

**Environment Canada
Proficiency Testing Program**

**Study 0098
September 2011**

Major Ions and Nutrients in Water

Environment Canada Proficiency Testing Program

Glossary of Terms and Definitions

A. Statistics listed in Data Summary (Appendix A)

- | | |
|----------------------|--|
| 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 A)

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 enclosed Z-Score Summary).

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 below).

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 below).

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 below).

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

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

* σ is the R-Std Dev

Systemic Bias: Systemic bias is indicated when a laboratory's test results (ranked by the Youden non-parametric analysis [4] for an individual parameter) are consistently 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 is identified when **Average Rank** falls outside of the 95% confidence interval for the **Overall Average Rank**. 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.

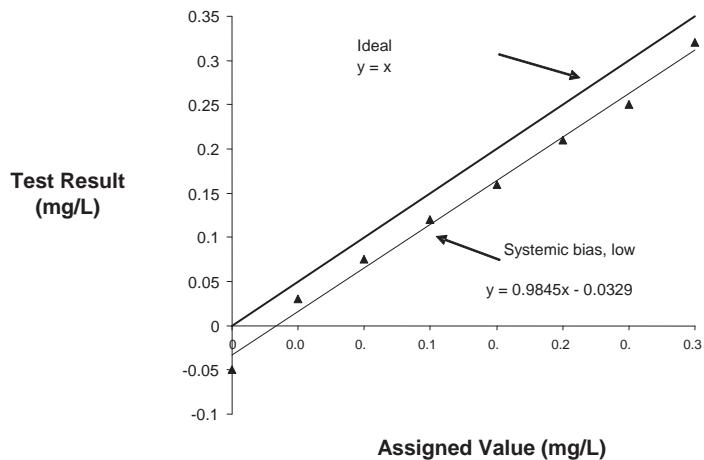
No. Samples Ranked: This is the number of test results used to calculate systemic bias. A laboratory must report five or more test results (not including '<') and there must be ten or more participating laboratories.

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 below 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 enclosed Laboratory Proficiency Appraisal). 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. Uncertainty of Assigned Values

If desired, the standard uncertainty (u_x) of the assigned value may be estimated from the statistics presented in the data summary (Appendix A)

$$u_x = 1.25 \times R\text{-Std Dev} / \sqrt{N} \quad [5]$$

This uncertainty is not used in the performance evaluations, but may be of interest to some participants. Reporting details of the measurement uncertainty of any assigned value is a requirement of ISO/IEC 17043:2010, *Conformity assessment – General requirements for proficiency testing*

D. Enclosures with the Final Report

1. Laboratory Proficiency Appraisal (see Table 2 in the Final Report for definitions)
2. Z-Score Summary [3]

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.
- [5] ISO 13528:2005(E), Statistical Methods for the use in Proficiency Testing by Interlaboratory Comparisons, Standard uncertainty u_x of the assigned value , Section 5.6.2, p 9-10.

Section 2 – Major Ions and Nutrients in Natural Waters

Table 1	Participating Laboratories
Table 2	Laboratory Performance Scores
Table 3	Five-Year Historical Laboratory Performance
Table 4	Sample Design
Table 5	Summary of Interlaboratory Median Values
Appendix A	Data Summary

Program Name: FPMI

Study Code: 0098

Range of Samples: 1 to 10

Table 1 Participating Laboratories in EC PT for Major Ions & Nutrients

ALS Environmental, Edmonton, AB
 ALS Environmental, Winnipeg, MB
 Bay of Plenty Regional Council, Whakatane, New Zealand
 Capital District Health Authority, QEII Lab, Halifax, NS
 Department of Fisheries & Oceans, Freshwater, Winnipeg, MB
 Environment Canada, ALET, Moncton, NB
 Environment Canada, NLET, Burlington, ON
 Environment Canada, NLET, Saskatoon, SK
 Environment Canada, PYLET, Vancouver, BC
 Environment New Brunswick, Fredericton, NB
 Environnement Quebec, CEAEQ, Government du QC, QC
 Environnement Quebec, CEAEQ, Laval, QC
 Kinetrics Inc., Toronto, ON
 Minera Alumbrera, Tucuman, Argentina
 Natural Resources Canada - GLFC, Sault Ste. Marie, ON
 NIWA, Hamilton, New Zealand
 RMB Environmental Laboratories, Detroit Lakes, MN, US
 Santé Canada - DSPA, Longueuil, QC
 Saskatchewan Disease Control Laboratory, Regina, SK
 Servicio Geologico Minero Argentino, Buenos Aires, Argentina
 Sisecam Soda Sanayii A.S., Mersin, Turkey
 South Florida Water Management Dist., West Palm Beach, FL, US
 TAIGA Environmental Laboratory, Yellowknife, NT
 U.S. Environmental Protection Agency, Corvallis, OR, US
 U.S. Environmental Protection Agency, DHHS, FOH, Chicago, IL
 U.S. Geological Survey, NWQL, Denver, CO, US
 Universidade da Coruña, A Coruña, Spain
 Ville de Montreal, Montreal, QC

31 Laboratories (3 laboratory names unpublished).

Program Name: FPMI

Number of Labs:

38

Study Code: 0098

Range of Samples: 1 to 10

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

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	19	0	0.00	189	0	0.00		0.00
F090	2	0	0.00	20	0	0.00		0.00
F094	2	0	0.00	20	0	0.00		0.00
F223b	1	0	0.00	9	0	0.00		0.00
F239a	1	0	0.00	1	0	0.00		0.00
F304	4	0	0.00	40	0	0.00		0.00
F248	11	0	0.00	110	1	0.45		0.45
F221	6	0	0.00	60	1	0.83		0.83
F207	15	0	0.00	150	3	1.00		1.00
F223a	7	0	0.00	70	2	1.43		1.43
F004	5	0	0.00	50	2	2.00		2.00
F015b	2	0	0.00	19	1	2.63		2.63
F074b	7	0	0.00	70	4	2.86		2.86
F153	13	0	0.00	130	11	4.23		4.23
F247	1	0	0.00	10	1	5.00		5.00
F006	1	0	0.00	10	1	5.00		5.00
F014	12	0	0.00	120	14	5.83		5.83
F011	17	0	0.00	170	22	6.47		6.47
F183	18	1	2.78	180	14	3.89		6.67
F239	11	0	0.00	44	6	6.82		6.82
F223	6	0	0.00	55	8	7.27		7.27
F158	18	2	5.56	180	7	1.94		7.50
F154	19	1	2.63	190	20	5.26		7.89
F074	6	0	0.00	60	10	8.33		8.33
F069	17	2	5.88	167	11	3.29		9.18
F009	11	1	4.55	110	11	5.00		9.55
F021	14	1	3.57	140	18	6.43		10.00
F026	16	3	9.38	160	7	2.19		11.56
F193	11	2	9.09	110	8	3.64		12.73
F015	18	3	8.33	179	17	4.75		13.08
F022	17	2	5.88	170	30	8.82		14.71
F324	7	1	7.14	70	13	9.29		16.43
F113	10	2	10.00	100	14	7.00		17.00
F010	16	3	9.38	160	26	8.13		17.50
F158b	3	1	16.67	30	1	1.67		18.33
F310	9	2	11.11	90	16	8.89		20.00
F099	11	3	13.64	110	17	7.73		21.36
F026b	5	2	20.00	50	3	3.00		23.00

Laboratory Performance Rating

Rating	% Score*
Very Good	0 - 5
Good	> 5 - 12.5
Fair	> 12.5 - 30
Poor	> 30

*Sum of Parameters Biased & Results Flagged

Program Name: FPMI

Study Code: 0098

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

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING
	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009	0095 Winter 2009	0096 Summer 2010	0097 Winter 2010	0098 Summer 2011		
F003	0.3	2.5	0.8	0.8	2.5	2.5	0.0	0.8	0.0	0.0	0.8	Very Good
F004	0.8	0.0	0.8	0.8	0.8	0.0	0.0	1.0	0.0	2.0	0.8	Very Good
F006	10.0	15.0	0.0	0.0	0.0	15.0	0.0	10.0	50.0	5.0	7.5	Good
F009	4.6	14.1	18.6	0.9	6.4	0.9	0.9	1.8	0.9	9.6	3.2	Very Good
F010	15.9	11.7	9.6	10.9	18.4	10.3	10.9	38.2	16.6	17.5	13.8	Fair
F011	21.1	19.4	22.5	15.6	35.6	16.5	15.8	22.2	1.4	6.5	18.0	Fair
F014	5.3	9.4	10.0	8.8	0.0	7.2	0.0	0.0	4.2	5.8	5.6	Good
F015	15.0	3.4	20.5	2.4	12.4	5.5	11.6	10.3	4.0	13.1	10.9	Good
F015b			0.0	100.0	27.5	2.5	0.0	40.0	15.0	2.6	8.8	Good
F021	11.3	12.0	8.3	5.3	1.3	11.3	5.4	2.3	6.3	10.0	7.3	Good
F022	11.4	6.7	1.9	1.4	1.4	5.6	17.2	10.3	11.7	14.7	8.5	Good
F026	3.8	7.5	5.3	0.3	8.8	0.3	4.0	0.3	4.1	11.6	4.0	Very Good
F026b	0.0	37.5	0.0	27.5	17.5	0.0	15.1	15.0	26.3	23.0	16.3	Fair
F069		4.7		19.4		7.4		12.4		9.2	9.2	Good
F074		4.0		16.8		14.7		36.3		8.3	14.7	Fair
F074b		18.6		41.7				3.6		2.9	11.1	Good
F090			25.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	Very Good
F094	9.5	9.3	15.5	14.3	11.0	0.0	26.7	0.0	6.7	0.0	9.4	Good
F099		1.4		6.9		0.6		2.5		21.4	2.5	Very Good
F113	10.0	9.4	13.8	11.7	5.0	10.9	17.2	6.9	17.7	17.0	11.3	Good
F153										4.2	4.2	Very Good
F154						33.1	27.3	17.8	12.0	7.9	17.8	Fair
F158	3.0	2.4	3.8	7.9	8.7	8.2	6.3	10.5	2.9	7.5	6.9	Good
F158b	15.0	2.0	0.0	16.3	12.1	11.9	1.9	12.9	12.0	18.3	12.1	Good
F183	11.9	15.4	9.1	13.2	2.2	4.7	6.9	9.2	2.9	6.7	8.0	Good
F193	8.9	0.7	1.4	27.1	3.6	5.0	28.9	14.3	4.6	12.7	7.0	Good
F207	5.3	7.7		2.1	5.6	0.7	0.9	9.7	0.0	1.0	2.1	Very Good

Program Name: FPMI

Study Code: 0098

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

LAB CODE	% Score Per Study (Sum of Parameters Biased & Results Flagged)										MEDIAN	RATING
	0089 Winter 2006	0090 Summer 2007	0091 Winter 2007	0092 Summer 2008	0093 Winter 2008	0094 Summer 2009	0095 Winter 2009	0096 Summer 2010	0097 Winter 2010	0098 Summer 2011		
F221	0.0	23.8	1.0	0.0	1.0	0.0	10.0	1.0	0.0	0.8	0.9	Very Good
F223		2.2		23.4		1.4		0.0		7.3	2.2	Very Good
F223a										1.4	1.4	Very Good
F223b						0.0				0.0	0.0	Very Good
F239										6.8	6.8	Good
F239a										0.0	0.0	Very Good
F247							15.0			5.0	10.0	Good
F248				17.7	7.8	8.8	1.5	0.0	5.0	0.5	5.0	Very Good
F304							0.0	0.0	0.0	0.0	0.0	Very Good
F310						7.9		9.5		20.0	9.5	Good
F324									13.6	16.4	15.0	Fair
Interlab Median	9.2	7.7	4.7	9.8	6.4	5.5	5.8	9.3	4.4	6.7		

Laboratory Performance Rating

Rating	% Score
Very Good	0 - 5
Good	> 5 - 12.5
Fair	> 12.5 - 30
Poor	> 30

Program Name: FPMI

2011-09-08

Study Code: 0098

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

Sample Number	Sample Name	Source
1	BELLE-09A	Quebec
2	CLEAR-01	Ontario
3	NSASK-05	Saskatchewan
4	HAMIL-20.2	Ontario
5	ION-96.4	Ontario
6	MICHIGAN-06D	Michigan
7	UPSAL-09B	New Brunswick
8	FRASER-96B	British Columbia
9	SUPER-05	Ontario
10	COLLING-96A	Ontario

