGH*	10	16.1	Spectrophotometry
F158	14.0	4.6			INSUFFICIENT DATA	3		Spectrophotometry
F183	29.0	9.6			INSUFFICIENT DATA	3		Spectrophotometry
F193	14.5	1.6			BIASED LOW*	9	-13.4	Spectrophotometry
F207	23.5	3.9				6		Spectrophotometry
F248	41.0	5.1				8		Spectrophotometry
F310	107.5	10.7	WH		10			Visual Comparison

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 25

OVERALL AVERAGE RANK IS 7.0

PARAMETER: 00392 Conductivity @ 25C uS/cm

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	163.	100.	454.	349.	211.	306.	334.	865.	628.	910.
F004	164.	100.	453.	349.	212.	309.	338.	868.	629.	908.
F009	166.	101.	457.	352.	215.	312.	342.	873.	633.	912.
F010	164.	98.	460.	353.	210.	311.	342.	886.	649. WH	921.
F011	157.	97.3	439.	338.	204.	303.	333.	860.	623.	901.
F014	165.	101.	452.	355.	215.	308.	338.	872.	632.	916.
F015	159.	97.	444.	343.	208.	304.	334.	852.	623.	897.
F015b	176. AH	101.	449.	348.	212.	308.	332.	869.	635.	907.
F021	163.	101.	457.	349.	213.	310.	339.	874.	631.	915.
F022	164.	101.	453.	350.	213.	309.	339.	868.	629.	914.
F026	161.	99.0	442.	342.	208.	305.	331.	853.	617.	892. WL
F032	164.	100.	445.	342.	210.	304.	336.	873.	626.	902.
F036	164.	103.	443.	341.	211.	304.	330.	861.	617.	912.
F042	169.	104.	463.	362.	221.	321. WH	349.	885.	646.	923.
F069	162.	<100.	437.	346.	210.	306.	334.	858.	624.	902.
F073	173. WH	106. WH	476. WH	364.	222. WH	325. WH	351. WH	898. WH	652. WH	942. AH
F090	166.	103.	458.	354.	215.	312.	343.	876.	633.	915.
F092	161.	99.	440.	342.	207.	302.	333.	854.	615. WL	895.
F099	163.	101.	456.	351.	214.	311.	341.	870.	632.	911.
F113	165.	101.	457.	352.	214.	312.	342.	874.	636.	916.
F154	158.	98.6	430. WL	334. WL	203.	303.	330.	838. AL	611. WL	881. AL
F158	159.	97.8	440.	335.	205.	296. WL	327. WL	862.	634.	892. WL
F158b	163.	99.7	456.	353.	211.	312.	341.	875.	635.	918.
F183	162.	102.	438.	341.	209.	303.	339.	869.	630.	911.
F186	166.	104.	464.	357.	217.	315.	343.	872.	634.	912.
F193	163.	101.	452.	348.	212.	308.	336.	864.	628.	907.
F207	166.	102.	458.	354.	216.	311.	340.	874.	636.	915.
F221	166.	103.	459.	355.	216.	313.	343.	874.	637.	914.
F223	455. AH	101.	455.	352.	212.	312.	341.	871.	635.	914.
F248	169.	1030. AH	465.	360.	219.	318.	345.	889.	646.	927.
F273	107. AL	65.7 AL	464.	358.	136. AL	196. AL	343.	865.	634.	910.
F310	166.	102.	456.	352.	212.	313.	342.	871.	627.	915.
ASSIGNED VALUE *	164	101	454	350	212	309	339	871	632	912
R-STD DEV *	3.8	2.41	10.3	7.7	4.6	5.5	5.7	9.9	8.1	9.5
ACCEPTABLE LIMITS(+-) *	7.6	4.82	20.6	15.4	9.2	11.0	11.4	19.8	16.2	19.0
WARNING LIMITS(+-) *	7.6 - 11.4	4.82 - 7.23	20.6 - 30.9	15.4 - 23.1	9.2 - 13.8	11.0 - 16.5	11.4 - 17.1	19.8 - 29.7	16.2 - 24.3	19.0 - 28.5
ACTION LIMITS(<>) *	11.4	7.23	30.9	23.1	13.8	16.5	17.1	29.7	24.3	28.5
N *	32	31	32	32	32	32	32	32	32	32

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	120.0	12.0			10			PC Titrate
F004	139.5	13.9			10			Radiometer
F009	212.5	21.2			10			Cond. meter
F010	215.0	21.5			10			Cond. meter
F011	44.0	4.4			10	-0.7	-6.1686	
F014	191.5	19.1			10			PC Titrate
F015	60.5	6.0			10	-1.7	-1.2331	Cond. meter
F015b	154.5	15.4	AH		10			Cond. meter
F021	182.5	18.2			10			PC Titrate
F022	162.5	16.2			10			Cond. meter
F026	57.5	5.7		WL	BIASED LOW*	10	-2.2	PC Titrate
F032	111.5	11.1			10			Potentiometry
F036	106.5	10.6			10			Cond. meter
F042	297.5	29.7	WH		BIASED HIGH*	10	0.9	Cond. meter
F069	70.5	7.8			9			Cond. meter
F073	316.0	31.6	WHWHWH	WHWHWHWHWAH	BIASED HIGH	10	2.8	Cond. meter
F090	246.0	24.6			10			Radiometer
F092	51.0	5.1		WL	BIASED LOW*	10	-2.0	PC Titrate
F099	174.5	17.4			10			Cond. meter
F113	226.5	22.6			10			PC Titrate
F154	23.5	2.3	WLWL	ALWLAL	BIASED LOW	10	-3.6	Radiometer
F158	54.5	5.4	WLWL	WL	BIASED LOW*	10	-0.7	Cond. meter
F158b	198.5	19.8			10			Cond. meter
F183	111.0	11.1			10			Cond. meter
F186	253.5	25.3			BIASED HIGH*	10	-0.5	Standard Methods for
F193	124.5	12.4				10		Cond. meter
F207	236.5	23.6				10		Cond. meter
F221	258.0	25.8			BIASED HIGH*	10	0.0	Radiometer
F223	208.0	20.8	AH			10		Cond. meter
F248	302.0	30.2	AH		BIASED HIGH	10	-41.1	Radiometer
F273	134.0	13.4	ALAL	ALAL		10		Cond. meter
F310	204.0	20.4				10		Cond. meter

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 2.5

OVERALL AVERAGE RANK IS 16.4

FPMI STUDY 0094

DATA SUMMARY

2009-09-02

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PARAMETER: 06592 Diss Inorg Carbon mg/L C

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT										
F003	4.4	10.2	46.8	19.2	19.1	22.2	27.6	53.5	34.8	60.										
F010	4.32	10.4	48.7	19.5	19.6	22.5	28.6	56.2	35.3	63.4										
F015	4.4	10.4	45.9	19.2	19.2	22.1	27.9	54.1	34.5	60.6										
F021	5.4 WH	11.0	51.4 AH	19.8	19.9	24.4 WH	30.8 AH	57.8	37.9 AH	67.1 AH										
F022	4.93	11.2	48.8	20.2	20.2	23.1	29.1	56.7	35.8	63.										
F026	4.53	10.1	47.0	19.0	19.0	21.9	27.6	58.2	34.3	63.7										
F032	5.37	11.2	47.3	19.7	19.7	22.7	28.0	54.0	34.4	60.3										
F036	4.70	10.7	45.9	19.9	19.5	23.7	28.8	56.2	35.6	62.8										
F042	4.78	10.7	46.6	19.3	19.6	22.3	27.9	57.4	34.7	62.5										
F073	4.5	9.8	46.1	18.8	18.9	21.3	26.7	53.3	33.8	60.1										
F094	4.40	9.94	46.3	18.9	18.8	21.6	27.5	53.7	34.4	59.6										
F113	4.58	10.6	44.6	17.2 AL	15.9 AL	23.0	29.5	52.9	36.8 WH	58.6										
F154	4.5	9.3 WL	46.8	18.8	18.7	21.7	27.8	54.5	34.6	60.5										
F183	5.38	10.9	47.3	19.6	19.6	22.5	28.3	55.0	34.6	60.8										
ASSIGNED VALUE *	4.56	10.50	46.8	19.3	19.5	22.4	27.9	54.8	34.6	60.6										
R-STD DEV *	0.417	0.573	1.35	0.55	0.56	0.83	0.91	2.04	0.86	2.05										
ACCEPTABLE LIMITS(+-) *	0.834	1.146	2.70	1.10	1.12	1.66	1.82	4.08	1.72	4.10										
WARNING LIMITS(+-) *	.834-	1.251	1.146-	1.719	2.70-	4.05	1.10-	1.65	1.12-	1.68	1.66-	2.49	1.82-	2.73	4.08-	6.12	1.72-	2.58	4.10-	6.15
ACTION LIMITS(<>) *	1.251	1.719	4.05	1.65	1.68	2.49	2.73	6.12	2.58	6.15										
N *	14	14	14	14	14	14	14	14	14	14										

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	52.5	5.2			10			IR detection
F010	88.5	8.8			10			Shimadzu
F015	55.0	5.5			10			Carbon analyser
F021	134.0	13.4	WH AH	WHAH AHAH	BIASED HIGH	10	9.4	-0.3883
F022	123.5	12.3			BIASED HIGH*	10	3.3	0.1784
F026	66.5	6.6				10		TOC analyser
F032	90.5	9.0				10		Colorimetry
F036	96.5	9.6				10		Colourimetry
F042	86.0	8.6				10		Colorimetry
F073	27.0	2.7			BIASED LOW*	10	-1.1	-0.4646
F094	31.5	3.1			BIASED LOW*	10	-1.2	-0.2471
F113	58.0	5.8	ALAL	WH		10		IR detection
F154	46.0	4.6	WL			10		Dohrmann
F183	94.5	9.4				10		Carbon analyser

