NATIONAL WATER RESEARCH INSTITUTE

INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX

Ecosystem Interlaboratory QA Program Study FP 73 - Major Ions & Nutrients and Total Phosphorus in Surface Waters (September & October 1998)

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December 14, 1998

To: Participants of the NWRI Ecosystem Interlaboratory QA Program

Re: Final Report for NWRI Study FP 73 - Major Ions & Nutrients and Total Phosphorus Portions

Dear Participant:

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

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

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

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

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

Yours truly,

Harry A.

Harry Alkema
QA Specialist
NLET/NWRI

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Attachment: Individual Laboratory Appraisal

National Water Research Institute
National Laboratory for Environmental Testing

Report no. NWRI-QA-98-05

Ecosystem Interlaboratory Quality Assurance Program
Study FP 73 - Final Report

September and October 1998

An Interlaboratory Quality Assurance Study for Major Ions & Nutrients and Total Phosphorus in Surface Waters*

by

H. Alkema

Environmental Standards and Reference Materials
Project Information & Quality Management
National Laboratory for Environmental Testing
National Water Research Institute
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December 1998

* companion studies: Rain and Soft Waters; Report NWRI-QA-98-04 and Trace Metals; Report NWRI-QA-98-06

NWRI Interlaboratory Quality Assurance Studies for Acid Rain and Surface Waters

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

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

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

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

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Table 1 List of participating[†] laboratories in the major ions & nutrients and total phosphorus portions of interlaboratory study FP 73 (September & October 1998).

Accutest Laboratories Ltd.
AECL Research - ASB, Whiteshell
Aqualta, Rossdale Laboratory
ASL - Analytical Service Lab Ltd.
Can Test Ltd.
Chemex Environmental Services
City of Calgary - Waterworks
CRD Water Department Laboratory
Entech Laboratories (Ontario)
Environment Canada - EPL, Prairie & Northern Region
Environment Canada - EQL, Atlantic Region
Environment Canada - ETC, AMD
Environment Canada - NHRI, WQL
Environment Canada - NWRI, NLET
Environment Canada - NWRI, RSB, Calibration Laboratory
Environment Canada - Pacific Environmental Science Centre
Environnement Canada - CSL, Laboratoire régional - Québec
Enviro-Test Laboratories
Enviro-Test Laboratories, Thunder Bay
Falconbridge Ltd. - Kidd Creek Division
Fisheries and Oceans Canada - Freshwater Institute
Food Control S.A. (Argentina)
Laboratoire de Santé Publique du Québec
Lakehead University
Maxxam Analytics
MB Laboratories Ltd.
Ministère de l'Environnement et de la Faune du Québec - Laval
Ministère de l'Environnement et de la Faune du Québec - Sainte-Foy
Monroe County Environmental Health Laboratory
Natural Resources Canada - CFS, Atlantic Region
Natural Resources Canada - CFS, Ontario Region
New Brunswick Department of the Environment - ASL
Norwest Laboratories
Ontario Ministry of Environment and Energy - Dorset
Ontario Ministry of Environment and Energy - Etobicoke
Ontario Ministry of Northern Development and Mines - Geosciences Laboratory
Regional Municipality of Ottawa-Charlton
Saskatchewan Health - LDCSB
TAIGA Environmental Laboratory
Tsakalidis Inc. (Greece)
University of Maine - Water Research Institute
US Environmental Protection Agency - Western Ecology Division
US Geological Survey - National Water Quality Laboratory
York-Durham Regional Environmental Laboratory

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

Table 2a

Laboratory Performance Scores for Study 0073

Major Ions & Nutrients

	SYSTEMATIC BIAS			FLAGGED RESULTS			
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF BIAS & FLAGGED DATA % SCORE
F036	13	0	0.00	126	0	0.00	0.00
F140	5	0	0.00	41	0	0.00	0.00
F146	2	0	0.00	11	0	0.00	0.00
F090	2	0	0.00	20	1	5.00	2.50
F002	14	0	0.00	136	10	7.35	3.68
F003	19	1	5.26	182	7	3.85	4.55
F143	13	0	0.00	130	12	9.23	4.62
F133	13	1	7.69	129	5	3.88	5.78
F038	18	1	5.56	159	11	6.92	6.24
F032	18	2	11.11	173	9	5.20	8.16
F048	16	1	6.25	149	15	10.07	8.16
F095	20	2	10.00	191	15	7.85	8.93
F019	8	1	12.50	69	4	5.80	9.15
F141	16	2	12.50	140	9	6.43	9.46
F014	17	2	11.76	147	12	8.16	9.96
F007	11	1	9.09	107	14	13.08	11.09
F113	15	2	13.33	150	15	10.00	11.67
F046	20	1	5.00	194	36	18.56	11.78
F135	11	1	9.09	110	19	17.27	13.18
F015	18	2	11.11	175	27	15.43	13.27
F068	7	1	14.29	60	8	13.33	13.81
F004	5	1	20.00	50	5	10.00	15.00
F093	11	1	9.09	110	25	22.73	15.91
F031	14	2	14.29	130	24	18.46	16.37
F074	17	3	17.65	153	28	18.30	17.97
F094	20	4	20.00	190	35	18.42	19.21
F042	15	3	20.00	141	27	19.15	19.57
F009	11	3	27.27	105	15	14.29	20.78
F006	15	3	20.00	135	36	26.67	23.33
F025	19	4	21.05	180	54	30.00	25.53
F010	18	5	27.78	168	41	24.40	26.09
F011	15	5	33.33	141	27	19.15	26.24
F014p	4	2	50.00	37	1	2.70	26.35
F063	14	4	28.57	131	39	29.77	29.17
F026	15	6	40.00	150	34	22.67	31.33
F037	13	5	38.46	128	45	35.16	36.81
F144	14	5	35.71	128	70	54.69	45.20
F145	20	8	40.00	193	103	53.37	46.68
F147	17	9	52.94	170	70	41.18	47.06
F073	8	5	62.50	80	42	52.50	57.50
F139	8	6	75.00	79	52	65.82	70.41