Program Name: FPMI

Range of Samples: 1 to 10

2011-09-08

Study Code: 0098

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

Parameters	BELLE-09A Sample 1	CLEAR-01 Sample 2	NSASK-05 Sample 3	HAMIL-20.2 Sample 4	ION-96.4 Sample 5	MICHIGAN-06D Sample 6	UPSLAL-09B Sample 7	FRASER-96B Sample 8	SUPER-05 Sample 9	COLLING-96A Sample 10
Ammonia (mg/L N)	0.005	0.034	0.004	0.005	0.010	0.014	0.005	0.004	0.005	0.004
Boron (mg/L)	0.008	0.007	0.014	0.054	0.043	0.023	0.0050	0.0020	0.0064	0.0131
Calcium (mg/L)	11.5	4.60	40.8	45.8	94.8	34.6	26.5	22.2	13.5	24.3
Chloride (mg/L)	5.64	8.04	1.74	73.0	74.8	11.1	1.82	0.342	1.40	5.70
Colour (Units)	36.0	4.00	15.2	5.00	13.0	2.00	6.65	7.00	2.00	1.75
Conductivity @ 25C (uS/cm)	105.0	61.7	313	551	830	289	167	147	99.0	191
Diss Inorg Carbon (mg/L C)	7.44	0.576	29.1	26.3	57.800	25.7	18.2	15.8	10.10	16.8
Diss Organic Carbon (mg/L C)	5.86	2.30	4.71	3.00	4.70	1.40	1.55	1.85	1.20	1.150
Fluoride (mg/L)	0.050	0.050	0.129	0.280	0.126	0.101	0.030	0.030	0.040	0.061
Magnesium (mg/L)	2.68	1.11	12.2	12.7	25.6	11.5	3.22	4.33	2.80	6.38
Nitrate + Nitrite (mg/L N)	0.310	0.040	0.330	2.01	2.87	0.330	0.150	0.130	0.358	0.313
pH (pH Units)	7.62	6.43	8.21	8.16	8.38	8.20	8.09	8.05	7.86	8.07
Potassium (mg/L)	0.800	0.570	1.20	3.96	3.50	1.31	0.314	0.372	0.505	0.860
Silicates (mg/L SiO2)	4.88	2.65	5.70	1.90	0.614	1.60	6.26	3.48	2.31	0.805
Sodium (mg/L)	4.80	3.50	6.01	42.1	42.9	6.30	2.86	0.760	1.40	3.46
Sulfate (mg/L)	7.82	10.8	37.4	43.8	77.0	22.5	5.52	8.09	3.48	14.6
Total Alkalinity (mg/L CaCO3)	33.0	2.87	122.5	110.0	246	108.5	77.0	66.20	42.65	71.40
Total Hardness (mg/L)	39.4	15.9	151	166	340	132	79.8	73.4	45.0	87.0
Total Kjeldahl N (mg/L N)	0.220	0.160	0.148	0.287	0.462	0.100	0.048	0.046	0.051	0.058
Total N (mg/L N)	0.514	0.200	0.474	2.21	3.14	0.430	0.200	0.170	0.420	0.385

PARAMETER: 07192 Ammonia

mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT
F003	<0.005	0.034	<0.005	0.005	0.009	<0.005	<0.005	<0.005	<0.005
F004	<0.005	0.033	<0.005	<0.005	0.011	0.015	<0.005	<0.005	<0.005
F010	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
F011	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
F015	0.003	0.026	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002
F021	0.014	0.053 WH	<0.002	0.005	<0.002	<0.002	0.005	0.004	0.008
F022	<0.01	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
F026	<0.01	0.033	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
F069	<0.010	0.039	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010
F074	0.007	0.037	0.005	0.006	0.01	0.004	0.006	0.005	0.004
F074b	0.005	0.037	0.004	0.003	0.007	<0.002	0.003	0.004	0.003
F113	0.005	0.033	0.004	0.004	0.009	<0.004	0.004	0.004	<0.004
F154	<0.010	0.045	<0.010	0.014 WH	0.018	<0.010	<0.010	0.015	<0.010
F158	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
F158b	<0.01	0.04	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
F183	<0.020	0.037	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
F207	<0.005	0.034	<0.005	0.005	0.012	0.013	<0.005	<0.005	<0.005
F221	0.002	0.031	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
F304	0.003	0.032	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002
F310	0.059 AH	0.097 AH	0.055	0.056 AH	0.054 AH	0.056	0.060	0.062 AH	0.057
F324	0.042 AH	0.060 AH	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
ASSIGNED VALUE *	0.005	0.034	0.004	0.005	0.010	0.014	0.005	0.004	0.004
R-STD DEV *	0.0096	0.0075	0.0030	0.0041	0.0054	0.0263	0.0032	0.0058	0.0140
ACCEPTABLE LIMITS(+-) *	0.0192	0.0150	-	0.0082	0.0108	-	-	0.0116	-
WARNING LIMITS(+-) *	.0192-	.0288.	0.0150-	.0225	.0082-	.0123.	0.0108-	.0162	-
ACTION LIMITS(<>) *	0.0288	0.0225	-	0.0123	0.0162	-	-	0.0174	-
N *	9	20	4	9	12	4	5	6	4

* 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	20.0	6.6			3			Phenate
F004	19.5	6.5			3			Salicylate/nitropruss
F010	1.0	1.0			1			Skalar
F011	3.0	3.0			1			
F015	5.5	1.8			3			Colorimetry
F021	41.0	5.8	WH		7			Flow injection
F022	5.5	5.5			1			Colorimetry
F026	8.0	8.0			1			Colorimetry
F069	23.5	11.7			2			
F074	49.5	4.9			10			Colorimetry
F074b	28.0	3.5			8			Colorimetry
F113	28.5	3.5			8			Flow injection
F154	41.0	10.2	WH		4			Colorimetry
F158	0.0	0.0			0			Colorimetry
F158b	22.5	11.2			2			Salicylate reaction
F183	13.0	13.0			1			Colorimetry
F207	27.5	6.8			4			Flow injection
F221	7.0	1.7			4			Flow injection
F304	10.0	3.3			3			
F310	78.0	7.8	AHAHAHAAH		10			
F324	27.0	13.5	AHAH		2			Colorimetry

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS

FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE RANK IS 5.8

PARAMETER: 05091 Boron

mg/L

EC PT for Major Ions & Nutrients

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F010	0.014	0.010	0.017	0.055	0.039	0.026	0.0062	0.0025	0.0069	0.0133
F014	<0.010	<0.010	0.016	0.057	0.046	0.024	<0.010	<0.010	<0.010	0.014
F022	0.008	0.007	0.015	0.058	0.049	0.026	0.005	0.002	0.007	0.015
F026	<0.02	<0.02	<0.02	0.053	0.043	0.023	<0.02	<0.02	<0.02	<0.02
F069	0.008	0.006	0.014	0.052	0.042	0.022	0.004	0.001	0.006	0.013
F154	<0.030	<0.030	<0.030	0.056	0.044	<0.030	<0.030	<0.030	<0.030	<0.030
F158	0.007	0.006	0.014	0.054	0.043	0.022	<0.005	<0.005	0.006	0.013
F183	0.006	<0.005	0.012	0.052	0.041	0.021	<0.005	<0.005	<0.005	0.012
ASSIGNED VALUE *	0.008	0.007	0.014	0.054	0.043	0.023	0.0050	0.0020	0.0064	0.0131
R-STD DEV *	0.0025	0.0021	0.0020	0.0026	0.0032	0.0023	0.00125	0.00087	0.00062	0.00116
ACCEPTABLE LIMITS(+-) *	-	-	0.0040	0.0052	0.0064	0.0046	-	-	-	0.00232
WARNING LIMITS(+-) *	-	-	.0040-	.0060.0052-	.0078.0064-	.0096.0046-	.0069	-	-	.00232-.003
ACTION LIMITS(<>) *	-	-	0.0060	0.0078	0.0096	0.0069	-	-	-	0.00348
N *	5	4	6	8	8	7	3	3	4	6

* 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
F010	40.5	4.0			10			ICP-AES
F014	29.0	5.8			5			
F022	47.0	4.7			10			ICP-AES
F026	11.5	3.8			3			ICP-AES
F069	20.5	2.0			10			ICP-AES
F154	12.0	6.0			2			ICP-MS
F158	21.0	2.6			8			ICP-MS
F183	7.5	1.2			6			

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS

FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE RANK IS 3.5

PARAMETER: 20091 Calcium

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	11.4	4.61	41.4	45.8	94.	33.8	26.1	22.2	13.4	24.2
F009	11.9	4.49	44.0	47.3	100.	34.2	27.9	23.3	14.0	24.6
F010	11.6	4.66	41.7	46.8	95.8	35.1	27.	22.7	13.7	24.8
F011	11.5	5.1 WH	42.7	46.0	94.3	35.9	26.7	22.3	14.0	25.4
F014	12.3	4.92	43.1	47.5	97.9	35.8	27.9	23.5	14.2	25.5
F015	12.4	5. WH	39.4	44.7	93.3	33.	26.9	22.2	14.5	24.3
F021	11.2	4.44	84.4 AH	93.0 AH	98.2	35.4	26.1	21.9	13.1	24.0
F022	10.7	4.35	43.3	50.2 WH	98.8	38.7 WH	29.5 AH	23.9 WH	13.	26.9 AH
F026	11.3	4.55	38.9	43.6	90.8	32.7	25.8	20.8	13.1	23.7
F069	11.6	4.64	40.7	45.8	95.3	33.9	26.5	22.	13.4	24.7
F099	11.2	4.56	39.5	46.0	94.2	34.5	24.8	22.0	13.3	24.0
F153	12.	4.6	44.	46.	96.	37.	27.	23.	14.	25.
F154	10.8	4.41	39.0	44.0	94.3	33.0	25.6	21.6	12.8	23.4
F158	11.2	4.5	40.9	45.8	95.6	34.7	26.1	21.9	13.2	23.9
F183	11.9	4.56	40.5	44.3	92.4	34.1	25.9	22.5	13.7	23.4
F193	12.5	4.8	41.5	46.6	96.2	34.8	27.1	23.4	14.0	25.3
F207	11.4	4.5	40.6	45.2	93.2	34.7	26.4	21.9	13.3	24.2
F223	11.5	<10.	40.7	46.5	94.8	33.7	25.1	21.3	12.6	23.5
F223a	11.5	4.61	40.8	45.9	92.8	34.4	26.6	22.5	13.6	24.3
F239			37.	44.	91.	40. AH				
F248	11.5	4.61	41.4	45.7	96.2	35.1	26.9	22.4	13.8	24.6
ASSIGNED VALUE *	11.5	4.60	40.8	45.8	94.8	34.6	26.5	22.2	13.5	24.3
R-STD DEV *	0.51	0.171	2.00	1.43	2.58	1.38	0.95	0.79	0.53	0.79
ACCEPTABLE LIMITS(+-) *	1.02	0.342	4.00	2.86	5.16	2.76	1.90	1.58	1.06	1.58
WARNING LIMITS(+-) *	1.02- 1.53	.342- .513	4.00- 6.00	2.86- 4.29	5.16- 7.74	2.76- 4.14	1.90- 2.85	1.58- 2.37	1.06- 1.59	1.58- 2.37
ACTION LIMITS(<>) *	1.53	0.513	6.00	4.29	7.74	4.14	2.85	2.37	1.59	2.37
N *	20	19	21	21	21	21	20	20	20	20