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 7.5

OVERALL AVERAGE RANK IS 7.5

PARAMETER: 06002 Diss Organic Carbon mg/L C

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	1.	1.2	17.5	1.5	1.3	1.4	1.5	7.2	3.1	15.4
F004	0.957	1.21	16.0	1.32	1.29	1.38	1.42	7.08	3.06	14.2
F010	1.10	1.30	18.3	1.50	1.46	1.50	1.55	7.53	3.25	15.9
F011	1.6	2.1 AH	19.4	2.4 AH	2.2 AH	2.3 AH	2.9 AH	9.0 WH	4.6 AH	17.6 WH
F014	1.3	1.5	16.1	1.9	1.9	1.9	1.9	7.7	3.4	14.7
F015	1.5	1.7	19.0	1.6	1.7	1.6	1.7	8.6	3.2	16.4
F021	1.2	1.4	18.2	1.9	1.7	1.9	2.0	8.3	4.2 AH	16.6
F022	1.31	1.46	16.9	1.92	1.62	1.79	1.77	7.44	3.43	15.
F026	1.01	1.27	16.5	1.26	1.36	1.37	1.54	7.13	3.17	15.0
F032	1.5	1.6	17.3	1.7	1.5	1.6	1.8	7.7	3.6	15.2
F036	0.96	1.37	17.4	1.4	1.36	1.47	1.48	7.78	3.14	15.5
F042	1.14	1.27	17.1	1.44	1.42	1.49	1.46	7.25	3.14	15.0
F069	1.1	1.3	18.	1.6	1.5	1.5	1.6	7.4	3.	15.
F073	0.93	1.11	16.3	1.48	1.24	1.32	1.39	6.69	2.97	14.1
F092	1.3	1.6	18.9	1.9	1.7	1.9	1.8	7.5	3.5	16.
F113	1.04	1.32	17.4	1.43	1.34	1.44	1.51	6.96	3.10	15.0
F154	1.4	2.4 AH	17.9	<1.0 WL	<1.0 WL	<1.0 WL	<1.0 WL	7.9	2.7	16.0
F158	0.9	1.1	18.5	1.3	1.2	1.3	1.4	7.6	3.2	16.1
F183	1.56	1.19	14.8 WL	1.73	1.21	1.35	<1. WL	6.19 WL	2.93	14.8
F207	1.3	1.5	16.1	1.6	1.5	1.7	1.7	6.5	3.2	13.6
F310	1.30	1.46	18.2	1.70	1.48	1.55	1.60	7.54	3.27	15.7
ASSIGNED VALUE *	1.200	1.32	17.4	1.60	1.46	1.50	1.58	7.50	3.17	15.2
R-STD DEV *	0.2470	0.223	1.22	0.257	0.218	0.241	0.209	0.599	0.255	0.89
ACCEPTABLE LIMITS(+-) *	0.4940	0.446	2.44	0.514	0.436	0.482	0.418	1.198	0.510	1.78
WARNING LIMITS(+-) *	.4940- .7410	.446- .669	2.44- 3.66	.514- .771	.436- .654	.482- .723	.418- .627	1.198- 1.797	.510- .765	1.78- 2.67
ACTION LIMITS(<>) *	0.7410	0.669	3.66	0.771	0.654	0.723	0.627	1.797	0.765	2.67
N *	21	21	21	20	20	20	19	21	21	21

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	72.0	7.2			10			IR detection
F004	38.0	3.8		BIASED LOW*	10	-6.8	-0.0567	TOC analyser
F010	113.0	11.3			10			Shimadzu
F011	204.0	20.4	AH AHAHAHAHWAHHW	BIASED HIGH	10	9.2	0.7292	TOC analyser
F014	139.0	13.9			10			Carbon analyser
F015	162.5	16.2			10			Carbon analyser
F021	167.5	16.7	AH	BIASED HIGH*	10	5.4	0.2532	TOC analyser
F022	135.5	13.5			10			Technicon UV digesti
F026	63.0	6.3			10			Colourimetry
F032	146.0	14.6			10			Colorimetry
F036	88.5	8.8			10			IR detection
F042	77.0	7.7			10			IR detection
F069	97.0	9.7			10			Dohrmann
F073	30.0	3.0		BIASED LOW*	10	-6.1	-0.1315	TOC analyser
F092	163.0	16.3			10			Dohrmann
F113	71.0	7.1			10			Carbon analyser
F154	86.5	14.4	AH WLWLWLWL		6			TOC analyser
F158	70.0	7.0			10			Shimadzu
F183	52.0	5.7	WL	WLWL	9			TOC analyser
F207	99.0	9.9			10			TOC analyser
F310	131.5	13.1			10			TOC analyser

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 7.5

OVERALL AVERAGE RANK IS 10.7

PARAMETER: 09092 Fluoride mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	1.19	0.03	0.11	0.57	0.08	0.64	0.7	0.24	0.67	0.15
F009	1.23	0.08 AH	0.12	0.57	0.11	0.67	0.72	0.27	0.66	0.17
F010	1.1	<0.03	0.12	0.57	0.08	0.59	0.67	0.20	0.67	0.12
F011	1.2	<0.1	0.1	0.5	<0.1	0.6	0.7	0.2	0.6	0.1
F014	1.10	<0.100	0.100	0.538	<0.100	0.566	0.652	0.223	0.622	0.135
F015	1.05 WL	0.03	0.11	0.58	0.08	0.63	0.70	0.24	0.64	0.14
F022	1.12	0.02	0.08	0.50	0.05	0.56	0.62	0.17	0.55	0.10
F032	1.19	0.04	0.10	0.56	0.08	0.62	0.68	0.21	0.62	0.13
F042	1.18	0.04	0.10	0.53	0.08	0.59	0.65	0.21	0.61	0.13
F069	1.24	0.03	0.19 AH	0.62 WH	0.13 WH	0.68 WH	0.76 WH	0.32 WH	0.71	0.21 WH
F073	1.1	0.03	0.09	0.52	0.08	0.59	0.65	0.23	0.58	0.14
F154	1.36 WH	0.10 AH	0.13 WH	0.61	0.20 AH	0.67	0.76 WH	0.30 WH	0.71	0.20
F158	1.18	<0.10	0.11	0.55	<0.10	0.61	0.68	0.22	0.63	0.14
F158b	1.14	<0.10	0.14 WH	0.56	<0.10	0.61	0.69	0.30 WH	0.63	0.23 WH
F183	1.23	<0.05	0.100	0.537	0.070	0.601	0.662	0.210	0.620	0.132
F193	1.20	<0.10	0.10	0.47 WL	0.10	0.59	0.56 AL	0.24	0.43 AL	0.17
F196	1.1	0.03	0.1	0.53	0.07	0.58	0.68	0.22	0.61	0.14
F207	1.13	0.04	0.10	0.52	0.07	0.59	0.65	0.21	0.60	0.13
F248	1.21	0.050	0.109	0.534	0.097	0.628	0.680	0.255	0.654	0.174
F310	1.18	<0.20	<0.20	0.56	<0.20	0.62	0.69	0.24	0.64	<0.20
ASSIGNED VALUE *	1.18	0.030	0.100	0.544	0.080	0.605	0.680	0.226	0.630	0.140
R-STD DEV *	0.063	0.0141	0.0147	0.0351	0.0211	0.0340	0.0344	0.0338	0.0420	0.0337
ACCEPTABLE LIMITS(+-) *	0.126	0.0282	0.0294	0.0702	0.0422	0.0680	0.0688	0.0676	0.0840	0.0674
WARNING LIMITS(+-) *	.126- .189	.0282- .0423	.0294- .0441	.0702- .1053	.0422- .0633	.0680- .1020	.0688- .1032	.0676- .1014	.0840- .1260	.0674- .1011
ACTION LIMITS(<>) *	0.189	0.0423	0.0441	0.1053	0.0633	0.1020	0.1032	0.1014	0.1260	0.1011
N *	20	12	19	20	15	20	20	20	20	19

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	130.0	13.0			10			IC Dionex
F009	157.0	15.7	AH	BIASED HIGH*	10	1.6	0.0316	Alizarin
F010	79.5	8.8			9			IC Dionex
F011	57.0	7.1			8			
F014	56.0	7.0			8			PC Titrate
F015	113.0	11.3	WL		10			IC
F022	19.0	1.9		BIASED LOW*	10	-3.7	-0.0290	IC Dionex
F032	90.5	9.0			10			IC
F042	65.5	6.5			10			IC Dionex
F069	173.0	17.3	AHHWHWHWHWH WH	BIASED HIGH*	10	2.0	0.0588	IC
F073	56.0	5.6			10			IC Dionex
F154	176.0	17.6	WHAHWH AH WHWH	BIASED HIGH	10	7.2	0.0521	Flow injection
F158	86.5	10.8			8			ISE
F158b	113.0	14.1	WH WH WH		8			IC
F183	74.0	8.2			9			IC
F193	70.0	7.7	WL AL AL		9			IC Dionex
F196	62.5	6.2			10			ISE
F207	54.0	5.4			10			IC Dionex
F248	128.5	12.8			10			ISE
F310	77.0	12.8			6			ISE

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 9.9

PARAMETER: 12091 Magnesium mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	1.56	2.91	10.3	8.94	7.51	8.65	13.5	37.8	27.2	42.8
F009	1.55	2.88	10.1	8.69	7.19	8.54	13.2	36.6	26.1	42.2
F010	1.62	2.96	10.6	8.85	7.65	8.72	13.6	38.0	27.0	43.0
F011	1.1 AL	2.6 AL	9.0 AL	8.1 WL	6.9 WL	7.9 AL	12.6 WL	37.2	26.1	42.5
F014	1.68	3.08	10.8	9.32	8.01	9.06 WH	14.0	38.8	27.6	43.5
F015	1.6	2.9	10.4	8.9	7.4	8.6	13.1	37.5	27.0	42.5
F021	1.58	2.91	10.4	8.95	7.61	8.73	13.5	37.7	26.9	42.5
F022	1.57	2.95	10.2	8.81	7.57	8.57	13.2	35.7 WL	25.8	39.9 WL
F026	1.57	2.86	9.90	8.67	7.35	8.40	13.2	36.4	26.2	41.4
F032	1.60	2.96	10.4	8.92	7.54	8.72	13.7	38.1	27.0	41.2
F036	1.54	2.91	10.4	9.07	7.59	8.77	13.4	33.7 AL	26.3	38.0 AL
F042	1.45 WL	2.51 AL	9.25 AL	7.85 AL	6.83 WL	7.69 AL	12.2 AL	40.2 WH	27.0	43.6
F069	1.56	2.88	10.1	8.46	7.24	8.22 WL	13.1	37.3	26.9	41.8
F113	1.59	2.92	10.7	9.00	7.65	8.79	13.7	38.9	28.0	42.4
F154	1.65	2.77	9.60 WL	8.11 WL	6.99 WL	8.41	13.1	35.4 WL	25.4 WL	39.7 WL
F158	1.6	3.1 WH	10.6	9.3	7.8	8.9	13.7	38.9	27.3	42.4
F183	1.48	2.85	10.5	9.43	8.46 AH	9.62 AH	14.3 WH	38.0	26.9	42.0
F186	1.56	2.89	9.74	8.81	7.59	8.54	14.5 WH	38.5	27.7	44.4
F193	1.54	2.94	10.3	8.68	7.47	8.58	13.5	38.6	25.3 WL	45.1 WH
F196	1.65	2.96	10.3	8.92	7.63	8.58	14.5 WH	38.3	27.8	42.6
F207	1.6	3.0	10.4	9.0	7.7	8.7	13.5	37.8	26.9	42.9
F223	<2.00	2.94	10.1	8.80	7.52	8.64	13.4	37.9	26.8	43.0
F223b	1.62	2.98	10.6	8.99	7.62	8.73	13.5	38.4	27.2	44.3
F273	1.63	3.11 WH	10.5	9.22	7.88	8.82	13.6	36.9	26.9	41.4
F310	<2.00	3.00	10.4	9.01	7.60	8.64	13.4	38.2	26.6	42.9
ASSIGNED VALUE *	1.58	2.94	10.40	8.92	7.58	8.64	13.5	38.0	26.9	42.5
R-STD DEV *	0.053	0.082	0.348	0.307	0.269	0.207	0.39	1.05	0.70	1.23
ACCEPTABLE LIMITS(++) *	0.106	0.164	0.696	0.614	0.538	0.414	0.78	2.10	1.40	2.46
WARNING LIMITS(+-) *	.106- .159	.164- .246	.696- 1.044	.614- .921	.538- .807	.414- .621	.78- 1.17	2.10- 3.15	1.40- 2.10	2.46- 3.69
ACTION LIMITS(<>) *	0.159	0.246	1.044	0.921	0.807	0.621	1.17	3.15	2.10	3.69
N *	23	25	25	25	25	25	25	25	25	25