* 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	87.5	8.7			10			AAS absorption
F009	150.5	15.0			10			ICP-MS
F010	147.0	14.7			10			ICP-AES
F011	143.5	14.3	WH		10			
F014	181.5	18.1		BIASED HIGH*	10	3.0	0.4104	
F015	108.0	10.8	WH		10			ICP-AES
F021	107.0	10.7	AH		10			ICP-AES
F022	143.0	14.3	WH WHAHWH AH	BIASED LOW*	10			ICP-AES
F026	31.5	3.1			10	-4.6	0.0773	ICP-AES
F069	104.0	10.4			10			ICP-AES
F099	71.0	7.1			10			AAS absorption
F153	157.5	15.7			10			ICP-AES
F154	31.0	3.1		BIASED LOW*	10	-0.5	-0.8648	ICP-MS
F158	77.0	7.7			10			ICP-MS
F183	76.5	7.6			10			
F193	164.0	16.4		BIASED HIGH*	10	0.8	0.4534	ICP-MS
F207	72.5	7.2			10			ICP-AES
F223	57.0	6.3			9			ICP-AES
F223a	102.5	10.2			10			IC Dionex
F239	26.5	6.6	AH	INSUFFICIENT DATA	4			IC
F248	125.0	12.5			10			ICP-MS

* 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 10.6

PARAMETER: 17092 Chloride

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	5.61	8.01	1.72	71.9	74.	11.	1.81	0.34	1.4	5.65
F009	5.73	8.24	1.72	74.0	76.0	11.4	1.82	0.335	1.41	5.81
F010	5.2 WL	7.5 WL	1.8	73.	75.	11.	1.8	0.4	1.3	5.3 WL
F011	5.6	7.9	1.7	73.1	75.6	11.4	1.7	<0.7	1.3	5.8
F014	5.55	8.70 WH	1.78	81.1 AH	80.4 AH	12.1 WH	1.65	0.354	1.38	6.10 WH
F015	6.2 WH	8.3	1.7	76.	76.	11.4	2.	0.3	1.3	6.1 WH
F021	5.63	8.00	1.75	74.5	76.8	11.1	1.87	0.35	1.41	5.66
F022	5.67	8.1	1.74	73.1	74.7	11.2	1.84	0.32	1.42	5.73
F026	5.71	7.97	1.73	70.8	74.6	10.7	1.81	0.336	1.39	5.75
F069	5.74	8.22	1.78	73.6	76.2	11.7	1.89	0.344	1.84 AH	5.95
F074	6.16 WH	8.05	2.33 AH	79.2 AH	69.3 AL	11.9 WH	2.53 AH	0.84 AH	1.54	5.68
F099	5.57	8.04	1.71	73.6	75.8	11.4	1.7	0.39	1.25	5.56
F113	5.68	8.15	1.74	73.0	75.5	11.3	1.83	0.32	1.40	5.77
F153	5.6	8.2	2.3 AH	71.	73.	11.	1.8	0.43 WH	1.6 WH	5.6
F154	5.66	8.04	1.74	71.9	74.5	11.1	1.84	<0.50	1.42	5.72
F158	5.9	8.4	1.8	71.7	73.3	11.1	1.9	<1.0	1.5	5.8
F183	5.53	7.89	1.80	72.4	74.7	10.9	1.91	0.36	1.45	5.58
F193	5.50	7.82	<2.00	73.1	76.1	11.1	2.01	<2.00	<2.00	5.69
F207	5.3	7.7	1.7	71.9	74.1	10.4 WL	1.7	0.3	1.4	5.3 WL
F223	5.66	7.92	<5.	72.3	74.8	11.1	<5.	<5.	<5.	5.9
F223a	5.61	7.98	1.74	71.5	74.1	11.0	1.84	0.34	1.42	5.66
F239			1.8	70.	74.	11.				
F239a					75.					
F247	6.1 WH	8.3	<5.0	73.	75.	11.	<5.0	<5.0	<5.0	5.8
F248	5.46	7.83	1.71	72.6	74.8	10.9	1.79	0.39	1.37	5.52
F324	5.86	8.54 WH	1.81	75.6	81.1 AH	11.9 WH	1.76	<1.0	1.39	5.69
ASSIGNED VALUE *	5.64	8.04	1.74	73.0	74.8	11.1	1.82	0.342	1.40	5.70
R-STD DEV *	0.185	0.243	0.050	1.69	1.25	0.33	0.102	0.0420	0.084	0.161
ACCEPTABLE LIMITS(+-) *	0.370	0.486	0.100	3.38	2.50	0.66	0.204	0.0840	0.168	0.322
WARNING LIMITS(+-) *	.370- .555	.486- .729	.100- .150	3.38- 5.07	2.50- 3.75	.66- .99	.204- .306	.0840- .1260	.168- .252	.322- .483
ACTION LIMITS(<>) *	0.555	0.729	0.150	5.07	3.75	0.99	0.306	0.1260	0.252	0.483
N *	24	24	22	25	26	25	22	17	21	24

* 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	81.0	8.1			10			IC Dionex
F009	152.0	15.2			10			IC Dionex
F010	82.0	8.2	WLWL	WL	10			IC Dionex
F011	94.0	10.4			9			
F014	161.0	16.1	WH AHAHWH	WH	10			
F015	157.5	15.7	WH	WH	10			IC
F021	140.0	14.0			10			IC Dionex
F022	129.5	12.9			10			IC Dionex
F026	84.0	8.4			10			IC Dionex
F069	184.0	18.4		AH	10			IC
F074	175.5	17.5	WH AHAHALWAHAH		10			IC
F099	102.5	10.2			10			Flow injection
F113	131.0	13.1			10			IC Dionex
F153	108.5	10.8	AH	WHHW	10			IC Dionex
F154	106.5	11.8			9			IC
F158	135.5	15.0			9			IC Dionex
F183	104.5	10.4			10			IC
F193	90.5	12.9			7			IC Dionex
F207	36.5	3.6	WL	WL	BIASED LOW*	10	-1.1	-0.1954
F223	76.0	12.6				6		Titration
F223a	93.0	9.3				10		IC Dionex
F239	30.5	7.6			INSUFFICIENT DATA	4		IC
F239a	15.0	15.0			INSUFFICIENT DATA	1		Titration
F247	96.0	16.0	WH			6		Potentiometric Titra
F248	66.0	6.6				10		IC Dionex
F324	158.5	17.6	WH	AHWH		9		Colorimetry

* 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: 00292 Colour

Units

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= WL LAB RESULT	8= FRASER-96B LAB RESULT	9= SUPER-05 LAB RESULT	10= COLLING-96A LAB RESULT
F003	32.9	3.5	14.5	4.5	13.	0.7	5.4	6.2	0.5	<0.5
F011	43.	<5.	17.	6.	17.	<5.	7.	7.	<5.	<5.
F015	40.	7.5 WH	20.	5.	12.5	5.	2.5 WL	7.5	2.5	2.5
F021	32.	<5.	14.	<5.	13.	<5.	<5.	5.	<5.	<5.
F094	40.0	4.0	16.0	5.0	14.0	2.0	7.0	7.0	<2.0	<2.0
F154	38.6	<5.0	13.9	<5.0	12.9	<5.0	6.3	6.6	<5.0	<5.0
F158	28.	<5.0	13.	<5.0	11.	<5.0	<5.0	<5.0	<5.0	<5.0
F183	36.9	<4.96	17.7	6.67	15.6	<4.96	7.31	8.64	<4.96	<4.96
F193	28.0	3.4	13.6	4.5	12.3	1.4	5.4	6.1	0.9	0.8
F207	35.	5.	17.	6.	14.	2.	7.	7.	2.	1.
F248	28.4	3.3	13.4	4.1	12.0	<0.8	5.2	6.1	<0.8	<0.8
F310	50. WH	5.	20.	5.	20. AH	5.	10. WH	10. WH	5.	5.
ASSIGNED VALUE *	36.0	4.00	15.2	5.00	13.0	2.00	6.65	7.00	2.00	1.75
R-STD DEV *	6.84	1.229	2.84	0.947	2.13	2.106	1.458	1.269	2.008	2.198
ACCEPTABLE LIMITS(+-) *	13.68	2.458	5.68	1.894	4.26	4.212	2.916	2.538	-	-
WARNING LIMITS(+-) *	13.68-	20.522	4.58-	3.6875	6.8-	8.52	1.894-	2.8414	1.26-	6.39
ACTION LIMITS(<>) *	20.52	3.687	8.52	2.841	6.39	6.318	4.374	3.807	-	-
N *	12	7	12	9	12	6	10	11	5	4

* 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	32.5	3.6			9			Auto Analyser
F011	52.0	8.6		BIASED HIGH*	6	21.3	-0.6087	True
F015	59.5	5.9	WH	WL	10			Apparent-Flow Inject
F021	16.5	4.1		INSUFFICIENT DATA	4			True
F094	51.5	6.4			8			True
F154	27.0	5.4			5			True
F158	3.5	1.1		INSUFFICIENT DATA	3			Spectrophotometry
F183	55.0	9.1		BIASED HIGH*	6	-1.4	1.8370	Spectrophotometry
F193	23.0	2.3		BIASED LOW*	10	-20.0	0.2200	Spectrophotometry
F207	58.5	5.8			10			Auto Analyser
F248	13.5	1.9		BIASED LOW*	7	-21.2	0.5646	Spectrophotometry
F310	81.5	8.1	WH AH WHHW	BIASED HIGH	10	34.5	1.0327	

* 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 5.3

PARAMETER: 00392 Conductivity @ 25C uS/cm

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= LAB RESULT	8= FRASER-96B LAB RESULT	9= SUPER-05 LAB RESULT	10= COLLING-96A LAB RESULT
F003	105.	62.	318.	554.	838.	293.	168.	148.	99.1	191.
F004	105.	61.4	310.	548.	827.	286.	165.	146.	97.4	189.
F009	103.	59.	312.	551.	829.	289.	165.	146.	97.	190.
F010	104.	60.	317.	562.	843.	295.	173. WH	151.	100.	193.
F011	96.1 AL	56.6 AL	286. AL	536.	819.	264. AL	153. AL	137. AL	92.1 AL	177. AL
F014	103.	60.6	307.	543.	824.	288.	166.	147.	98.0	191.
F015	105.	61.	308.	544.	823.	285.	166.	147.	98.	189.
F015b	110. WH		320.	550.	830.	290.	170.	150.	100.	190.
F021	105.	61.3	314.	556.	837.	290.	167.	148.	98.4	191.
F022	106.	62.3	316.	551.	830.	292.	169.	149.	99.2	193.
F026	104.	61.7	308.	552.	844.	287.	167.	147.	99.1	191.
F069	<100. WL	<100.	294. AL	529. WL	796. AL	276. WL	159. AL	140. WL	<100.	182. AL
F074b	108.	64.	314.	556.	836.	289.	168.	149.	99.	193.
F090	107.	63.	315.	556.	843.	294.	168.	149.	99.	192.
F099	105.	61.6	310.	550.	828.	290.	167.	147.	98.3	190.
F113	101.	59.9	302.	532. WL	805. WL	278.	162.	144.	94.6 AL	183. AL
F153	107.	63.	317.	554.	822.	295.	166.	146.	99.	196. WH
F154	103.	60.7	296. WL	529. WL	788. AL	274. WL	160. WL	142. WL	95.7 WL	183. AL
F158	107.	63.4	314.	556.	844.	292.	169.	150.	101.	194.
F183	105.	61.7	311.	551.	833.	289.	166.	145.	97.9	191.
F193	104.	62.5	312.	550.	831.	288.	166.	147.	99.4	190.
F221	105.	62.1	313.	549.	823.	290.	167.	148.	98.4	191.
F239			315.	537.	845.	275. WL				
F248	107.	62.4	311.	557.	840.	288.	167.	149.	99.7	191.
F310	105.	63.6	313.	551.	830.	287.	166.	147.	98.6	190.
ASSIGNED VALUE *	105.0	61.7	313	551	830	289	167	147	99.0	191
R-STD DEV *	1.99	1.47	5.4	8.6	11.2	5.7	2.5	2.4	1.27	2.5
ACCEPTABLE LIMITS(+-) *	3.98	2.94	10.8	17.2	22.4	11.4	5.0	4.8	2.54	5.0
WARNING LIMITS(+-) *	3.98- 5.97	2.94- 4.41	10.8- 16.2	17.2- 25.8	22.4- 33.6	11.4- 17.1	5.0- 7.5	4.8- 7.2	2.54- 3.81	5.0- 7.5
ACTION LIMITS(<>) *	5.97	4.41	16.2	25.8	33.6	17.1	7.5	7.2	3.81	7.5
N *	23	22	25	25	25	25	24	24	23	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	175.5	17.5			10			PC Titrate		
F004	77.0	7.7			10			Radiometer		
F009	83.5	8.3			10			Cond. meter		
F010	195.0	19.5	WH	BIASED HIGH*	10	1.8	-0.3801	Cond. meter		
F011	16.0	1.6	ALALAL	ALALALALAL	BIASED LOW*	10	-0.7	-11.5577		
F014	82.5	8.2			10					
F015	79.5	7.9			10			Cond. meter		
F015b	165.5	18.3	WH		9			Cond. meter		
F021	151.0	15.1			10			PC Titrate		
F022	181.0	18.1			10			Radiometer		
F026	132.0	13.2			10			PC Titrate		
F069	15.5	2.2	WL	ALWLALWLALWL	AL	BIASED LOW	7	-3.8	-2.2770	Cond. meter
F074b	187.0	18.7			10			Cond. meter		
F090	195.0	19.5			BIASED HIGH*	10	1.4	-0.6208	Radiometer	
F099	114.0	11.4			10			Cond. meter		
F113	33.5	3.3	WLWL	ALAL	BIASED LOW	10	-3.1	-0.5799	Cond. meter	
F153	163.0	16.3		WH		10			Cond. meter	
F154	30.0	3.0	WLWLALWLWLWLWL		BIASED LOW	10	-5.1	2.0397	Radiometer	
F158	212.0	21.2			BIASED HIGH*	10	1.4	0.0039	PC Titrate	
F183	114.5	11.4			10			Cond. meter		
F193	122.5	12.2			10			Cond. meter		
F221	130.5	13.0			10			Radiometer		
F239	52.5	13.1	WL		INSUFFICIENT DATA	4			Cond. meter	
F248	170.5	17.0				10			Radiometer	
F310	126.0	12.6				10				