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	129.0	12.9			10			AAS absorption
F009	62.5	6.2			10			ICP-MS
F010	173.5	17.3			10			ICP-AES
F011	36.5	3.6	ALALALWLWLALWL	BIASED LOW*	10	0.8	-0.8107	
F014	230.0	23.0	WH	BIASED HIGH*	10	2.0	0.1860	ICP-AES
F015	112.5	11.2			10			ICP-AES
F021	138.0	13.8			10			ICP-AES
F022	81.0	8.1	WL WL		10			ICP-AES
F026	58.0	5.8		BIASED LOW*	10	-3.1	0.0131	ICP-AES
F032	146.5	14.6			10			AAS absorption
F036	104.5	10.4	AL AL		10			AAS absorption
F042	72.5	7.2	WLALALALWLALALWH		10			ICP-AES
F069	64.5	6.4	WL		10			ICP-AES
F113	188.0	18.8			10			ICP-AES
F154	48.5	4.8	WLWLWL	WLWLWL	BIASED LOW	10	-6.6	0.0954
F158	204.5	20.4	WH		BIASED HIGH*	10	0.7	0.1667
F183	159.0	15.9	AHAHWH			10		ICP-MS
F186	141.0	14.1	WH			10		ICP-MS
F193	114.5	11.4		WLWH		10		ICP-MS
F196	173.0	17.3	WH			10		ICP-AES
F207	162.0	16.2				10		
F223	103.5	11.5				9		AAS absorption
F223b	188.5	18.8				10		ICP-AES
F273	172.5	17.2	WH			10		ICP-AES
F310	137.0	15.2				9		ICP-AES

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 12.9

PARAMETER: 07092 Nitrate + Nitrite mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	0.383	0.37	0.386	0.448	0.275	0.482	0.189	0.151	0.208	0.439
F004	0.394	0.375	0.398	0.458	0.280	0.500	0.189	0.162	0.226	0.470
F009	0.38	0.36	0.38	0.43	0.26	0.48	0.18	0.15	0.21	0.44
F010	0.37	0.36	0.31	0.42	0.27	0.45	0.17	0.09 AL	0.13 AL	0.23 AL
F011	0.34	0.30 WL	0.14 AL	0.35 WL	0.17 AL	0.35 AL	0.12 AL	0.24 AH	0.02 AL	0.10 AL
F014	0.36	0.40	0.38	0.45	0.29	0.51	0.17	0.16	0.23	0.45
F015	0.414	0.393	0.409	0.479	0.297	0.535 WH	0.202	0.165	0.235	0.431
F021	0.26 AL	0.36	0.27 WL	0.43	0.26	0.47	0.17	0.13	0.21	0.20 AL
F022	0.361	0.343	0.356	0.415	0.248	0.455	0.160	0.133	0.193	0.419
F026	0.379	0.359	0.349	0.437	0.263	0.481	0.177	0.147	0.211	0.426
F026b	0.379	0.359	0.372	0.435	0.262	0.479	0.174	0.145	0.208	0.441
F032	0.378	0.352	0.371	0.434	0.260	0.477	0.175	0.144	0.209	0.446
F036	0.420	0.374	0.336	0.448	0.274	0.480	0.184	0.100 WL	0.208	0.530
F042	0.406	0.385	0.387	0.451	0.288	0.515	0.193	0.164	0.224	0.464
F069	0.404	0.385	0.377	0.457	0.281	0.500	0.191	0.157	0.223	0.456
F073	0.32	0.31 WL	0.29	0.38	0.23 WL	0.41 WL	0.16	0.13	0.19	0.37
F092	0.374	0.356	0.364	0.429	0.26	0.471	0.18	0.148	0.209	0.429
F099	0.40	0.38	0.39	0.46	0.28	0.50	0.20	0.16	0.22	0.46
F113	0.353	0.330	0.338	0.403	0.233	0.442	0.150	0.121	0.180	0.398
F154	0.0630 AL	0.393	0.371	0.476	0.289	0.497	0.194	0.159	0.228	0.459
F158	0.37	0.35	0.34	0.41	0.26	0.46	0.18	0.14	0.21	0.34 WL
F158b	0.39	0.39	0.40	0.47	0.29	0.49	0.19	0.16	0.23	0.47
F183	0.347	0.388	0.399	0.449	0.283	0.477	0.218 WH	0.204 AH	0.260 WH	0.518
F193	0.33	0.38	0.30	0.39	0.28	0.49	0.23 WH	0.16	0.27 AH	0.38
F196	0.267 AL	0.287 AL	0.274 WL	0.381	0.184 AL	0.404 WL	0.141 WL	0.129	0.191	0.446
F207	0.399	0.378	0.377	0.458	0.281	0.498	0.190	0.157	0.228	0.448
F221	0.359	0.363	0.333	0.437	0.269	0.481	0.185	0.148	0.215	0.409
F310	0.38	0.36	0.37	0.44	0.26	0.47	0.18	0.15	0.21	0.44
ASSIGNED VALUE *	0.3790	0.363	0.371	0.437	0.272	0.480	0.180	0.150	0.210	0.441
R-STD DEV *	0.03402	0.0234	0.0420	0.0293	0.0193	0.0258	0.0172	0.0172	0.0190	0.0461
ACCEPTABLE LIMITS(+-) *	0.06804	0.0468	0.0840	0.0586	0.0386	0.0516	0.0344	0.0344	0.0380	0.0922
WARNING LIMITS(+-) *	.06804-	.102.0468-	.0702.0840-	.1260.0586-	.0879.0386-	.0579.0516-	.0774.0344-	.0516.0344-	.0516.0380-	.0570.0922- .1383
ACTION LIMITS(<>) *	0.10206	0.0702	0.1260	0.0879	0.0579	0.0774	0.0516	0.0516	0.0570	0.1383
N *	28	28	28	28	28	28	28	28	28	28

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	166.0	16.6			10			AA Cadmium redn
F004	220.5	22.0			10			AA Cadmium redn
F009	141.0	14.1			10			IC Dionex
F010	72.0	7.2	ALALAL		10			AA Hydrazine redn
F011	43.0	4.3	WLALWLALALALAHALAL	BIASED LOW	10	-48.9	0.0455	
F014	204.0	20.4			10			Flow injection Cd
F015	255.5	25.5	WH	BIASED HIGH	10	5.0	0.0122	Flow injection Cd
F021	72.0	7.2	AL WL AL		10			IC Dionex
F022	72.5	7.2			10			IC Dionex
F026	129.0	12.9			10			AA Cadmium redn
F026b	124.0	12.4			10			IC
F032	116.5	11.6			10			Colourimetry
F036	155.0	15.5	WL	BIASED HIGH*	10			Colorimetry
F042	235.5	23.5			10	4.4	0.0058	AA Cadmium redn
F069	213.0	21.3			10			
F073	38.0	3.8	WL WLWL	BIASED LOW	10	-17.5	0.0087	IC Dionex
F092	110.0	11.0			10			Flow injection Cd
F099	224.0	22.4		BIASED HIGH*	10	3.2	0.0070	Flow injection Cd
F113	50.0	5.0		BIASED LOW*	10	-2.1	-0.0258	IC Dionex
F154	203.5	20.3	AL		10			Flow injection Cd
F158	89.0	8.9			10			AA Hydrazine redn
F158b	237.0	23.7	WL	BIASED HIGH*	10	3.8	0.0081	AA Hydrazine redn
F183	218.5	21.8	WAHAWH		10			Colorimetry, Hydrazine
F193	156.5	15.6	WH AH		10			IC Dionex
F196	42.5	4.2	ALALWL ALWLWL	BIASED LOW	10	-10.0	-0.0243	EPA 352.1 EPA354.1
F207	207.0	20.7			10			Flow injection Cd
F221	130.5	13.0			10			Flow injection Cd
F310	134.0	13.4			10			Flow injection Cd

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 14.5

PARAMETER: 01092 pH

pH Units

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	7.23	7.68	8.35	7.96	7.94	8.	8.17	8.34	8.25	8.45
F009	7.32	7.80	8.36	8.01	8.04	8.10	8.19	8.28	8.23	8.46
F010	6.7 AL	7.1 AL	8.1 WL	7.7 AL	7.6 AL	7.8 AL	7.9 AL	8.1 WL	8.0 AL	8.3 WL
F011	7.46	7.85	8.36	8.06	8.07	8.10	8.19	8.28	8.24	8.42
F014	7.56	7.96	8.42	8.16	8.18	8.22	8.29	8.39	8.33	8.50
F015	7.49	7.90	8.42	8.14	8.17	8.20	8.26	8.37	8.32	8.48
F015b	7.51	7.89	8.38	8.13	8.15	8.17	8.23	8.35	8.26	8.45
F021	7.63	8.09	8.46	8.29	8.32	8.36 WH	8.42 WH	8.5	8.47 WH	8.48
F022	7.60	7.91	8.42	8.10	8.18	8.19	8.25	8.34	8.30	8.45
F026	7.30	7.68	8.40	8.14	8.13	8.18	8.27	8.47	8.37	8.56
F032	7.51	7.81	8.36	8.07	8.08	8.09	8.21	8.34	8.26	8.44
F036	7.24	7.75	8.34	8.00	8.00	8.09	8.17	8.29	8.24	8.44
F042	7.25	7.54 WL	8.17 WL	7.60 AL	7.81 WL	7.79 AL	8.01 WL	8.06 WL	8.08 WL	8.38
F069	6.3 AL	6.9 AL	8.0 AL	8.0	8.0	8.	8.1	8.2	7.5 AL	8.3 WL
F073	7.6	7.8	8.1 WL	8.0	8.0	8.1	8.1	8.1 WL	8.2	8.1 AL
F090	7.47	7.87	8.35	8.06	8.05	8.12	8.22	8.28	8.27	8.41
F092	7.43	7.79	8.31	8.01	8.04	8.07	8.17	8.26	8.22	8.4
F099	7.44	7.93	8.39	8.06	8.13	8.12	8.19	8.29	8.28	8.45
F113	7.51	7.87	8.37	8.11	8.27	8.15	8.23	8.34	8.27	8.45
F154	7.61	7.99	8.51	8.22	8.24	8.30	8.37	8.47	8.41	8.58 WH
F158	7.68	8.03	8.45	8.22	8.24	8.26	8.33	8.42	8.37	8.50
F158b	7.28	7.73	8.44	8.16	8.16	8.18	8.26	8.35	8.33	8.50
F183	7.30	7.71	8.45	8.13	8.17	8.21	8.14	8.30	8.26	8.47
F186	7.52	7.91	8.35	8.08	8.09	8.11	8.20	8.29	8.25	8.44
F193	7.47	7.69	8.36	8.01	8.04	8.07	8.19	8.28	8.26	8.45
F221	7.73	7.99	8.43	8.15	8.16	8.19	8.24	8.31	8.30	8.46
F248	7.60	7.92	8.53	8.22	8.22	8.30	8.34	8.46	8.40	8.58 WH
F273	6.72 AL	7.84	8.14 WL	8.22	8.24	8.25	8.35	8.18	8.54 AH	8.27 AL
F310	7.40	7.85	8.36	8.13	8.06	8.10	8.22	8.33	8.27	8.45
ASSIGNED VALUE *	7.48	7.85	8.36	8.11	8.13	8.15	8.22	8.31	8.27	8.45
R-STD DEV *	0.187	0.140	0.086	0.101	0.116	0.104	0.089	0.102	0.083	0.058
ACCEPTABLE LIMITS(+-) *	0.374	0.280	0.172	0.202	0.232	0.208	0.178	0.204	0.166	0.116
WARNING LIMITS(+-) *	.374- .561	.280- .420	.172- .258	.202- .303	.232- .348	.208- .312	.178- .267	.204- .306	.166- .249	.116- .174
ACTION LIMITS(<>) *	0.561	0.420	0.258	0.303	0.348	0.312	0.267	0.306	0.249	0.174
N *	29	29	29	29	29	29	29	29	29	29

* NOTE: SEE GLOSSARY FOR DEFINITIONS

PARAMETER: 01092 pH

pH Units

2009-09-02

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LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	77.0	7.7			10			pH Stirred
F009	105.5	10.5			10			pH Stirred
F010	20.5	2.0	ALALWLALALALALWLALWL	BIASED LOW	10	70.3	-6.1094	pH Stirred
F011	110.5	11.0			10			
F014	233.5	23.3		BIASED HIGH*	10	-4.5	0.4362	pH Stirred
F015	209.0	20.9			10			pH Stirred
F015b	173.5	17.3			10			pH Stirred
F021	278.5	27.8	WHWH WH	BIASED HIGH	10	-8.9	0.8931	pH Stirred
F022	197.5	19.7			10			pH Stirred
F026	188.5	18.8			10			pH Stirred
F032	133.5	13.3			10			Stirred
F036	75.0	7.5			10			pH meter
F042	29.0	2.9	WLWLALWLALWLWL	BIASED LOW	10	12.1	-1.2440	pH unstirred
F069	29.5	2.9	ALALAL ALWL	BIASED LOW	10	104.8	-8.9137	
F073	69.5	6.9	WL WL AL	BIASED LOW	10	-41.2	3.2334	pH Stirred
F090	124.5	12.4			10			pH unstirred
F092	73.5	7.3			10			pH Stirred
F099	151.5	15.1			10			pH Stirred
F113	179.5	17.9			10			pH Stirred
F154	271.5	27.1	WH	BIASED HIGH*	10	0.5	0.0993	pH Stirred
F158	259.5	25.9		BIASED HIGH	10	-15.2	1.3590	PC Titrate
F158b	190.0	19.0			10			pH Stirred
F183	155.0	15.5			10			pH Stirred
F186	137.0	13.7			10			Standard Methods for
F193	102.5	10.2			10			pH Stirred
F221	212.5	21.2			10			pH unstirred
F248	260.5	26.0	WH	BIASED HIGH*	10	3.9	-0.1879	pH Stirred
F273	160.5	16.0	AL WL	AHAL	10			pH unstirred
F310	141.5	14.1			10			pH unstirred

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 15.0

PARAMETER: 19091 Potassium mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	1.02	0.53	1.39	1.74	0.93	1.5	1.49	10.4	8.65	15.
F009	0.973	0.502	1.33	1.69	0.940	1.49	1.46	10.3	8.36	14.7
F010	1.02	0.54	1.43	1.72	0.94	1.52	1.53	10.6	8.60	14.9
F011	1.0	0.5	1.4	1.7	1.0	1.5	1.5	10.8	8.8	15.3
F014	1.0	0.54	1.4	1.8	0.98	1.6	1.5	11.	9.1	14.
F015	0.9 WL	0.6 AH	1.4	1.7	0.9	1.5	1.4	10.6	8.7	15.1
F021	1.04	0.53	1.38	1.74	0.97	1.56	1.57	10.5	8.75	15.0
F022	1.03	0.546	1.41	1.74	0.941	1.48	1.47	12.3 AH	10.3 AH	16.5 AH
F026	1.02	0.534	1.40	1.74	0.946	1.52	1.53	10.6	8.68	15.0
F032	1.03	0.53	1.38	1.75	0.93	1.53	1.53	10.7	8.77	14.9
F036	0.975	0.508	1.35	1.72	0.947	1.53	1.53	9.37 WL	8.66	14.9
F042	1.13 WH	0.50	1.50 WH	2.02 AH	0.97	1.70 AH	1.66 WH	8.50 AL	7.23 AL	12.9 AL
F069	0.964	0.504	1.35	1.74	0.907	1.45	1.46	10.3	8.53	14.5
F113	1.10	0.550	1.67 AH	2.04 AH	0.999	1.75 AH	1.69 AH	14.9 AH	11.5 AH	19.2 AH
F154	1.02	0.506	1.27 WL	1.60 WL	0.863	1.49	1.45	10.0	8.32	14.6
F158	1.0	0.5	1.4	1.8	1.0	1.6	1.5	10.6	8.7	14.5
F183	1.05	0.52	1.42	1.83	1.00	1.52	1.54	10.3	8.99	14.6
F186	1.21 AH	0.556	1.32	1.74	0.942	1.51	1.46	9.98	8.28	14.8
F193	0.98	0.52	1.41	1.74	0.95	1.52	1.52	11.1	8.42	16.5 AH
F196	1.03	0.51	1.44	1.83	0.92	1.62	1.58	10.8	8.98	15.3
F207	1.0	0.5	1.4	1.7	0.9	1.5	1.5	10.3	8.4	14.5
F223	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	10.8	8.99	15.5
F223b	0.99	0.55	1.40	1.75	0.96	1.53	1.49	10.2	8.26	14.4
F310	0.88 AL	<0.50	1.32	1.64	0.83 WL	1.38 WL	1.37 WL	10.1	8.32	15.2
ASSIGNED VALUE *	1.020	0.520	1.40	1.74	0.942	1.52	1.50	10.50	8.66	14.9
R-STD DEV *	0.0425	0.0232	0.047	0.062	0.0411	0.056	0.055	0.462	0.345	0.52
ACCEPTABLE LIMITS(+-) *	0.0850	0.0464	0.094	0.124	0.0822	0.112	0.110	0.924	0.690	1.04
WARNING LIMITS(+-) *	.0850-	.1275	.0464-	.0696	.094-	.141	.124-	.186	.0822-	.1233
ACTION LIMITS(<>) *	0.1275	0.0696	0.141	0.186	0.1233	0.168	0.165	1.386	.690-	1.035
N *	23	22	23	23	23	23	23	24	24	24

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	108.0	10.8			10			AAS absorption
F009	58.5	5.8		BIASED LOW*	10	-1.8	-0.0249	ICP-MS
F010	132.5	13.2			10			ICP-AES
F011	127.5	12.7			10			
F014	152.5	15.2			10			ICP-MS
F015	101.0	10.1	WLAH		10			ICP-AES
F021	150.0	15.0			10			ICP-AES
F022	154.0	15.4		AHAHAH	10			ICP-AES
F026	138.0	13.8			10			ICP-AES
F032	140.0	14.0			10			AAS absorption
F036	98.5	9.8		WL	10			AAS absorption
F042	133.0	13.3	WH WWAH	AHWHALALAL	10			ICP-AES
F069	61.0	6.1			10			ICP-AES
F113	224.5	22.4	AHAH	AHAHAHAHAAH	BIASED HIGH	10	34.6	-0.2173
F154	48.0	4.8	WLWL		BIASED LOW*	10	-2.9	-0.0406
F158	130.5	13.0				10		ICP-MS
F183	160.0	16.0				10		ICP-MS
F186	101.5	10.1	AH			10		ICP-MS
F193	140.0	14.0		AH		10		ICP-MS
F196	173.0	17.3				10		ICP-AES
F207	73.0	7.3				10		ICP-AES
F223	60.5	20.1			INSUFFICIENT DATA	3		AAS absorption
F223b	107.5	10.7				10		ICP-AES
F310	36.0	4.0	AL	WLWLWL	BIASED LOW*	9	0.6	-0.1629
								ICP-AES