* 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 12.5

PARAMETER: 06592 Diss Inorg Carbon mg/L C

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	7.3	0.6	29.1	26.3	55.5	25.6	17.8	15.2	9.6	16.4
F010	7.8	0.7	31.4	28.6	65.6 WH	28.4	20.0	17.1	10.9	18.4
F015	7.6	<0.5	30.3	27.4	59.6	26.6	19.	16.3	10.6	17.4
F022	7.01	0.7	26.4	24.0	52.5	23.7	16.9	14.5	9.6	15.7
F026	7.53	0.467	29.2	26.4	58.5	26.4	18.6	15.8	10.1	16.8
F074b	7.96	0.576	33.1	29.7	<0.006 AL	32.3 AH	20.8	17.6	11.4	18.8
F094	7.19	0.50	28.8	26.1	59.1	25.8	18.2	15.8	10.4	16.9
F154	7.3	1.1 AH	28.6	25.7	57.1	25.5	17.0	14.8	9.7	16.0
F183	7.44	0.504	28.0	25.3	55.3	25.0	17.9	15.5	9.91	16.5
ASSIGNED VALUE *	7.44	0.576	29.1	26.3	57.800	25.7	18.2	15.8	10.10	16.8
R-STD DEV *	0.340	0.1373	2.05	1.89	3.6620	1.87	1.42	1.14	0.674	1.17
ACCEPTABLE LIMITS(+-) *	0.680	0.2746	4.10	3.78	7.3240	3.74	2.84	2.28	1.348	2.34
WARNING LIMITS(+-) *	.680- 1.020	.2746- .4119	4.10- 6.15	3.78- 5.67	7.3240- 10.93	7.4- 5.61	2.84- 4.26	2.28- 3.42	1.348- 2.022	2.34- 3.51
ACTION LIMITS(<>) *	1.020	0.4119	6.15	5.67	10.9860	5.61	4.26	3.42	2.022	3.51
N *	9	8	9	9	8	9	9	9	9	9

* 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	36.0	3.6			10			IR detection
F010	78.5	7.8	WH		10			Shimadzu
F015	63.0	7.0			9			Carbon analyser
F022	16.0	1.6			10			Shimadzu
F026	51.5	5.1			10			Colorimetry
F074b	76.0	8.4	ALAH		9			Carbon analyser
F094	45.5	4.5			10			IR detection
F154	33.5	3.3	AH		10			Carbon analyser
F183	32.0	3.2			10			Shimadzu

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS

FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE RANK IS 4.9

PARAMETER: 06002 Diss Organic Carbon mg/L C

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	6.	2.3	4.9	3.	4.7	1.4	1.6	1.8	1.1	1.1
F004	5.71	2.31	4.72	3.07	4.67	1.42	1.56	1.85	1.20	1.17
F010	5.9	2.2	4.8	3.0	4.7	1.3	1.5	1.8	1.1	1.1
F011	5.8	2.5	4.9	3.4 WH	5.1	1.8 WH	1.8	2.2	1.5	1.5
F015	6.8 WH	2.7 WH	4.7	3.1	4.9	1.3	1.5	1.8	1.	1.2
F021	6.3	2.5	5.6 AH	4.0 AH	5.8 AH	2.2 AH	2.1 WH	2.2	1.4	1.6
F022	4.95 WL	2.49	4.7	3.12	4.79	1.71	1.55	1.88	1.28	1.33
F026	5.64	2.30	4.68	2.88	4.47	1.36	1.53	1.85	1.15	1.13
F069	6.	2.54	5.23 AH	3.2	4.83	1.53	1.73	2.	1.29	1.28
F113	5.86	2.27	4.75	2.87	4.58	1.38	1.52	1.82	1.15	1.11
F154	6.6	2.9 AH	4.6	2.9	4.7	<1.0 WL	2.1 WH	2.9 AH	2.3 AH	2.2 AH
F158	5.7	2.3	4.6	3.0	4.6	1.4	1.5	1.8	1.2	1.1
F183	4.85 WL	2.15	4.83	2.91	5.46 AH	1.40	1.27	1.55	<0.50 AL	0.947
F207	5.7	2.4	4.7	3.	4.8	1.6	1.8	2.	1.7 WH	1.4
F310	5.86	2.27	4.71	3.0	4.59	1.37	1.52	2.06	1.18	1.10
ASSIGNED VALUE *	5.86	2.30	4.71	3.00	4.70	1.40	1.55	1.85	1.20	1.150
R-STD DEV *	0.411	0.181	0.140	0.144	0.235	0.183	0.191	0.204	0.206	0.2170
ACCEPTABLE LIMITS(+-) *	0.822	0.362	0.280	0.288	0.470	0.366	0.382	0.408	0.412	0.4340
WARNING LIMITS(+-) *	.822- 1.233	.362- .543	.280- .420	.288- .432	.470- .705	.366- .549	.382- .573	.408- .612	.412- .618	.4340- .6510
ACTION LIMITS(<>) *	1.233	0.543	0.420	0.432	0.705	0.549	0.573	0.612	0.618	0.6510
N *	15	15	15	15	15	14	15	15	14	15

* 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	70.5	7.0			10			IR detection
F004	78.0	7.8			10			TOC analyser
F010	50.0	5.0			10			Shimadzu
F011	122.0	12.2	WH WH	BIASED HIGH*	10	-4.7	0.4044	
F015	75.0	7.5	W H W H		10			Carbon analyser
F021	136.5	13.6	A H A H A H A H W H	BIASED HIGH	10	8.3	0.3627	Carbon analyser
F022	87.0	8.7	WL		10			Shimadzu
F026	44.0	4.4			10			UV digestion autoana
F069	114.0	11.4	AH		10			IR detection
F113	51.0	5.1			10			UV IR
F154	99.0	11.0	AH	W L W H A H A H A H	9			Carbon analyser
F158	47.5	4.7			10			TOC analyser
F183	41.0	4.5	WL	AH AL	9			Shimadzu
F207	94.5	9.4		WH	10			TOC analyser
F310	60.0	6.0			10			

* 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 7.9

PARAMETER: 09092 Fluoride

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT										
F003	0.05	0.05	0.12	0.28	0.12	0.1	0.03	0.03	0.04										
F009	0.059	0.053	0.131	0.265	0.116	0.102	0.036	0.037	0.053										
F010	0.05	0.06	0.12	0.26	0.12	0.10	0.03	0.03	0.07										
F011	<0.1	<0.1	0.1 WL	0.3	0.1 WL	0.1	<0.1	<0.1	<0.1										
F014	<0.100	<0.100	0.112	0.255	0.126	0.125 AH	<0.100	<0.100	<0.100										
F015	0.05	0.05	0.11	0.24 WL	0.12	0.09	0.03	0.03	0.04										
F022	0.043	0.048	0.128	0.283	0.122	0.098	0.03	0.023	0.031										
F069	0.050	0.051	0.124	0.302	0.144 WH	0.103	<0.040	<0.040	0.037										
F153	<0.05	<0.05	0.14	0.23 WL	0.09 AL	0.10	<0.05	<0.05	0.05										
F154	<0.10	<0.10	0.13	0.28	0.13	0.10	<0.10	<0.10	<0.10										
F158	<0.10	<0.10	0.13	0.28	0.12	<0.10	<0.10	<0.10	<0.10										
F158b	<0.10	<0.10	0.15	0.27	0.13	0.11	<0.10	<0.10	<0.10										
F183	<0.06	<0.06	0.13	0.28	0.13	0.11	<0.06	<0.06	0.06										
F193	0.07 WH	0.07 AH	0.15	0.29	0.13	0.11	0.06	0.05 AH	0.06 WH										
F223a	0.049	0.047	0.134	0.293	0.130	0.105	0.036	0.029	0.037										
F248	0.04	0.05	0.12	0.28	0.13	0.11	0.03	0.03	0.04										
F310	<0.2	<0.2	<0.2	0.289	<0.2	<0.2	<0.2	<0.2	<0.2										
ASSIGNED VALUE *	0.050	0.050	0.129	0.280	0.126	0.101	0.030	0.030	0.040										
R-STD DEV *	0.0075	0.0051	0.0137	0.0188	0.0085	0.0064	0.0000	0.0036	0.0084										
ACCEPTABLE LIMITS(+-) *	0.0150	0.0102	0.0274	0.0376	0.0170	0.0128	-	0.0072	0.0168										
WARNING LIMITS(+-) *	.0150-	.0225	.0102-	.0153	.0274-	.0411	.0376-	.0564	.0170-	.0255	.0128-	.0192	-	.0072-	.0108	.0168-	.0252	.0182-	.0273
ACTION LIMITS(<>) *	0.0225	0.0153	0.0411	0.0564	0.0255	0.0192	-	-	0.0108	0.0252	0.0273								
N *	9	9	16	17	16	15	8	8	9	11									

* NOTE: SEE GLOSSARY FOR DEFINITIONS

LAB NO.	TOTAL	AVERAGE	SUMMARY OF FLAGGING	BIAS STATEMENT	NO. SAMPLES RANKED	BIAS % SLOPE	BIAS BLANK	METHOD CODING	
F003	50.5	5.0			10			IC Dionex	
F009	74.5	7.4			10			Alizarin	
F010	54.5	5.4			10			IC Dionex	
F011	24.0	6.0	WL WL	INSUFFICIENT DATA	4				
F014	30.0	7.5	AH	INSUFFICIENT DATA	4				
F015	36.5	3.6	WL	BIASED LOW	10	-16.4	0.0071	IC	
F022	45.0	4.5		BIASED LOW*	10	3.0	-0.0057	IC Dionex	
F069	64.0	8.0	WH		8			IC	
F153	24.5	4.9	WLAL		5			IC Dionex	
F154	36.5	9.1		INSUFFICIENT DATA	4			IC	
F158	24.5	8.1		INSUFFICIENT DATA	3			ISE	
F158b	46.5	11.6		INSUFFICIENT DATA	4			IC Dionex	
F183	52.5	10.5			5			IC	
F193	108.5	10.8	WHAH	AHWHWH	BIASED HIGH	10	-5.9	0.0226	IC Dionex
F223a	72.5	7.2			10			IC Dionex	
F248	60.5	6.0			10			IC Dionex	
F310	13.0	13.0		INSUFFICIENT DATA	1				