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 12.1

PARAMETER: 14091 Silicates mg/L SiO₂WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	7.4	2.65	3.05	0.68	1.12	1.17	2.81	4.07	9.22	17.1
F011	6.88	2.46	2.96	0.672	1.11	1.15	2.72	3.94	8.65	16.4
F022	7.26	2.42	4.21 AH	0.615	1.01	1.13	2.75	4.4 WH	9.47	19. AH
F026	7.01	2.56	2.94	0.64	1.06	1.12	2.73	4.01	8.53	16.9
F026b	6.92	2.50	2.80	0.649	1.07	1.11	2.69	3.83	8.78	16.3
F032	7.36	2.59	3.04	0.60	1.05	1.09	2.80	4.13	9.20	17.1
F036	7.06	2.44	2.89	0.62	1.03	1.07	2.63	3.87	8.92	16.9
F042	7.70 WH	2.59	3.19	<1.07	1.09	1.13	3.14 AH	4.30	9.58	17.8
F069	7.02	2.86	2.98	0.662	1.11	1.14	2.84	4.19	9.11	16.9
F099	7.23	2.55	2.99	0.68	1.11	1.16	2.76	3.99	9.02	16.8
F113	7.15	2.61	3.09	0.666	1.10	1.15	2.78	4.10	9.00	17.0
F154	7.33	2.66	3.03	0.65	1.13		2.73	4.04	8.90	17.5
F158	7.0	2.3	2.8	<1.0	<1.0	<1.0 WL	2.6	4.0	9.0	17.0
F183	7.70 WH	2.73	3.07	0.64	1.15	1.12	2.81	4.08	9.46	17.4
F193	6.99	2.38	3.20	0.41 AL	0.80 AL	0.85 AL	2.45 WL	3.97	8.76	17.5
F221	6.76	2.35	2.80	0.576	0.982	1.04	2.59	3.85	8.43	16.4
F310	6.62	2.24	2.79	<0.50 AL	0.86 AL	0.92 AL	2.34 AL	3.74	8.02 WL	14.9 AL
ASSIGNED VALUE *	7.06	2.55	2.99	0.649	1.095	1.13	2.73	4.01	9.00	17.0
R-STD DEV *	0.297	0.166	0.163	0.0391	0.0685	0.054	0.122	0.164	0.405	0.57
ACCEPTABLE LIMITS(+-) *	0.594	0.332	0.326	0.0782	0.1370	0.108	0.244	0.328	0.810	1.14
WARNING LIMITS(+-) *	.594-.891	.332-.498	.326-.489	.0782-.1173	.1370-.2055	.108-.162	.244-.366	.328-.492	.810-.1.215	1.14-.1.71
ACTION LIMITS(<>) *	0.891	0.498	0.489	0.1173	0.2055	0.162	0.366	0.492	1.215	1.71
N *	17	17	17	14	16	15	17	17	17	17

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL RANK	AVERAGE RANK	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	134.5	13.4			10			Molybdsilicate
F011	73.0	7.3			10			Molybdsilicate
F022	111.5	11.1	AH	WH AH	10			Molybdsilicate
F026	71.5	7.1			10			Molybdsilicate
F026b	53.0	5.3			10			ICP-AES
F032	102.0	10.2			10			Colourimetry
F036	58.0	5.8			10			Colorimetry
F042	127.5	14.1	WH	AH	BIASED HIGH	9	5.0	0.0646
F069	116.0	11.6			10			Auto Molybdate
F099	102.5	10.2			10			ICP-AES
F113	114.5	11.4			10			Flow injection
F154	102.0	11.3			9			Flow injection
F158	42.0	6.0	WL		7			Flow injection
F183	130.0	13.0	WH	ALALALWL	10			Molybdsilicate
F193	55.5	5.5			10			ICP-MS
F221	27.5	2.7		BIASED LOW*	10	-3.6	-0.0687	Molybdsilicate
F310	11.0	1.2	ALALALAL WLAL	BIASED LOW	9	-11.7	0.0514	Molybdsilicate

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 8.7

PARAMETER: 11091 Sodium

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	13.2	1.44	9.49	19.	3.88	12.7	9.45	67.4	43.4	78.3
F009	13.2	1.43	9.21	18.9	3.98	12.6	9.50	66.8	42.3	79.4
F010	13.0	1.44	9.73	18.5	3.94	12.6	9.55	67.0	43.0	79.0
F011	13.4	1.5	9.6	19.1	3.9	12.9	8.4 WL	68.3	42.8	79.7
F014	14.0	1.53	10.1	19.8	4.17 WH	13.5	9.94	69.4	44.4	81.0
F015	13.2	1.4	9.5	18.5	3.8	12.6	9.4	63.6	42.0	75.2
F021	13.9	1.48	9.93	19.6	4.07	13.4	9.85	67.7	43.9	80.0
F022	13.2	1.45	9.56	18.6	3.93	12.7	9.39	64.9	41.9	74.8
F026	13.2	1.44	8.94	18.7	3.90	12.6	9.09	67.0	41.8	77.9
F032	13.4	1.43	9.60	19.0	3.90	12.8	9.62	67.7	43.5	77.2
F036	13.4	1.44	9.56	19.1	3.87	12.9	9.4	67.5	40.1 WL	75.9
F042	15.6 AH	1.67 AH	10.4 WH	21.7 AH	3.29 AL	14.5 AH	10.6 AH	79.5 AH	48.1 AH	79.8
F069	13.1	1.39	9.40	18.3	3.85	12.4	9.02	64.9	42.3	75.2
F113	12.7	1.50	9.68	18.3	3.87	12.5	9.33	69.0	43.1	77.5
F154	12.8	1.24 WL	8.96	17.6	3.27 AL	12.1	9.09	63.4 WL	39.8 WL	73.9 WL
F158	13.1	1.4	9.4	18.9	3.8	12.7	9.2	65.2	41.2	76.2
F183	14.5 WH	1.21 AL	9.89	19.9	2.80 AL	13.3	9.73	65.2	42.8	79.0
F186	13.6	1.40	9.14	21.6 AH	3.92	12.3	9.44	66.9	43.7	80.6
F193	12.5	1.34	9.26	18.0	3.74	12.4	9.45	67.0	43.5	79.2
F196	13.9	1.53	10.1	19.8	4.18 WH	13.5	10.2 WH	68.8	44.2	79.7
F207	13.2	1.4	9.6	19.1	3.9	12.8	9.5	66.7	42.8	78.6
F223	13.5	<5.0	9.7	19.3	<5.0	13.1	9.9	67.6	43.4	79.1
F223b	13.5	<10.0	<10.0	18.9	<10.0	12.8	<10.	68.5	43.5	81.5
F310	12.9	1.44	9.59	18.9	3.88	12.3	9.31	67.0	41.4	77.4
ASSIGNED VALUE *	13.2	1.44	9.59	18.9	3.90	12.7	9.44	67.0	42.8	78.8
R-STD DEV *	0.47	0.068	0.358	0.69	0.128	0.45	0.352	1.74	1.21	2.27
ACCEPTABLE LIMITS(+-) *	0.94	0.136	0.716	1.38	0.256	0.90	0.704	3.48	2.42	4.54
WARNING LIMITS(+-) *	.94- 1.41	.136- .204	.716- 1.074	1.38- 2.07	.256- .384	.90- 1.35	.704- 1.056	3.48- 5.22	2.42- 3.63	4.54- 6.81
ACTION LIMITS(<>) *	1.41	0.204	1.074	2.07	0.384	1.35	1.056	5.22	3.63	6.81
N *	24	22	23	24	22	24	23	24	24	24

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING		BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	120.5	12.0				10			AAS absorption
F009	110.0	11.0				10			ICP-MS
F010	122.0	12.2				10			ICP-AES
F011	144.0	14.4				10			
F014	218.0	21.8	WL WH		BIASED HIGH*	10	2.8	0.2619	ICP-AES
F015	67.5	6.7			BIASED HIGH*	10			ICP-AES
F021	196.0	19.6				10	1.0	0.3176	ICP-AES
F022	92.5	9.2				10			ICP-AES
F026	84.5	8.4				10			ICP-AES
F032	140.0	14.0				10			AAS absorption
F036	112.0	11.2	WL AHAHWAHALAHALAHAHAH		BIASED HIGH	10			AAS absorption
F042	211.0	21.1			BIASED LOW*	10	8.3	0.5863	ICP-AES
F069	49.5	4.9				10	-3.9	0.1991	ICP-AES
F113	106.5	10.6				10			ICP-AES
F154	17.5	1.7	WL	AL	WLWLWL	BIASED LOW	10	-6.0	-0.0432
F158	67.0	6.7				10			ICP-MS
F183	134.0	13.4	WHAH	AL					ICP-MS
F186	132.0	13.2	AH			10			ICP-MS
F193	77.5	7.7				10			ICP-MS
F196	211.0	21.1	WH	WH	BIASED HIGH*	10	1.3	0.4504	ICP-AES
F207	120.0	12.0				10			ICP-AES
F223	138.0	17.2				8			AAS absorption
F223b	105.0	17.5				6			ICP-AES
F310	82.0	8.2				10			ICP-AES

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 12.2

PARAMETER: 16092 Sulfate mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	13.1	3.5	19.8	42.8	16.	26.7	35.6	229.	168.	198.
F009	13.3	3.52	20.1	42.7	16.3	26.9	35.6	232.	164.	199.
F010	13.	3.5	19.5	41.7	16.	26.5	34.5	225.	163.	193.
F011	13.	3. AL	19.	43.	16.	27.	36.	233.	170.	200.
F014	11.8 AL	3.59	18.2	42.2	14.9	25.2	34.7	224.	159.	190.
F015	13.4	3.4	20.5	42.	16.9	25.	34.	214. WL	163.	195.
F021	13.3	3.51	19.8	43.4	16.2	27.1	35.3	237.	167.	230. AH
F022	13.0	3.33	18.9	41.5	15.6	25.8	34.4	223.	163.	192.
F026	13.5	3.61	19.9	42.8	16.3	27.0	36.0	232.	170.	201.
F032	13.2	3.45	19.3	42.2	15.9	26.4	35.1	230.	166.	197.
F036	13.1	3.54	19.5	42.7	15.9	26.4	35.5	233.	167.	192.
F042	13.	3.6	20.	43.	16.	28.	36.	229.	169.	196.
F069	13.2	3.5	20.5	41.0	17.5 WH	26.6	34.6	232.	168.	199.
F073	13.3	3.5	19.8	43.	16.4	26.	35.	243.	174.	206.
F113	13.3	3.45	19.5	42.5	16.1	26.6	35.4	225.	165.	191.
F154	10.7 AL	3.7	34.7 AH	39.5 WL	14.9	25.2	34.1	220.	161.	204.
F158	13.0	<5.0	14.0 AL	44.0	16.0	25.0	36.0	219.	154. WL	203.
F158b	13.3	3.48	19.2	40.0 WL	15.5	25.0	31.8 AL	216.	156. WL	181. WL
F183	13.3	3.52	19.7	42.5	16.0	26.5	35.4	231.	168.	198.
F193	13.4	3.44	19.9	42.3	16.4	26.7	35.8	230.	168.	203.
F196	10.6 AL	2.1 AL	27.4 AH	41.	15.1	26.6	30.6 AL	222.	170.	199.
F207	12.6	3.2 WL	17.8 WL	40.2	15.1	25.0	33.3	218.	159.	186.
F223								230.	166.	197.
F223b								219.	160.	195.
F310	13.0	3.32	18.7	41.6	15.6	25.9	34.5	226.	164.	194.
ASSIGNED VALUE *	13.2	3.50	19.6	42.3	16.0	26.5	35.3	229	166	197
R-STD DEV *	0.28	0.126	0.86	1.06	0.57	0.89	0.94	7.2	4.7	5.8
ACCEPTABLE LIMITS(+-) *	0.56	0.252	1.72	2.12	1.14	1.78	1.88	14.4	9.4	11.6
WARNING LIMITS(+-) *	.56- .84	.252- .378	1.72- 2.58	2.12- 3.18	1.14- 1.71	1.78- 2.67	1.88- 2.82	14.4- 21.6	9.4- 14.1	11.6- 17.4
ACTION LIMITS(<>) *	0.84	0.378	2.58	3.18	1.71	2.67	2.82	21.6	14.1	17.4
N *	23	22	23	23	23	23	23	25	25	25