* 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 6.9

PARAMETER: 12091 Magnesium

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= LAB RESULT	8= FRASER-96B LAB RESULT	9= SUPER-05 LAB RESULT	10= COLLING-96A LAB RESULT
F003	2.65	1.11	12.2	12.6	26.2	10.9	3.13	4.32	2.8	6.25
F009	2.68	1.12	13.3	13.4	26.7	12.1	3.70 WH	4.91 WH	3.36 AH	6.48
F010	2.63	1.08	11.7	12.3	24.5	11.0	3.13	4.22	2.75	6.18
F011	2.7	1.2	12.5	12.7	25.6	11.8	3.2	4.3	2.8	6.6
F014	2.86	1.18	12.6	12.9	25.7	11.6	3.36	4.50	2.95	6.57
F015	2.9	1.2	12.4	13.1	25.7	11.7	3.5	4.6	3.	6.5
F021	2.62	1.07	24.7 AH	25.4 AH	25.3	11.6	3.14	4.21	2.72	6.26
F022	2.63	1.09	12.9	13.8	25.8	12.9 WH	3.69 WH	4.9 WH	2.81	7.16 AH
F026	2.64	1.11	11.5	11.9	23.6 WL	11.0	3.17	4.24	2.76	6.14
F069	2.83	1.15	12.2	12.9	26.1	11.6	3.3	4.43	2.9	6.51
F099	2.60	1.07	12.0	12.7	25.0	11.6	3.15	4.32	2.70	6.35
F153	2.9	1.2	13.	13.	25.	12.	3.4	4.6	2.9	6.4
F154	2.49	1.03	11.3	11.9	25.2	11.2	3.11	4.15	2.68	6.17
F158	2.6	1.1	11.7	11.9	23.6 WL	10.8	3.0	4.0	2.6	6.0
F183	2.62	1.13	12.2	12.8	24.9	11.4	3.18	4.38	2.76	6.39
F193	2.92	1.16	12.3	12.6	27.6 WH	11.3	3.37	4.51	2.87	6.38
F207	2.7	1.1	12.1	12.5	25.6	11.4	3.3	4.3	2.8	6.4
F223	2.38		12.1	12.8	25.5	11.4	12.8 AH	4.02	2.41 WL	6.23
F223a	2.90	1.15	12.9	13.5	26.7	12.2	3.40	4.63	3.03	6.82 WH
F223b	2.84		11.5	12.1	25.8	11.4	3.14	4.44	2.79	6.25
F239			12.	12.	24.	15. AH				
F248	2.71	1.09	11.7	12.3	25.2	11.5	3.23	4.33	2.85	6.42
ASSIGNED VALUE *	2.68	1.11	12.2	12.7	25.6	11.5	3.22	4.33	2.80	6.38
R-STD DEV *	0.155	0.054	0.63	0.62	0.93	0.49	0.195	0.230	0.137	0.196
ACCEPTABLE LIMITS(+-) *	0.310	0.108	1.26	1.24	1.86	0.98	0.390	0.460	0.274	0.392
WARNING LIMITS(+-) *	.310- .465	.108- .162	1.26- 1.89	1.24- 1.86	1.86- 2.79	.98- 1.47	.390- .585	.460- .690	.274- .411	.392- .588
ACTION LIMITS(<>) *	0.465	0.162	1.89	1.86	2.79	1.47	0.585	0.690	0.411	0.588
N *	21	19	22	22	22	22	21	21	21	21

* 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	92.5	9.2			10			AAS absorption
F009	178.5	17.8	WHWHAH	BIASED HIGH*	10	4.0	0.1790	ICP-MS
F010	49.0	4.9		BIASED LOW*	10	-4.5	0.0579	ICP-AES
F011	135.0	13.5			10			
F014	158.5	15.8			10			
F015	171.0	17.1		BIASED HIGH*	10	-0.2	0.2118	ICP-AES
F021	98.0	9.8	AHAH		10			ICP-AES
F022	163.0	16.3	WHHHWH AH		10			ICP-AES
F026	51.5	5.1	WL	BIASED LOW	10	-8.2	0.2218	ICP-AES
F069	146.5	14.6			10			ICP-AES
F099	74.5	7.4			10			AAS absorption
F153	161.5	16.1			10			ICP-AES
F154	30.5	3.0		BIASED LOW*	10	-2.3	-0.1547	ICP-MS
F158	25.5	2.5	WL	BIASED LOW	10	-7.6	0.0908	ICP-MS
F183	96.0	9.6			10			
F193	143.5	14.3	WH		10			ICP-MS
F207	102.0	10.2			10			ICP-AES
F223	72.5	8.0	AH WL		9			ICP-AES
F223a	187.0	18.7	WH	BIASED HIGH*	10	4.3	0.1017	IC Dionex
F223b	83.5	9.2			9			AAS absorption
F239	36.5	9.1	AH	INSUFFICIENT DATA	4			IC
F248	100.5	10.0			10			ICP-MS

* 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 11.1

PARAMETER: 07092 Nitrate + Nitrite mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= LAB RESULT	8= FRASER-96B LAB RESULT	9= SUPER-05 LAB RESULT	10= COLLING-96A LAB RESULT
F003	0.324	0.041	0.342	2.02	2.85	0.341	0.151	0.13	0.366	0.325
F004	0.324	0.042	0.341	2.02	2.87	0.343	0.151	0.131	0.365	0.322
F009	0.307	0.037	0.322	1.94	2.78	0.323	0.143	0.124	0.350	0.307
F010	0.29	0.03 WL	0.30	1.65 AL	1.93 AL	0.29 WL	0.14	0.12	0.35	0.30
F011	0.25 WL	0.07 AH	0.30	1.78 AL	2.61	0.38 WH	0.14	0.13	0.26 AL	0.31
F015	0.338	0.041	0.374 WH	2.22 AH	3.1	0.373 WH	0.159	0.137	0.389	0.345
F021	0.31	0.04	0.33	1.99	2.85	0.33	0.15	0.13	0.35	0.31
F022	0.284	0.034	0.296	1.97	2.85	0.297	0.124 WL	0.11 WL	0.324	0.272 WL
F026	0.293	0.042	0.322	2.03	2.89	0.330	0.142	0.122	0.358	0.313
F026b	0.314	0.037	0.354	2.04	2.95	0.349	0.160	0.135	0.359	0.320
F069	0.315	0.038	0.333	1.98	2.85	0.33	0.146	0.125	0.36	0.317
F074	0.312	0.038	0.331	2.08	2.97	0.338	0.151	0.135	0.347	0.32
F074b	0.327	0.043	0.347	2.01	2.91	0.352	0.153	0.132	0.371	0.329
F099	0.32	0.039	0.34	2.02	2.91	0.34	0.15	0.12	0.38	0.32
F113	0.28	0.03 WL	0.31	1.96	2.82	0.31	0.12 AL	0.11 WL	0.32	0.28
F153	0.29	0.05 WH	0.30	2.0	3.0	0.30	0.14	0.11 WL	0.32	0.25 AL
F154	0.310	<0.050	0.327	2.02	2.85	0.331	0.143	0.123	0.357	0.311
F158	0.30	0.06 AH	0.33	1.99	2.71	0.33	0.15	0.19 AH	0.34	0.30
F158b	0.34	0.04	0.37	2.05	3.06	0.37 WH	0.16	0.14	0.38	0.34
F183	0.308	0.041	0.326	2.09	2.98	0.326	0.134	0.130	0.335	0.307
F193	0.31	<0.07	0.33	2.00	2.84	0.33	0.14	0.12	0.35	0.30
F207	0.325	0.041	0.342	2.03	2.87	0.343	0.15	0.13	0.37	0.326
F221	0.312	0.039	0.334	1.88	2.32 AL	0.332	0.145	0.126	0.364	0.313
F239			0.32	1.9	2.7	0.32				
F304	0.327	0.042	0.347	2.09	3.01	0.350	0.155	0.131	0.376	0.344
F324	0.28	0.03 WL	0.32	1.99	3.02	0.33	0.15	0.13	0.37	0.31
ASSIGNED VALUE *	0.310	0.040	0.330	2.01	2.87	0.330	0.150	0.130	0.358	0.313
R-STD DEV *	0.0202	0.0048	0.0201	0.066	0.137	0.0189	0.0089	0.0084	0.0215	0.0164
ACCEPTABLE LIMITS(+-) *	0.0404	0.0096	0.0402	0.132	0.274	0.0378	0.0178	0.0168	0.0430	0.0328
WARNING LIMITS(+-) *	.0404-	.0606	.0096-	.0144	.0402-	.0603	.132-	.198	.274-	.411
ACTION LIMITS(<>) *	0.0606	0.0144	0.0603	0.198	0.411	0.0567	0.0178-	.0267	0.0168-	.0252
N *	25	23	26	26	26	26	26	25	25	25

* 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	171.5	17.1			10			AA Cadmium redn
F004	180.5	18.0			10			AA Cadmium redn
F009	75.5	7.5			10			IC Dionex
F010	38.5	3.8	WL ALALWL	BIASED LOW	10	-30.1	0.0622	AA Hydrazine redn
F011	89.0	8.9	WLAH AL WH AL		10			
F015	237.5	23.7	WHAH WH	BIASED HIGH	10	9.0	0.0032	Flow injection Cd
F021	117.0	11.7			10			IC Dionex
F022	39.0	3.9	WLWL WL	BIASED LOW*	10	0.2	-0.0283	IC Dionex
F026	121.0	12.1			10			AA Cadmium redn
F026b	183.5	18.3			10			IC Dionex
F069	122.0	12.2			10			
F074	160.5	16.0			10			AA Cadmium redn
F074b	203.5	20.3		BIASED HIGH*	10	0.9	0.0080	AA Cadmium redn
F099	157.0	15.7			10			Flow injection Cd
F113	35.0	3.5	WL ALWL	BIASED LOW*	10	-0.9	-0.0233	IC Dionex
F153	78.0	7.8	WH WL AL		10			IC Dionex
F154	106.0	11.7			9			Flow injection Cd
F158	119.5	11.9	AH AH		10			AA Hydrazine redn
F158b	227.5	22.7	WH	BIASED HIGH	10	5.2	0.0064	AA Hydrazine redn
F183	117.0	11.7			10			Colorimetry
F193	81.0	9.0			9			IC Dionex
F207	179.5	17.9			10			Flow injection Cd
F221	112.5	11.2	AL		10			Flow injection Cd
F239	19.5	4.8		INSUFFICIENT DATA	4			IC
F304	219.0	21.9		BIASED HIGH*	10	4.8	0.0011	
F324	114.5	11.4	WL		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 13.1