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	149.5	14.9			10			IC Dionex
F009	171.0	17.1			10			IC Dionex
F010	96.0	9.6			10			IC Dionex
F011	154.5	15.4	AL		10			
F014	68.0	6.8	AL		10			IC Dionex
F015	104.0	10.4		WL	10			IC
F021	185.0	18.5		AH	10			IC Dionex
F022	64.5	6.4			10			IC Dionex
F026	201.5	20.1		BIASED HIGH*	10	1.7	0.0822	IC
F032	113.5	11.3			10			IC
F036	133.5	13.3			10			IC
F042	168.0	16.8			10			IC Dionex
F069	153.5	15.3	WH		10			IC
F073	178.5	17.8			10			IC Dionex
F113	121.5	12.1			10			IC Dionex
F154	95.0	9.5	AL AHWL		10			Flow injection
F158	95.0	10.5	AL	WL	9			Turbidimetry
F158b	51.0	5.1	WL	AL WLWL	BIASED LOW	10	-6.7	0.3569
F183	150.0	15.0			10			IC
F193	170.0	17.0			10			IC
F196	95.0	9.5	ALALAH	AL	BIASED LOW*	10	-4.8	-0.1843
F207	29.5	2.9	WLWL		INSUFFICIENT DATA	3		IC Dionex
F223	42.0	14.0			INSUFFICIENT DATA	3		Gravimetry
F223b	19.0	6.3						Turbidimetry
F310	75.0	7.5						IC

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 12.2

PARAMETER: 06192 Total Alkalinity mg/L CaCO₃WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	18.3	44.1	205.	83.1	82.2	93.5	118.	233.	145.	263.
F009	19.	44.	207.	82.	81.	94.	119.	235.	146.	265.
F010	17.5	42. WL	201.	79.5	78.7	91.	117.	231.	144.	260.
F011	20.1	44.0	201.	80.8	80.6	93.3	117.	229.	145.	260.
F014	21.5	46.0 WH	206.	83.8	83.6	95.6	121.	235.	149.	267.
F015	21.7	44.8	204.	81.6	81.5	93.6	119.	238.	147.	262.
F021	<20.	43.2	200.	80.1	79.3	91.5	117.	227.	142.	257.
F022	19.9	44.3	199.	80.7	80.6	92.8	118.	229.	144.	260.
F026	18.1	43.1	202.	81.8	81.7	94.3	119.	233.	146.	264.
F032	20.0	44.7	214. WH	83.1	83.0	95.1	120.	234.	149.	263.
F036	19.4	43.9	202.	81.2	81.0	93.1	117.	231.	144.	258.
F042	19.0	43.9	211. WH	82.6	82.3	95.0	121.	239.	149.	271.
F069	21.	45.	205.	83.	82.	95.	120.	234.	147.	265.
F092	17.6	43.5	213. WH	79.8	79.7	91.5	116.	228.	143.	258.
F099	19.5	44.5	201.	80.5	81.	92.5	118.	229.	146.	261.
F113	17.2	41.0 AL	195. WL	77.8 WL	77.9	89.2 WL	114.	224. WL	140.	254. WL
F154	20.2	44.9	204.	82.6	82.5	94.5	120.	233.	147.	264.
F158	20.1	43.6	199.	80.0	79.8	91.5	116.	226.	142.	256.
F158b	19.0	43.0	198.	79.0	83.0	94.0	116.	228.	145.	258.
F183	18.7	41.0 AL	206.	77.5 WL	78.3	89.8	114.	236.	146.	271.
F193	18.0	44.4	203.	80.4	80.8	93.2	119.	233.	145.	263.
F196	17.5	44.7	205.	82.8	82.2	95.5	118.	236.	147.	266.
F207	16.	44.	204.	82.	82.	94.	119.	233.	145.	261.
F248	21.	44.	200.	82.	82.	96.	123. WH	232.	150.	268.
F310	20.8	43.8	200.	81.0	80.7	92.0	117.	230.	142.	264.
ASSIGNED VALUE *	19.2	44.0	203	81.2	81.0	93.5	118	233	145	263
R-STD DEV *	1.60	0.86	3.9	1.67	1.55	1.83	2.1	4.0	2.6	4.4
ACCEPTABLE LIMITS(+-) *	3.20	1.72	7.8	3.34	3.10	3.66	4.2	8.0	5.2	8.8
WARNING LIMITS(+-) *	3.20- 4.80	1.72- 2.58	7.8- 11.7	3.34- 5.01	3.10- 4.65	3.66- 5.49	4.2- 6.3	8.0- 12.0	5.2- 7.8	8.8- 13.2
ACTION LIMITS(<>) *	4.80	2.58	11.7	5.01	4.65	5.49	6.3	12.0	7.8	13.2
N *	24	25	25	25	25	25	25	25	25	25

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	150.5	15.0			10			PC Titrate
F009	164.0	16.4			10			Radiometer
F010	59.0	5.9	WL	BIASED LOW*	10	-0.2	-1.6126	Mettler
F011	104.5	10.4			10			
F014	231.5	23.1	WH	BIASED HIGH*	10	0.5	2.1684	PC Titrate
F015	175.5	17.5			10			Titration
F021	45.0	5.0		BIASED LOW*	9	-2.4	0.6939	PC Titrate
F022	96.5	9.6			10			PC Titrate
F026	136.0	13.6			10			PC Titrate
F032	207.0	20.7	WH	BIASED HIGH*	10	1.0	1.2313	Titration
F036	100.5	10.0			10			Titration
F042	201.5	20.1	WH	BIASED HIGH	10	3.7	-1.4197	Gran Titration
F069	201.5	20.1		BIASED HIGH*	10	0.1	1.4498	
F092	69.5	6.9	WH		10			PC Titrate
F099	116.5	11.6			10			Titration
F113	13.0	1.3	ALWLWL WL WL WL	BIASED LOW	10	-3.1	-1.0545	PC Titrate
F154	190.0	19.0			10			Radiometer
F158	57.0	5.7		BIASED LOW	10	-3.2	1.3648	PC Titrate
F158b	84.0	8.4			10			Colorimetry
F183	100.0	10.0	AL WL		10			Colorimetry
F193	123.0	12.3			10			Titration
F196	181.0	18.1			10			Titration
F207	133.0	13.3			10			Titration
F248	185.0	18.5	WH		10			Titration
F310	100.0	10.0			10			PC Titrate

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 3

OVERALL AVERAGE RANK IS 12.9

PARAMETER: 10692 Total Hardness mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	41.8	47.	235.	127.	98.5	125.	153.	330.	235.	326.
F011	38.2 AL	45.1 WL	214. AL	120. WL	94.3	117. WL	147.	334.	232.	337.
F014	42.4	47.6	234.	128.	101.	126.	153.	330.	232.	324.
F015	43.3	48.5	234.	123.	93.9 WL	120.	147.	326.	232.	325.
F022	41.8	47.4	234.	126.	99.4	124.	151.	315.	225.	308.
F026b	42.6	47.8	234.	126.	98.0	123.	152.	322.	230.	320.
F032	41.5	46.2	221. WL	128.	97.5	125.	154.	324.	217. AL	318.
F099	42.	48.5	232.	126.	97.4	123.	150.	325.	230.	319.
F154	40.5	44.4 WL	222. WL	123.	92.4 WL	117. WL	147.	313. WL	212. AL	308.
F158	40.5	46.7	236.	128.	99.2	125.	150.	331.	230.	317.
F207	41.7	48.1	237.	129.	99.6	125.	152.	329.	232.	326.
F223		48.0	239.	128.	99.2	126.	152.	337.	236.	331.
F223b	41.9	47.5	239.	128.	99.3	127.	154.	337.	237.	337.
F310	43.2	47.3	233.	127.	98.7	120.	148.	329.	231.	324.
ASSIGNED VALUE *	41.8	47.4	234	127	98.6	124	152	329	232	324
R-STD DEV *	1.11	1.04	5.3	2.3	2.31	3.4	2.9	7.2	4.8	10.0
ACCEPTABLE LIMITS(+-) *	2.22	2.08	10.6	4.6	4.62	6.8	5.8	14.4	9.6	20.0
WARNING LIMITS(+-) *	2.22- 3.33	2.08- 3.12	10.6- 15.9	4.6- 6.9	4.62- 6.93	6.8- 10.2	5.8- 8.7	14.4- 21.6	9.6- 14.4	20.0- 30.0
ACTION LIMITS(<>) *	3.33	3.12	15.9	6.9	6.93	10.2	8.7	21.6	14.4	30.0
N *	13	14	14	14	14	14	14	14	14	14

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL RANK	AVERAGE RANK	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	89.0	8.9			10			calculated AAS
F011	46.5	4.6	ALWLALWL WL		10			
F014	102.0	10.2			10			calculated ICP
F015	68.5	6.8	WL		10			calculated ICP
F022	58.5	5.8			10			calculated ICP
F026b	68.0	6.8			10			calculated ICP
F032	58.0	5.8	WL AL		10			
F099	61.5	6.1			10			Titration (EDTA)
F154	17.0	1.7	WLWL WLWL WLAL	BIASED LOW	10	-5.4	0.1337	APHA calculation
F158	72.0	7.2			10			calculated ICP
F207	102.0	10.2			10			calculated ICP
F223	105.0	11.6		BIASED HIGH*	9	2.9	-2.3987	calculated AAS
F223b	120.0	12.0		BIASED HIGH*	10	3.7	-2.6829	calculated ICP
F310	68.0	6.8			10			calculated ICP