PARAMETER: 01092 pH

pH Units

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSAL-09B LAB RESULT	7= 7.8 WL LAB RESULT	8= FRASER-96B LAB RESULT	9= SUPER-05 LAB RESULT	10= COLLING-96A LAB RESULT
F003	7.62	6.38	8.2	8.16	8.34	8.21	8.1	8.11	7.9	8.07
F009	7.63	6.35	8.22	8.16	8.37	8.20	8.09	8.06	7.86	8.06
F010	7.1 WL	6.0 WL	8.0 WL	8.0	8.3	8.0	7.8 WL	7.7 AL	7.5 WL	7.8 WL
F011	7.58	6.34	8.15	8.08	8.29	8.13	8.02	8.00	7.82	8.01
F014	7.71	6.47	8.26	8.21	8.39	8.25	8.17	8.14	7.99	8.17
F015	7.77	6.4	8.26	8.24	8.44	8.26	8.16	8.11	7.95	8.15
F015b	7.6	6.09	8.2	8.15	8.4	8.2	8.14	8.04	7.64	8.14
F021	7.74	6.44	8.25	8.21	8.37	8.21	8.13	8.10	7.93	8.12
F022	7.63	6.67	8.22	8.25	8.33	8.18	8.05	8.02	7.9	7.94
F026	7.23 WL	6.23	7.92 AL	7.99	8.45	8.12	7.89	7.79 WL	7.57	7.82 WL
F026b	7.40	6.69	8.26	8.17	8.40	8.16	8.02	7.96	7.86	8.04
F069	7.7	6.6	8.3	8.2	8.4	8.3	8.2	8.1	8.	8.1
F074b	7.53	6.63	8.19	8.16	8.41	7.97 WL	8.07	7.93	7.83	7.91
F090	7.69	6.45	8.24	8.16	8.38	8.21	8.13	8.09	7.90	8.08
F099	7.47	6.29	8.10	8.01	8.16 AL	7.90 WL	7.72 AL	7.82 WL	7.50 WL	7.69 AL
F113	7.56	6.33	8.19	8.17	8.38	8.21	8.09	8.06	7.87	8.11
F153	7.7	6.5	8.3	8.3	8.4	8.3	8.2	8.1	7.8	8.1
F154	7.81	6.52	8.35	8.29	8.50	8.33	8.22	8.16	7.99	8.20
F158	7.87	6.51	8.35	8.29	8.44	8.32	8.22	8.19	8.02	8.20
F183	7.15 WL	6.77	8.06	8.05	8.33	8.09	7.87	7.88	7.57	7.96
F193	7.37	6.22	8.15	8.12	8.30	8.10	8.00	7.95	7.63	7.96
F221	7.63	6.42	8.10	8.07	8.30	8.12	8.00	8.00	7.86	7.98
F239			8.2	8.1	8.3	8.1				
F248	7.65	6.32	8.24	8.20	8.42	8.20	8.11	8.05	7.90	8.09
F310	7.39	6.51	8.17	8.15	8.37	8.20	8.08	8.02	7.85	8.01
ASSIGNED VALUE *	7.62	6.43	8.21	8.16	8.38	8.20	8.09	8.05	7.86	8.07
R-STD DEV *	0.188	0.181	0.092	0.096	0.062	0.100	0.116	0.111	0.167	0.119
ACCEPTABLE LIMITS(+-) *	0.376	0.362	0.184	0.192	0.124	0.200	0.232	0.222	0.334	0.238
WARNING LIMITS(+-) *	.376-.564	.362-.543	.184-.276	.192-.288	.124-.186	.200-.300	.232-.348	.222-.333	.334-.501	.238-.357
ACTION LIMITS(<>) *	0.564	0.543	0.276	0.288	0.186	0.300	0.348	0.333	0.501	0.357
N *	24	24	25	25	25	25	24	24	24	24

* 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	137.0	13.7			10			pH Stirred
F009	125.5	12.5			10			pH Stirred
F010	20.0	2.0	WLWLWL	WLALWLWL	BIASED LOW	10	16.3	-1.5751
F011	75.0	7.5			10			pH Stirred
F014	195.0	19.5			BIASED HIGH*	10	0.2	0.0519
F015	198.0	19.8			BIASED HIGH*	10	4.3	-0.2704
F015b	121.5	12.1				10		pH Stirred
F021	172.5	17.2				10		pH Stirred-PC-Titrat
F022	132.0	13.2				10		pH Stirred
F026	53.0	5.3	WL AL	WL WL	BIASED LOW	10	6.8	-0.7422
F026b	129.5	12.9				10		pH Stirred
F069	197.5	19.7			BIASED HIGH	10	-6.0	0.5537
F074b	101.0	10.1		WL		10		pH Stirred
F090	154.0	15.4				10		pH Stirred
F099	28.0	2.8	ALWLALWLWL		BIASED LOW	10	-5.5	0.1931
F113	131.0	13.1				10		pH Stirred
F153	185.0	18.5				10		pH Stirred
F154	231.5	23.1			BIASED HIGH*	10	1.6	0.0072
F158	231.0	23.1			BIASED HIGH*	10	0.5	0.0967
F183	61.5	6.1	WL			10		pH Stirred
F193	54.5	5.4			BIASED LOW	10	9.0	-0.8396
F221	81.5	8.1				10		pH unstirred
F239	29.0	7.2			INSUFFICIENT DATA	4		pH unstirred
F248	150.0	15.0				10		pH unstirred
F310	105.5	10.5				10		pH Stirred

* 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 12.7

PARAMETER: 19091 Potassium

mg/L

EC PT for Major Ions & Nutrients

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSA-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	0.8	0.57	1.18	3.96	3.52	1.31	0.34	0.38	0.53	0.86
F009	0.803	0.565	1.27	4.50 WH	4.05 AH	1.54 AH	0.382 WH	0.428	0.613	1.03 WH
F010	0.79	0.54	1.19	3.92	3.43	1.31	0.29	0.34	0.49	0.83
F011	0.7 WL	0.5	1.2	3.8	3.4	1.3	0.3	0.3	0.4	0.8
F014	0.81	0.57	1.2	3.9	3.5	1.3	0.31	0.36	0.51	0.87
F015	0.9 WH	0.6	1.3	4.1	3.6	1.4	0.3	0.4	0.6	0.9
F021	0.76	0.51	2.49 AH	7.91 AH	3.33	1.36	0.16 AL	0.16 AL	0.31 AL	0.64 AL
F022	0.781	0.569	1.28	4.46 WH	3.76	1.52 AH	0.35	0.394	0.505	0.969
F026	0.823	0.588	1.20	3.97	3.51	1.32	0.322	0.376	0.514	0.853
F069	0.839	0.573	1.17	3.89	3.48	1.29	0.319	0.32	0.539	0.862
F099	0.720	0.499	1.09	3.62	3.19	1.24	0.267	0.303	0.432	0.761
F153	0.75	0.61	1.1	3.7	3.3	1.3	0.31	0.41	0.48	0.84
F154	0.79	0.57	1.17	3.85	3.50	1.32	0.32	0.37	0.50	0.84
F158	0.8	0.6	1.2	3.9	3.4	1.3	<0.5	<0.5	0.5	0.9
F183	0.855	0.583	1.24	3.97	3.52	1.31	0.329	0.374	0.509	0.861
F207	0.8	0.5	1.2	3.8	3.4	1.3	0.3	0.3	0.5	0.8
F223	1.01 AH	0.75 AH	1.38 WH	4.00	3.60	1.47 WH			0.68 AH	1.02 WH
F223a	0.80	0.54	1.18	4.01	3.57	1.30	0.31	0.35	0.48	0.83
F239			1.4 WH	4.1	5.0 AH	1.4				
F248	0.819	0.581	1.20	3.98	3.60	1.38	0.328	0.376	0.517	0.879
ASSIGNED VALUE *	0.800	0.570	1.20	3.96	3.50	1.31	0.314	0.372	0.505	0.860
R-STD DEV *	0.0449	0.0437	0.080	0.181	0.159	0.061	0.0257	0.0485	0.0545	0.0667
ACCEPTABLE LIMITS(+-) *	0.0898	0.0874	0.160	0.362	0.318	0.122	0.0514	0.0970	0.1090	0.1334
WARNING LIMITS(+-) *	.0898- .1347-.0874- .1311.160- .240	.362- .543	.318- .477	.122- .183	.0514- .0771.0970- .1455.1090- .1635.1334- .2001					
ACTION LIMITS(<>) *	0.1347	0.1311	0.240	0.543	0.477	0.183	0.0771	0.1455	0.1635	0.2001
N *	19	19	20	20	20	20	17	17	19	19

* 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	110.5	11.0			10			AAS absorption
F009	163.0	16.3	WHAHAWH	WH	BIASED HIGH	10	14.5	-0.0173
F010	65.5	6.5				10		ICP-MS
F011	41.0	4.1	WL		BIASED LOW*	10	-2.5	ICP-AES
F014	97.0	9.7				10		
F015	153.0	15.3	WH		BIASED HIGH*	10	2.1	0.0413
F021	69.0	6.9	AHAH	ALALALAL		10		ICP-AES
F022	141.0	14.1	WH AH			10		ICP-AES
F026	121.0	12.1				10		ICP-AES
F069	90.5	9.0				10		ICP-AES
F099	18.0	1.8			BIASED LOW	10	-8.3	-0.0172
F153	68.5	6.8				10		AAS absorption
F154	82.5	8.2				10		ICP-AES
F158	78.0	9.7				8		ICP-MS
F183	125.0	12.5				10		ICP-MS
F207	55.5	5.5				10		
F223	141.0	17.6	AHAWH	WH AHW	BIASED HIGH*	8	-4.1	0.2129
F223a	80.0	8.0				10		ICP-AES
F239	72.0	18.0	WH AH		INSUFFICIENT DATA	4		IC Dionex
F248	134.0	13.4				10		Flame photometer
								ICP-MS

* 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 10.0

PARAMETER: 14091 Silicates

mg/L SiO₂WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	4.88	2.75	5.87	1.98	0.65	1.66	6.43	3.51	2.34	0.83
F011	4.83	2.60	5.56	2.01	0.633	1.72	6.78	3.72	2.50	0.849
F015	4.79	2.55	5.69	1.71	0.43 AL	1.46	6.51	3.32	2.10	0.64 WL
F022	5.27	2.75	5.82	2.03	0.886 AH	1.69	6.26	3.55	2.34	0.96
F026	4.79	2.60	5.58	1.85	0.58	1.57	6.11	3.37	2.22	0.79
F026b	4.35 WL	2.42	5.08 WL	1.70	0.536	1.45	5.65	3.09 WL	2.06	0.713
F069	4.97	2.76	5.73	1.83	0.575	1.6	6.24	3.44	2.29	0.786
F099	5.09	2.74	5.99	1.97	0.62	1.69	6.57	3.51	2.35	0.83
F113	4.94	2.80	5.72	1.99	0.637	1.71	6.21	3.55	2.39	0.845
F153	5.0	3.1 AH	5.8	1.9	0.56	1.6	6.3	3.5	2.5	0.75
F154	4.97	2.65	7.00 AH	1.98	0.671	7.14 AH	7.15 WH	3.58	2.38	0.846
F158	4.6	2.4 WL	5.4	1.6 WL	<1.0	1.4	5.9	3.2 WL	2.0 WL	<1.0
F183	4.82	2.65	5.46	1.87	0.555	1.57	6.08	3.45	2.26	0.775
F207	4.85	2.64	5.69	1.86	0.57	1.56	6.14	3.35	2.23	0.77
F221	5.05	2.78	5.91	1.95	0.614	1.67	6.41	3.51	2.33	0.820
F310	6.09 AH	2.68	5.7	2.66 AH	0.632	1.57	3.85 AL	3.41	2.22	2.18 AH
ASSIGNED VALUE *	4.88	2.65	5.70	1.90	0.614	1.60	6.26	3.48	2.31	0.805
R-STD DEV *	0.205	0.127	0.225	0.141	0.0576	0.116	0.372	0.131	0.153	0.0720
ACCEPTABLE LIMITS(+-) *	0.410	0.254	0.450	0.282	0.1152	0.232	0.744	0.262	0.306	0.1440
WARNING LIMITS(+-) *	.410- .615	.254- .381	.450- .675	.282- .423	.1152- .1728	.232- .348	.744- 1.116	.262- .393	.306- .459	.1440- .2160
ACTION LIMITS(<>) *	0.615	0.381	0.675	0.423	0.1728	0.348	1.116	0.393	0.459	0.2160
N *	16	16	16	16	15	16	16	16	16	15

* 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	110.0	11.0			10			Molybdate
F011	114.0	11.4			10			
F015	40.0	4.0	AL	WL	BIASED LOW	10	5.4	-0.2731 ICP-AES
F022	128.0	12.8		AH	BIASED HIGH*	10	-0.6	0.1466 Molybdate
F026	52.5	5.2				10		Molybdate
F026b	17.0	1.7	WL	WL	WL	BIASED LOW	10	-10.3 -0.0117 ICP-AES
F069	81.0	8.1				10		ICP-AES
F099	117.0	11.7				10		Flow injection
F113	117.5	11.7				10		Flow injection
F153	97.0	9.7	AH			10		ICP-AES
F154	131.5	13.1	AH	AHWH	BIASED HIGH*	10	-4.7	0.9517 Heteropolyblue
F158	13.0	1.6	WL	WL	WLWL	BIASED LOW*	8	-1.6 -0.2377 Molybdate
F183	55.5	5.5				10		
F207	54.5	5.4				10		Flow injection
F221	108.0	10.8				10		Flow injection
F310	91.5	9.1	AH	AH	AL	AH	10	

* 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 8.4

PARAMETER: 11091 Sodium

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	4.83	3.47	5.91	42.	42.4	6.19	2.7	0.74	1.35	3.32
F009	4.74	3.44	6.58	44.9	44.4	6.67	3.24 AH	0.866	1.67 WH	4.05 AH
F010	4.78	3.47	5.99	42.	41.9	6.28	2.80	0.76	1.40	3.43
F011	4.7	3.6	6.2	41.5	42.1	6.5	2.8	0.7	1.4	3.6
F014	4.76	3.49	5.77	41.7	42.8	5.98	2.54 WL	0.48 AL	1.15 WL	3.16 WL
F015	5.1	3.7 WH	6.2	42.1	42.8	6.5	2.9	0.8	1.5	3.6
F021	4.96	3.61	12.5 AH	87.8 AH	43.4	6.63	2.89	0.78	1.44	3.55
F022	4.92	3.53	6.69 WH	48.3 AH	46.6 WH	7.47 AH	3.3 AH	0.86	1.43	4.06 AH
F026	4.76	3.34	5.75	38.4 WL	38.4 WL	6.10	2.79	0.716	1.28	3.40
F069	5.07	3.56	6.02	43.8	44.6	6.35	2.9	0.759	1.45	3.61
F099	4.70	3.59	5.66	42.2	43.2	6.04	2.99	7.27 AH	1.27	5.02 AH
F153	5.0	3.5	6.1	43.	43.	6.3	2.9	0.69	1.3	3.5
F154	4.65	3.41	5.80	44.5	44.8	6.39	2.82	0.771	1.36	3.40
F158	4.8	3.5	5.9	40.6	41.7	6.2	2.8	0.8	1.4	3.4
F183	5.03	3.54	6.02	41.1	39.7	6.13	2.88	0.704	1.40	3.48
F193	5.22 WH	3.6	6.19	42.9	47.5 WH	6.39	2.97	0.81	1.44	3.52
F207	4.8	3.4	6.	41.6	42.4	6.3	2.9	0.7	1.3	3.4
F223	<10.	<10.	<10.	43.9	44.2	<10.	<10.	<10.	<10.	<10.
F223a	4.81	3.43	5.00 AL	42.3	42.9	6.28	2.74	0.66	1.32	3.38
F239				6.2	43.	46.	6.3			
F248	4.78	3.53	5.89	41.3	42.5	6.44	2.86	0.76	1.46	3.51
ASSIGNED VALUE *	4.80	3.50	6.01	42.1	42.9	6.30	2.86	0.760	1.40	3.46
R-STD DEV *	0.164	0.088	0.296	1.67	1.82	0.220	0.114	0.0760	0.090	0.162
ACCEPTABLE LIMITS(+-) *	0.328	0.176	0.592	3.34	3.64	0.440	0.228	0.1520	0.180	0.324
WARNING LIMITS(+-) *	.328- .492	.176- .264	.592- .888	3.34- 5.01	3.64- 5.46	.440- .660	.228- .342	.1520- .2280	.180- .270	.324- .486
ACTION LIMITS(<>) *	0.492	0.264	0.888	5.01	5.46	0.660	0.342	0.2280	0.270	0.486
N *	19	19	20	21	21	20	19	19	19	19

* 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	65.5	6.5			10			AAS absorption
F009	153.0	15.3		AH WWAH	10			ICP-MS
F010	78.0	7.8			10			ICP-AES
F011	97.0	9.7			10			
F014	39.0	3.9		WLALWLWL	BIASED LOW*	10	-0.2	-0.2226
F015	149.5	14.9	WH		10			ICP-AES
F021	156.5	15.6	AHAH		10			ICP-AES
F022	170.5	17.0	WHAHWHAH	AH	BIASED HIGH	10	11.6	-0.0337
F026	34.0	3.4	WLWL		BIASED LOW	10	-10.3	0.2408
F069	142.0	14.2				10		ICP-AES
F099	102.5	10.2		AH AH		10		AAS absorption
F153	105.0	10.5				10		ICP-AES
F154	92.0	9.2				10		ICP-MS
F158	73.5	7.3				10		ICP-MS
F183	85.0	8.5				10		ICP-MS
F193	155.5	15.5	WH WH			10		ICP-MS
F207	72.0	7.2				10		ICP-AES
F223	32.0	16.0			INSUFFICIENT DATA	2		ICP-AES
F223a	60.5	6.0	AL		INSUFFICIENT DATA	10		IC Dionex
F239	59.5	14.8				4		Flame photometer
F248	99.5	9.9				10		ICP-MS

* 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 10.3

PARAMETER: 16092 Sulfate

mg/L

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	7.74	10.7	37.4	43.	76.1	22.4	5.45	8.02	3.4	14.5
F009	7.7	10.3	36.0	41.7	73.5	21.9	5.46	7.90	3.40	14.1
F010	6.3 AL	8.6 AL	31. AL	36. AL	63. AL	18. AL	4.5 WL	6.5 WL	2.8 WL	12. AL
F011	8.	11.	40. WH	45.	80.	24.	6.	9.	4. WH	16. WH
F014	7.67	11.6	44.1 AH	47.6 WH	87.7 AH	25.4 AH	5.18	8.38	3.63	14.0
F015	7.1 WL	9.9	37.	40. WL	74.	22.4	5.	7.4	3.1	14.3
F021	7.84	10.7	37.2	44.8	79.4	22.4	5.59	8.04	3.46	14.6
F022	7.72	10.8	37.7	43.7	76.9	22.5	5.42	7.98	3.36	14.5
F026	8.0	10.9	37.5	43.8	77.1	22.3	5.67	8.30	3.51	15.1
F069			37.	42.7	76.7	22.8	5.86	8.5		15.5
F074	8.62 WH	11.4	39.3	45.6	79.6	24.	7.03 AH	8.98	3.65	15.6
F113	8.06	11.0	39.0	45.0	79.5	23.6	6.25	8.86	3.64	15.2
F153	7.9	10.	36.	45.	77.	23.	6.0	8.0	3.6	14.
F154	7.91	11.0	37.6	43.8	77.3	22.6	5.40	8.09	3.40	14.7
F158	8.4	11.8	37.6	43.3	74.1	22.2	5.6	8.7	3.6	15.0
F183	7.49	10.2	37.5	43.9	78.6	22.1	5.45	7.79	3.64	14.1
F193	7.81	10.9	37.8	44.0	77.6	23.0	5.75	8.27	3.54	14.8
F207	7.5	10.3	36.3	42.2	75.2	21.2	5.3	7.8	3.3	13.7
F223a	7.72	10.7	37.1	43.0	76.2	22.5	5.41	8.00	3.36	14.5
F239			36.	45.	79.	23.				
F248	7.86	10.7	37.7	43.5	77.0	22.6	5.74	8.26	1.63 AL	14.7
F324	9.41 AH	11.7	36.2	43.4	79.9	21.1	6.32	9.32 WH	4.61 AH	14.4
ASSIGNED VALUE *	7.82	10.8	37.4	43.8	77.0	22.5	5.52	8.09	3.48	14.6
R-STD DEV *	0.339	0.65	1.25	1.45	2.54	0.93	0.436	0.547	0.246	0.66
ACCEPTABLE LIMITS(+-) *	0.678	1.30	2.50	2.90	5.08	1.86	0.872	1.094	0.492	1.32
WARNING LIMITS(+-) *	.678- 1.017	1.30- 1.95	2.50- 3.75	2.90- 4.35	5.08- 7.62	1.86- 2.79	.872- 1.308	1.094- 1.641	.492- .738	1.32- 1.98
ACTION LIMITS(<>) *	1.017	1.95	3.75	4.35	7.62	2.79	1.308	1.641	0.738	1.98
N *	20	20	22	22	22	22	21	21	20	21

* 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	85.5	8.5			10			IC Dionex
F009	52.0	5.2		BIASED LOW*	10	-4.9	0.2060	IC Dionex
F010	11.0	1.1	ALALALALALALWLWLWL	BIASED LOW	10	-18.0	-0.0981	IC Dionex
F011	189.0	18.9	WH WHWH	BIASED HIGH*	10	3.4	0.3957	
F014	147.5	14.7	AHWAHAH		10			
F015	39.5	3.9	WL WL	BIASED LOW*	10	-4.1	-0.1566	IC
F021	114.5	11.4			10			IC Dionex
F022	95.0	9.5			10			IC Dionex
F026	127.0	12.7			10			IC Dionex
F069	86.5	12.3			7			IC
F074	194.5	19.4	WH AH	BIASED HIGH*	10	2.6	0.6666	IC
F113	178.0	17.8		BIASED HIGH*	10	2.8	0.2492	IC Dionex
F153	107.0	10.7			10			IC Dionex
F154	120.0	12.0			10			IC
F158	129.0	12.9			10			IC Dionex
F183	87.0	8.7			10			IC
F193	141.5	14.1			10			IC Dionex
F207	41.5	4.1		BIASED LOW*	10	-2.5	-0.2713	IC
F223a	79.0	7.9			10			IC Dionex
F239	54.5	13.6		INSUFFICIENT DATA	4			IC
F248	111.5	11.1	AL		10			IC Dionex
F324	144.0	14.4	AH WHAH		10			Turbidimetry

* 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 11.0

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

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	31.8		121.	109.	246.	108.	76.9	65.6	41.6	70.9
F009	34.	3.3	124.	112.	248.	109.	78.	68.	43.	72.
F010	33.	1.1	126.	113.	253.	111.	79.	68.	43.	73.
F011	33.2	1.5	120.	109.	245.	108.	76.9	66.3	42.6	71.4
F014	33.7	1.38	124.	112.	250.	110.	78.6	68.1	43.7	73.3
F015	33.5		124.	112.	248.	110.	78.4	67.5	43.2	72.7
F021	32.7	<20.0	121.	109.	243.	107.	76.3	65.7	42.3	70.9
F022	109. AH	5.15	125.	113.	223. AL	116. WH	79.5	68.5	51.5 AH	74.5
F026	31.5	1.41	122.	110.	248.	109.	76.6	65.6	41.8	71.0
F069	34.6	4.8	125.	112.	250.	111.	79.5	68.5	44.6	73.8
F099	33.1	3.3	12.5 AL	11.3 AL	25. AL	11.1 AL	7.9 AL	6.95 AL	4.44 AL	7.35 AL
F113	31.6	2.64	119.	106.	238.	104.	74.3	64.0	41.3	69.2
F153	30. WL	<20.	126.	107.	245.	112.	76.	65.	42.	71.
F154	33.4	3.1	123.	111.	248.	109.	77.7	66.9	42.9	71.8
F158	31.8	1.4	118.	106.	238.	105.	75.1	64.4	41.5	69.7
F183	39.4 AH	10.4 AH	138. AH	126. AH	263. WH	125. AH	91.5 AH	78.9 AH	52.4 AH	92.1 AH
F193	33.2	3.32	122.	110.	244.	107.	76.4	66.2	42.7	71.3
F207	33.	<2.	117.	107.	243.	107.	77.	66.	42.	72.
F223			122.	110.	247.	108.	77.4	66.7	42.8	71.5
F239			125.	113.	249.	111.				
F248	33.	<20.	123.	111.	245.	108.	77.	66.	43.	71.
F310	32.1	<10.0	118.	106.	238.	106.	75.6	64.3	41.8	69.6
ASSIGNED VALUE *	33.0	2.87	122.5	110.0	246	108.5	77.0	66.20	42.65	71.40
R-STD DEV *	1.25	1.736	3.48	3.10	5.8	2.91	1.81	1.821	1.126	1.744
ACCEPTABLE LIMITS(+-) *	2.50	3.472	6.96	6.20	11.6	5.82	3.62	3.642	2.252	3.488
WARNING LIMITS(+-) *	2.50- 3.75	3.472- 5.208	6.96- 10.44	6.20- 9.30	11.6- 17.4	5.82- 8.73	3.62- 5.43	3.642- 5.463	2.252- 3.378	3.488- 5.232
ACTION LIMITS(<>) *	3.75	5.208	10.44	9.30	17.4	8.73	5.43	5.463	3.378	5.232
N *	20	13	22	22	22	22	21	21	21	21