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 7.4

PARAMETER: 07392 Total Kjeldahl N mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	0.053	0.098	0.73	0.121	0.112	0.128	0.49	0.552	0.352	1.21
F026b	0.012	0.088	0.648	0.099	0.098	0.088	0.481	0.510	0.318	0.983
F032	<0.06	0.15	0.75	0.13	0.14	0.14	0.51	0.54	0.37	1.19
F036	0.056	0.105	0.682	0.118	0.120	0.127	0.510	0.548	0.333	1.09
F069	<0.1	0.1	0.7	0.1	0.1	0.1	0.5	0.5	0.3	1.0
F092	0.083	0.12	0.686	0.157	0.174	0.156	0.532	0.558	0.375	1.10
F154	<0.20	<0.20	0.59	<0.20	<0.20	<0.20	0.30 AL	0.38 AL	<0.20 WL	0.98
F207	<0.05	0.06	0.67	0.08	0.21	0.08	0.46	0.51	0.28	1.02
F248	<0.4	<0.4	1.5 AH	<0.4	<0.4	<0.4	0.4	0.5	<0.4	1.0
F310	<0.20	<0.20	0.78	<0.20	<0.20	<0.20	0.56	0.71 AH	0.77 AH	1.65 AH
ASSIGNED VALUE *	0.054	0.100	0.686	0.118	0.120	0.127	0.500	0.525	0.333	1.020
R-STD DEV *	0.0332	0.0313	0.0738	0.0283	0.0450	0.0320	0.0606	0.0411	0.0515	0.1182
ACCEPTABLE LIMITS(+-) *	-	0.0626	0.1476	0.0566	0.0900	0.0640	0.1212	0.0822	0.1030	0.2364
WARNING LIMITS(+-) *	-	.0626- .0939	.1476- .2214	.0566- .0849	.0900- .1350	.0640- .0960	.1212- .1818	.0822- .1233	.1030- .1545	.2364- .3546
ACTION LIMITS(<>) *	-	0.0939	0.2214	0.0849	0.1350	0.0960	0.1818	0.1233	0.1545	0.3546
N *	4	7	10	7	7	7	10	10	8	10

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL RANK	AVERAGE RANK	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	52.0	5.2			10			digested Phenate
F026b	23.5	2.3			10			calculated
F032	59.5	6.6			9			Colourimetry
F036	48.5	4.8			10			Colorimetry
F069	32.0	3.5			9			Kjeldahl digestion
F092	67.0	6.7			10			calculated
F154	4.0	1.0	ALALWL		4			block digestion
F207	26.5	2.9			9			block digestion
F248	18.0	4.5	AH		4			Kjeldahl digestion
F310	47.0	9.4	AHAHAAH		5			block digestion

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS

FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE RANK IS 4.7

FPMI STUDY 0094

DATA SUMMARY

2009-09-02

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PARAMETER: 07293 Total N

mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT		
F003	0.44	0.471	1.04	0.569	0.389	0.615	0.689	0.673	0.563	1.65		
F004	0.463	0.476	1.03	0.581	0.389	0.606	0.693	0.670	0.557	1.44		
F006	0.4	0.4 WL	1.0	0.5 WL	0.3 WL	0.6	0.6	0.6	0.5	1.5		
F010	0.47	0.45	0.95	0.58	0.38	0.59	0.76	0.84 WH	0.65 WH	1.59		
F014	0.3 WL	0.4 WL	0.8 AL	0.5 WL	0.3 WL	0.5 WL	0.6	0.5 WL	0.5	1.1 AL		
F015	0.39	0.46	1.14	0.59	0.37	0.61	0.70	0.72	0.56	1.59		
F021	0.40	0.51	1.08	0.59	0.42	0.66	0.75	0.70	0.59	1.44		
F026	0.391	0.447	0.997	0.535	0.361	0.569	0.658	0.656	0.528	1.41		
F042	0.413	0.434	1.08	0.559	0.376	0.596	0.669	0.706	0.543	1.51		
F069	0.43	0.46	1.06	0.57	0.38	0.60	0.73	0.71	0.55	1.57		
F092	0.457	0.476	1.05	0.586	0.434	0.627	0.712	0.706	0.584	1.53		
F113	0.459	0.484	1.02	0.602	0.407	0.649	0.653	0.744	0.568	1.59		
F158	0.49	0.48	1.08	0.56	0.37	0.66	0.68	0.48 WL	0.49	1.38		
F221	0.410	0.448	1.03	0.545	0.374	0.583	0.671	0.665	0.540	1.43		
ASSIGNED VALUE *	0.422	0.460	1.040	0.569	0.378	0.603	0.684	0.686	0.554	1.51		
R-STD DEV *	0.0419	0.0288	0.0542	0.0298	0.0302	0.0360	0.0524	0.0686	0.0398	0.106		
ACCEPTABLE LIMITS(+-) *	0.0838	0.0576	0.1084	0.0596	0.0604	0.0720	0.1048	0.1372	0.0796	0.212		
WARNING LIMITS(+-) *	.0838-	.1257.	.0576-	.0864.1084-	.1626.0596-	.0894.0604-	.0906.0720-	.1080.1048-	.1572.1372-	.2058.0796-	.1194.212-	.318
ACTION LIMITS(<>) *	0.1257	0.0864	0.1626	0.0894	0.0906	0.1080	0.1572	0.2058	0.1194	0.318		
N *	14	14	14	14	14	14	14	14	14	14		

* NOTE: SEE GLOSSARY FOR DEFINITIONS

PARAMETER: 07293 Total N

mg/L N

2009-09-02

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LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	92.5	9.2			10			autoclaved
F004	86.0	8.6			10			Persulfate dig.
F006	33.5	3.3	WL WLWL	BIASED LOW*	10	3.8	-0.0769	Combustion Chemilum.
F010	96.5	9.6		WHHH	10			Flow injection
F014	14.5	1.4	WLWLALWLWLWL	WL AL	BIASED LOW	10	-30.4	UV digestion
F015	92.5	9.2			10			autoclaved
F021	109.0	10.9			10			Flow injection
F026	33.0	3.3		BIASED LOW*	10	-6.4	0.0091	autoclaved
F042	67.5	6.7			10			Persulfate dig.
F069	88.5	8.8			10			Persulfate dig.
F092	107.0	10.7			10			autoclaved
F113	106.0	10.6			10			Persulfate dig.
F158	73.0	7.3	WL		10			UV digestion
F221	50.5	5.0			10			Flow injection

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 10

OVERALL AVERAGE RANK IS 7.5

PARAMETER: 00192 Turbidity

JTU/NTU

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= QUETAP-MX LAB RESULT	2= ION-915 LAB RESULT	3= RAISIN-99 LAB RESULT	4= BURTAP-05 LAB RESULT	5= HURON-98 LAB RESULT	6= ONTARIO-99 LAB RESULT	7= LETHBRIDG-03 LAB RESULT	8= SWIFT-05 LAB RESULT	9= SWIFT-01D LAB RESULT	10= SOURIS-05 LAB RESULT
F003	0.06	0.06	0.18	0.06	0.05	0.06	0.06	0.12	0.06	0.19
F011	0.44 AH	0.14	0.13	0.10	0.11	0.07	0.08	0.15	0.10	0.14
F015	0.08	0.05	0.14	0.06	0.07	0.06	0.07	0.14	0.06	0.16
F021	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2
F022	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F090	0.207	0.141	0.540 AH	0.173	0.152	0.195	0.158	0.383 AH	0.189 WH	0.555 AH
F099	0.146	0.09	0.169	0.095	0.068	0.093	0.051	0.121	0.073	0.189
F113	0.020	0.01	0.080	0.010	0.030	0.020	0.010	0.040	0.010	0.120
F154	<0.050	<0.050	0.050	0.050	<0.050	<0.050	<0.050	0.050	<0.050	0.10
F158	0.09	0.05	0.12	0.25	0.19	0.06	0.18	0.10	0.10	0.23
F193	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	0.14
F248	<0.09	<0.09	0.14	<0.09	<0.09	<0.09	<0.09	0.10	<0.09	0.16
F310	<0.20	<0.20	0.30 WH	0.31 WH	0.35 AH	0.46 AH	0.23	0.40 AH	<0.20	0.38 AH
ASSIGNED VALUE *	0.085	0.060	0.135	0.095	0.070	0.060	0.075	0.100	0.073	0.160
R-STD DEV *	0.1037	0.0557	0.0765	0.1062	0.0836	0.0762	0.0856	0.0671	0.0521	0.0666
ACCEPTABLE LIMITS(+-) *	0.2074	0.1114	0.1530	0.2124	0.1672	0.1524	0.1712	0.1342	0.1042	0.1332
WARNING LIMITS(+-) *	.2074- .3111.1114- .1671.1530- .2295.2124- .3186.1672- .2508.1524- .2286.1712- .2568.1342- .2013.1042- .1563.1332- .1998									
ACTION LIMITS(<>) *	0.3111	0.1671	0.2295	0.3186	0.2508	0.2286	0.2568	0.2013	0.1563	0.1998
N *	7	7	11	9	8	8	8	11	7	12

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL RANK	AVERAGE RANK	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	43.0	4.3			10			Hach
F011	57.0	5.7	AH		10			Nephelometry
F015	42.5	4.2			10			Nephelometry
F021	16.0	5.3			3			Nephelometry
F022	0.0	0.0			0			Nephelometry
F090	79.0	7.9	AH	AHWAH	10			Hach
F099	52.0	5.2			10			Hach
F113	12.0	1.2			10			PC Titrate
F154	6.0	1.5			4			Turbidimeter
F158	55.0	5.5			10			Turbidimeter
F193	3.5	3.5			1			Turbidimeter
F248	16.0	5.3			3			Turbidimeter
F310	65.0	9.2	WHWHAH	AH AH	7			Nephelometry