* 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	67.0	7.4			9			PC Titrate
F009	146.5	14.6			10			Mettler
F010	156.0	15.6			10			Mettler
F011	93.5	9.3			10			
F014	155.5	15.5			10			
F015	141.5	15.7			9			Titration
F021	63.5	7.0			9			PC Titrate
F022	172.0	17.2	AH	AIWH AH	BIASED HIGH	10	-20.4	PC Titrate
F026	83.5	8.3			10			PC Titrate
F069	178.0	17.8			BIASED HIGH*	10	1.0	PC Titrate
F099	27.5	2.7		ALALALALALALALAL	BIASED LOW	10	-94.5	Titration
F113	31.0	3.1			BIASED LOW	10	-3.1	Titration
F153	82.5	9.1	WL			9		Potentiometry
F154	129.5	12.9				10		Radiometer
F158	35.0	3.5			BIASED LOW	10	-3.0	PC Titrate
F183	204.0	20.4	AHAHAHAHWAHAHAHAHAH		BIASED HIGH	10	4.3	Colorimetry
F193	96.5	9.6				10		Titration
F207	72.0	8.0				9		Titration
F223	93.5	11.6				8		Titration
F239	74.0	18.5			INSUFFICIENT DATA	4		Titration
F248	98.5	10.9				9		Titration
F310	36.0	4.0			BIASED LOW	9	-3.5	Titration
							0.5320	

* 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 10.9

PARAMETER: 10692 Total Hardness mg/L

EC PT for Major Ions & Nutrients

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= LAB RESULT	8= FRASER-96B LAB RESULT	9= SUPER-05 LAB RESULT	10= COLLING-96A LAB RESULT
F003	39.3	16.	151.	166.	340.	131.	78.4	73.3	45.1	86.1
F011	39.7	17.6	158.	167.	341.	138.	80.0	73.4	46.5	90.7
F014	42.4	17.2	159.	172.	350.	137.	83.6	77.1	47.6	90.7
F015	43.3	17.5	150.	166.	340.	131.	81.8	74.4	48.4	87.4
F022	37.6	15.3	161.	182. WH	353.	150. WH	88.8 WH	80.0	44.1	96.7 WH
F026b	39.1	15.9	145.	158.	324.	127.	77.4	69.5	44.1	84.5
F099	40.0	58.8 AH	154.	170.	345.	137.	82.	75.7	46.6	89.3
F153	42.	17.	161.	166.	344.	140.	81.	77.	46.	90.
F154	37.3	15.2	144.	159.	339.	128.	76.6	70.9	42.9	83.9
F158	38.6	15.8	150.	163.	336.	131.	77.5	71.1	43.6	84.3
F207	39.6	15.7	151.	164.	338.	134.	79.6	72.4	44.9	86.5
F239			142.	159.	326.	162. AH				
F324	38.	15.	139.	150. WL	295. AL	125.	74.9	70.6	41.1	81.3
ASSIGNED VALUE *	39.4	15.9	151	166	340	132	79.8	73.4	45.0	87.0
R-STD DEV *	2.09	1.22	8.2	6.5	10.7	7.8	3.38	3.34	2.22	4.00
ACCEPTABLE LIMITS(+-) *	4.18	2.44	16.4	13.0	21.4	15.6	6.76	6.68	4.44	8.00
WARNING LIMITS(+-) *	4.18- 6.27	2.44- 3.66	16.4- 24.6	13.0- 19.5	21.4- 32.1	15.6- 23.4	6.76- 10.14	6.68- 10.02	4.44- 6.66	8.00- 12.00
ACTION LIMITS(<>) *	6.27	3.66	24.6	19.5	32.1	23.4	10.14	10.02	6.66	12.00
N *	12	12	13	13	13	13	12	12	12	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	64.0	6.4			10			calculated AAS
F011	91.5	9.1			10			
F014	107.0	10.7		BIASED HIGH*	10	2.6	1.5218	
F015	84.0	8.4			10			calculated ICP
F022	96.0	9.6	WH WWHH WH		10			calculated ICP
F026b	33.5	3.3		BIASED LOW	10	-5.1	1.0436	calculated ICP
F099	97.5	9.7	AH		10			Titration (EDTA)
F153	94.5	9.4			10			calculated ICP
F154	27.5	2.7		BIASED LOW*	10	-0.4	-3.0372	APHA Calculation
F158	42.5	4.2			10			calculated ICP
F207	59.5	5.9			10			calculated ICP
F239	21.5	5.3	AH	INSUFFICIENT DATA	4			Calculated IC
F324	13.0	1.3	WLAL	BIASED LOW	10	-13.7	5.2855	Titration (EDTA)

* 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 6.7

PARAMETER: 07392 Total Kjeldahl N mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT			
F003	0.229	0.174	0.16	0.31	0.474	0.114	0.06	0.065	0.088	0.092		
F026b	0.220	0.145	0.145	0.196	0.292	0.082	0.048	0.046	0.051	0.058		
F069	0.215	0.159	0.182	0.318	0.453	0.121	0.068	0.062	0.079	0.085		
F074	0.185	0.16	0.121	-0.005	-0.005 AL	0.062	0.031	0.036	0.049	0.027		
F074b	0.188	0.151	0.131	0.101	<0.005 AL	0.055	0.033	0.035	0.013	0.022		
F154	0.26	<0.20	<0.20	4.01 AH	0.47	<0.20	<0.20	<0.20	<0.20	<0.20		
F207	0.22	0.17	0.17	0.35	0.48	0.13	0.06	0.06	0.08	0.07		
F304	0.20	0.16	0.15	0.15	0.24	0.09	0.04	0.04	0.04	0.04		
F310	0.352 AH	0.24 AH	0.281 AH	0.487	0.559	<0.2	<0.2	<0.2	<0.2	<0.2		
F324	0.234	0.184	0.145	0.287	0.453	0.111	<0.1	<0.1	<0.1	<0.1		
ASSIGNED VALUE *	0.220	0.160	0.148	0.287	0.462	0.100	0.048	0.046	0.051	0.058		
R-STD DEV *	0.0315	0.0174	0.0274	0.1975	0.1456	0.0315	0.0165	0.0146	0.0304	0.0314		
ACCEPTABLE LIMITS(+-) *	0.0630	0.0348	0.0548	0.3950	0.2912	0.0630	0.0330	0.0292	0.0608	0.0628		
WARNING LIMITS(+-) *	.0630-	.0945.	.0348-	.0522.0548-	.0822.3950-	.5925.2912-	.4368.0630-	.0945.0330-	.0495.0292-	.0438.0608-	.0912.0628-	.0942
ACTION LIMITS(<>) *	0.0945	0.0522	0.0822	0.5925	0.4368	0.0945	0.0495	0.0438	0.0912	0.0942		
N *	10	9	9	10	9	8	7	7	7	7		

* 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	65.5	6.5			10			block digestion
F026b	36.0	3.6			10			calculated
F069	57.5	5.7			10			Kjeldahl digestion
F074	18.5	1.8	AL		10			calculated
F074b	14.0	1.5	AL		9			calculated
F154	25.0	8.3	AH		3			block digestion
F207	64.0	6.4			10			block digestion
F304	32.5	3.2			10			
F310	46.0	9.2	AHAHAH		5			
F324	34.0	5.6			6			block digestion

NOTE: BIAS WAS NOT ASSESSED BECAUSE STATISTICS

FOR FEWER THAN 10 LABS WERE AVAILABLE

OVERALL AVERAGE RANK IS 4.7

PARAMETER: 07293 Total N

mg/L N

WATER SCIENCE & TECHNOLOGY
ENVIRONMENT CANADA

EC PT for Major Ions & Nutrients

SAMPLE LAB NO	1= BELLE-09A LAB RESULT	2= CLEAR-01 LAB RESULT	3= NSASK-05 LAB RESULT	4= HAMIL-20.2 LAB RESULT	5= ION-96.4 LAB RESULT	6= MICHIGAN-06DUPSL-09B LAB RESULT	7= FRASER-96B LAB RESULT	8= SUPER-05 LAB RESULT	9= COLLING-96A LAB RESULT	
F003	0.549	0.211	0.491	2.32	3.34	0.442	0.214	0.186	0.436	0.405
F004	0.604 AH	0.259 WH	0.528	2.35	3.30	0.459	0.227	0.207	0.459	0.421
F006	0.5	0.2	0.4	2.1	3.0	0.4	0.2	0.2	0.4	0.3 WL
F010	0.50	0.17	0.53	2.21	3.10	0.48	0.21	0.21	0.42	0.40
F011	0.52	0.20	0.46	2.19	3.11	0.42	0.21	0.17	0.43	0.38
F015	0.5	0.18	0.45	2.2	3.06	0.4	0.17	0.15	0.39	0.35
F021	0.53	0.20	0.47	2.31	3.26	0.43	0.20	0.16	0.44	0.39
F026	0.512	0.187	0.467	2.23	3.18	0.412	0.190	0.168	0.409	0.370
F069	0.492	0.171	0.43	2.21	3.22	0.384	0.157	0.132	0.396	0.343
F074	0.497	0.198	0.452	2.05	2.92	0.4	0.182	0.171	0.396	0.347
F074b	0.515	0.194	0.478	2.12	2.9	0.407	0.186	0.167	0.384	0.351
F113	0.659 AH	0.275 AH	0.57 WH	2.21	3.01	0.561 AH	0.251 WH	0.313 AH	0.5 WH	0.449
F158	0.50	0.17	0.43	2.17	3.09	0.40	0.18	0.16	0.42	0.38
F183	0.53	0.19	0.52	2.18	2.99	0.46	0.20	0.17	0.43	0.40
F207	0.545	0.211	0.512	2.38	3.35	0.473	0.21	0.19	0.45	0.396
F221	0.535	0.205	0.487	2.25	3.22	0.443	0.205	0.176	0.436	0.390
F304	0.52	0.20	0.49	2.24	3.25	0.44	0.20	0.17	0.42	0.39
F324	0.514	0.214	0.465	2.28	3.47	0.441	0.15 WL	0.13	0.37	0.31 WL
ASSIGNED VALUE *	0.514	0.200	0.474	2.21	3.14	0.430	0.200	0.170	0.420	0.385
R-STD DEV *	0.0240	0.0198	0.0418	0.090	0.174	0.0350	0.0223	0.0265	0.0291	0.0354
ACCEPTABLE LIMITS(+-) *	0.0480	0.0396	0.0836	0.180	0.348	0.0700	0.0446	0.0530	0.0582	0.0708
WARNING LIMITS(+-) *	.0480-	.0720.	.0396-	.0594.	.0836-	.1254.	.180-	.270	.348-	.522
ACTION LIMITS(<>) *	0.0720	0.0594	0.1254	0.270	0.522	0.1050	0.0669	0.0795	0.0873	0.1062
N *	18	18	18	18	18	18	18	18	18	18

* 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	146.0	14.6		BIASED HIGH*	10	5.8	-0.0042	autoclaved
F004	163.0	16.3	AHWH	BIASED HIGH*	10	4.1	0.0314	Persulfate dig.
F006	57.0	5.7			10			Combustion chemilum.
F010	111.5	11.1			10			UV digestion
F011	93.0	9.3			10			
F015	43.0	4.3		BIASED LOW*	10	-1.4	-0.0201	Persulfate dig.
F021	110.0	11.0			10			Hydrazine-Flow Injec
F026	76.0	7.6			10			autoclaved
F069	39.5	3.9		BIASED LOW*	10	3.3	-0.0493	Persulfate dig.
F074	46.0	4.6		BIASED LOW*	10	-7.5	0.0064	UV digestion
F074b	56.0	5.6			10			UV digestion
F113	158.0	15.8	AHAHWH	AHWAHAWH	BIASED HIGH*	10	-7.3	Persulfate digestion
F158	49.0	4.9			10			UV digestion
F183	101.0	10.1			10			Flow injection
F207	151.5	15.1		BIASED HIGH*	10	6.8	0.0004	Calculated flow inje
F221	124.0	12.4			10			Flow injection
F304	106.5	10.6			10			
F324	79.0	7.9	WL	WL				Calculation

* 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 9.5