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS

FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE RANK IS 5.0

Appendix B

Data Summary

b) Total Phosphorus in Water

PARAMETER: 15092 Total Phosphorus mg/L P

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Total Phosphorus in Water

SAMPLE LAB NO	1= TP94-1 LAB RESULT	2= TP94-2 LAB RESULT	3= TP94-3 LAB RESULT	4= TP94-4 LAB RESULT	5= TP94-5 LAB RESULT	6= TP94-6 LAB RESULT	7= TP94-7 LAB RESULT	8= TP94-8 LAB RESULT	9= TP94-9 LAB RESULT	10= TP94-10 LAB RESULT
F003	0.093	0.008	0.35	0.055	0.226	0.004	0.001	0.704	0.02	0.159
F004	0.088	0.009	0.363	0.063	0.238	0.006	<0.002	0.726	0.022	0.169
F007	0.091	0.008	0.351	0.055	0.226	0.004	<0.002	0.702	0.019	0.157
F010	0.082	0.0089	0.328	0.050	0.211	0.0045	0.0021	0.680	0.0202	0.148
F011	0.11 AH	0.02 AH	0.36	0.06	0.24	0.01 AH	0.03 AH	0.70	0.03 AH	0.19 AH
F014	0.095	0.008	0.36	0.058	0.24	<0.005	<0.005	0.72	0.022	0.17
F015	0.090	0.006	0.36	0.055	0.220	0.004	<0.002	0.73	0.020	0.158
F019	0.09	<0.01	0.34	0.05	0.22	<0.01	<0.01	0.68	0.01 AL	0.15
F021	0.095	0.008	0.355	0.057	0.229	0.003	<0.002	0.699	0.021	0.163
F022	0.088	<0.02	0.339	0.05	0.225	<0.02	<0.02	0.681	0.021	0.151
F026	0.089	0.008	0.343	0.054	0.222	0.004	<0.001	0.664	0.020	0.153
F026b	0.099	<0.02	0.345	0.062	0.239	<0.02	<0.02	0.657	0.022	0.165
F032	0.096	0.012	0.345	0.058	0.220	<0.003	<0.002	0.69	0.020	0.158
F036	0.096	0.007	0.351	0.054	0.230	0.004	0.001	0.696	0.02	0.171
F042	0.086	0.008	0.329	0.053	0.216	0.004	0.001	0.668	0.019	0.151
F074	0.089	0.008	0.344	0.07 AH	0.199 WL	0.005	0.002	0.237 AL	0.02	0.046 AL
F074b	0.095	0.008	0.353	0.055	0.244	0.004	<0.001	0.705	0.019	0.165
F092	0.091	0.007	0.336	0.055	0.216	0.003	<0.001	0.5 AL	0.019	0.15
F099	0.0984	0.0081	0.385 AH	0.0584	0.234	0.0034	0.0017	0.703	0.0202	0.161
F112	0.091	0.008	0.344	0.055	0.219	0.003	0.001	0.695	0.020	0.140 WL
F113	0.0914	0.0053	0.354	0.0542	0.228	0.0023	0.0013	0.709	0.019	0.159
F154	0.0898	0.0118	0.316 WL	0.0518	0.225	0.0062	0.0821 AH	0.662	0.0181	0.156
F170	0.086	0.007	0.333	0.051	0.214	0.003	0.001	0.669	0.019	0.152
F196	0.10	0.02 AH	0.35	0.05	0.21	0.01 AH	0.01 WH	0.66	0.03 AH	0.16
F202	0.094	0.014 WH	0.366	0.060	0.233	0.006	0.005	0.696	0.024 WH	0.162
F207	0.091	0.007	0.339	0.054	0.227	0.003	<0.002	0.706	0.019	0.154
F221	0.087	0.006	0.341	0.052	0.218	0.002	<0.001	0.681	0.018	0.154
F248	0.090	0.009	0.35	0.058	0.222	0.005	<0.003	0.70	0.021	0.154
F271	0.096	0.012	0.338	0.061	0.225	0.006	0.004	0.691	0.024 WH	0.161
F310	0.090	0.008	0.311 WL	0.054	0.205	0.006	<0.003	0.653	0.020	0.158
ASSIGNED VALUE *	0.0910	0.0080	0.345	0.0550	0.225	0.0040	0.0015	0.696	0.0200	0.158
R-STD DEV *	0.00464	0.00224	0.0130	0.00424	0.0110	0.00159	0.00295	0.0251	0.00168	0.0079
ACCEPTABLE LIMITS(+-) *	0.00928	0.00448	0.0260	0.00848	0.0220	0.00318	0.00590	0.0502	0.00336	0.0158
WARNING LIMITS(+-) *	.00928-	.013.00448-	.006.0260-	.0390.00848-	.012.0220-	.0330.00318-	.004.00590-	.008.0502-	.0753.00336-	.005.0158- .0237
ACTION LIMITS(<>) *	0.01392	0.00672	0.0390	0.01272	0.0330	0.00477	0.00885	0.0753	0.00504	0.0237
N *	30	27	30	30	30	25	14	30	30	30

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	156.5	15.6			10			Autoclaved SnCl2
F004	210.5	23.3		BIASED HIGH*	9	4.7	0.0011	Autoclaved SnCl2
F007	138.5	15.3			9			Autoclaved ascorbic
F010	87.5	8.7			10			Autoclaved SnCl2
F011	254.0	25.4	AHAH	AHAH AHAH	BIASED HIGH*	10	-0.7	0.0160
F014	192.0	24.0			BIASED HIGH*	8	3.8	0.0021
F015	140.0	15.5				9		UV irradiation Ascor
F019	51.0	7.2		AL		7		Autoclaved ascorbic
F021	170.5	18.9				9		Autoclaved SnCl2
F022	73.5	10.5				7		Block dig. ICP-AES
F026	98.5	10.9				9		Autoclaved SnCl2
F026b	153.0	21.8				7		ICP-AES
F032	141.5	17.6				8		
F036	160.5	16.0			10			Colourimetry
F042	70.0	7.0			BIASED LOW*	10	-3.7	Autoclaved ascorbic
F074	106.5	10.6	AHWL	AL AL		10		UV Oxd'n,Molyb blue,
F074b	172.5	19.1				9		UV/H+/H2O2 digest, M
F092	68.5	7.6		AL		9		Flow inj. ascorbic
F099	203.0	20.3	AH			10		Flow inj. ascorbic
F112	107.5	10.7		WL		10		Block dig. ascorbic
F113	136.5	13.6				10		Flow inj. ascorbic
F154	114.0	11.4	WL	AH		10		Flow inj. ascorbic
F170	55.0	5.5			BIASED LOW*	10	-3.3	Flow inj. ascorbic
F196	170.0	17.0	AH	AHWH AH		10		EPA365.3
F202	223.0	22.3	WH	WH		10		manual ascorbic
F207	109.0	12.1				9		Flow inj. ascorbic
F221	59.0	6.5			BIASED LOW*	9		Flow inj. ascorbic
F248	156.5	17.3				9	-1.3	Autoclaved ascorbic
F271	193.0	19.3		WH		10		Microwave ascorbic
F310	91.5	10.1	WL			9		Autoclaved ascorbic

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 5

OVERALL AVERAGE RANK IS 14.7

Appendix B

Data Summary

c) Turbidity in Water

PARAMETER: 00192 Turbidity

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WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Turbidity in Water

SAMPLE LAB NO	1= TU94 -1 LAB RESULT	2= TU94 -2 LAB RESULT	3= TU94 -3 LAB RESULT	4= TU94 -4 LAB RESULT	5= TU94 -5 LAB RESULT	6= TU94 -6 LAB RESULT	7= TU94 -7 LAB RESULT	8= TU94 -8 LAB RESULT	9= TU94 -9 LAB RESULT	10= TU94 -10 LAB RESULT
F003	112.	7.3	0.96	0.46	2.63	649.	165.	3.42	19.6	17.
F004	114.	7.78	1.16	0.46	2.98	619.	163.	3.92	20.5	17.0
F007	120.	7.8	1.1	0.7	2.9	647.	170.	3.8	21.9	18.1
F010	120.	8.6	1.8 WH	1.1	3.1	610.	160.	4.8	21.	17.
F011	90.0	6.42	0.87	0.73	2.00	518.	135.	3.59	16.3	13.8
F014	101.	6.6	0.9	0.5	2.3	606.	146.	3.6	18.	15.
F015	109.	7.23	1.99 AH	0.88	3.7	678.	165.	4.10	21.7	18.
F022	103.	5.78	0.76	0.20	1.86	537.	143.	2.58	16.3	13.4
F032	114.	7.49	1.18	0.58	2.89	615.	163.	4.00	20.4	17.6
F090	150. AH	15.4 AH	2.5 AH	0.725	6.2 AH	635.	202. AH	8.01 AH	41. AH	37. AH
F099	104.	6.	0.903	0.321	2.17	713.	150.	3.08	18.2	15.5
F113	97.9	5.65	0.79	0.08	2.15	558.	147.	3.24	18.0	14.7
F158	105.	7.04	0.85	0.23	2.38	594.	151.	3.16	19.0	16.7
F202	103.	6.58	0.99	0.63	2.50	565.	151.	3.11	18.2	15.3
ASSIGNED VALUE *	105	7.04	0.932	0.540	2.50	612	151	3.59	19.0	16.7
R-STD DEV *	10.33	1.090	0.3278	0.2970	0.619	57.5	12.7	0.662	2.33	1.96
ACCEPTABLE LIMITS(+-) *	20.66	2.180	0.6556	0.5940	1.238	115	25.4	1.324	4.66	3.92
WARNING LIMITS(+-) *	20.66	30.992	1.80	3.270	6.556	.9834	.5940	.8910	1.238	1.8571
ACTION LIMITS(<>) *	30.99	3.270	0.9834	0.8910	1.857	172.5	38.1	1.986	6.99	5.88
N *	14	14	14	14	14	14	14	14	14	14

* NOTE: SEE GLOSSARY FOR DEFINITIONS

PARAMETER: 00192 Turbidity

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2009-09-02

PAGE 2

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	85.0	8.5			10			Hach
F004	95.5	9.5			10			Hach
F007	112.5	11.2		BIASED HIGH*	10	5.6	1.4149	Hach
F010	111.5	11.1	WH		10			Nephelometry
F011	35.5	3.5		BIASED LOW	10	-15.5	0.2964	
F014	50.5	5.0			10			PC-Titrate
F015	115.5	11.5	AH	BIASED HIGH	10	10.4	-1.3664	Nephelometry
F022	18.0	1.8		BIASED LOW	10	-12.1	0.9386	Nephelometry
F032	97.0	9.7			10			
F090	133.0	13.3	AHAHAH AH AHAHAHAH	BIASED HIGH*	10	3.1	14.1629	Hach
F099	55.5	5.5			10			
F113	27.5	2.7		BIASED LOW*	10	-8.8	0.2287	PC Titrate
F158	55.5	5.5			10			Turbidimeter
F202	57.5	5.7			10			Turbidimeter

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON = 10

OVERALL AVERAGE RANK IS 7.5

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