Laboratory parameters are selected from:

Colour	Sp Cond	pH	DOC	Tot Alk	DIC
NO3 /2	Tot N	Na	Mg	SO4	Cl
K	Ca	NH4	TKN	F	Tot Hard
SiO2	B	Si			

Table 2b Laboratory Performance Scores for Study 0073

Total Phosphorus

	SYSTEMATIC BIAS			FLAGGED RESULTS			
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF BIAS & FLAGGED DATA % SCORE
F002	1	0	0.00	10	0	0.00	0.00
F003	1	0	0.00	9	0	0.00	0.00
F004	1	0	0.00	10	0	0.00	0.00
F007	1	0	0.00	8	0	0.00	0.00
F010	1	0	0.00	7	0	0.00	0.00
F014	1	0	0.00	7	0	0.00	0.00
F026	1	0	0.00	10	0	0.00	0.00
F032	1	0	0.00	9	0	0.00	0.00
F038	1	0	0.00	10	0	0.00	0.00
F072	1	0	0.00	8	0	0.00	0.00
F074	1	0	0.00	10	0	0.00	0.00
F133	1	0	0.00	10	0	0.00	0.00
F141	1	0	0.00	7	0	0.00	0.00
F095	1	0	0.00	10	1	10.00	5.00
F140	1	0	0.00	9	1	11.11	5.56
F146	1	0	0.00	9	1	11.11	5.56
F113	1	0	0.00	10	2	20.00	10.00
F048	1	0	0.00	9	2	22.22	11.11
F015	1	0	0.00	8	2	25.00	12.50
F006	1	0	0.00	7	2	28.57	14.29
F036	1	0	0.00	10	3	30.00	15.00
F042	1	0	0.00	10	3	30.00	15.00
F145	1	0	0.00	10	3	30.00	15.00
F060	1	0	0.00	6	2	33.33	16.67
F009	1	0	0.00	8	4	50.00	25.00
F139	1	0	0.00	10	6	60.00	30.00
F025	1	1	100.00	8	2	25.00	62.50
F069	1	1	100.00	8	3	37.50	68.75
F094	1	1	100.00	8	5	62.50	81.25

Table 3a

SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Major Ions & Nutrients

LAB CODE	% BIASED PARAMETERS & FLAGGED RESULTS ON STUDIES 0064	0065	0066	0067	0068	0069	0070	0071	0072	0073	MEDIAN SCORE	COMMENTS
F002	12.5	6.5	4.8	1.7	4.0	4.9	10.9	13.3	3.8	3.8	4.9	GOOD
F003	3.3	2.1	6.1	9.3	9.7	14.8	0.5	3.1	3.7	4.6	4.1	GOOD
F004	0.0	3.8	1.5	1.4	16.8	0.8	1.4	1.4	2.1	12.5	1.5	GOOD
F006	15.8	18.6	23.4	23.8	21.1	30.3	19.7	24.9	27.4	21.8	22.6	MODERATE
F007	0.9	-	11.0	9.6	13.7	4.1	11.9	3.2	13.9	11.1	11.0	SATISFACTORY
F009	20.6	27.2	12.5	10.0	1.2	1.3	22.5	2.8	11.2	20.8	11.9	SATISFACTORY
F010	6.6	10.1	20.6	12.7	7.9	-	14.4	23.1	21.0	24.7	14.4	MODERATE
F011	27.9	6.2	25.5	25.7	8.4	12.6	26.5	22.5	28.7	24.7	25.1	MODERATE
F014	15.4	30.9	23.6	12.6	5.4	12.8	4.5	15.3	13.3	9.9	13.1	MODERATE
F014p	-	-	-	-	-	-	-	-	-	26.4	-	-
F015	7.6	8.5	11.5	20.0	15.6	18.7	19.1	4.7	18.3	12.6	14.1	MODERATE
F019	-	-	38.2	15.3	3.1	9.2	5.2	2.4	8.1	9.1	8.6	SATISFACTORY
F025	8.7	7.0	20.4	-	-	-	13.6	44.3	27.7	26.8	20.4	MODERATE
F026	3.8	5.7	9.0	25.3	10.7	15.7	25.0	11.3	9.7	31.3	11.0	SATISFACTORY
F031	3.6	23.6	16.8	15.9	14.3	17.1	13.3	11.1	18.2	15.4	15.6	MODERATE
F032	0.8	7.1	10.4	5.0	4.2	9.1	5.0	9.6	8.4	7.7	7.4	SATISFACTORY
F036	7.2	-	8.3	15.9	20.1	6.4	2.0	1.7	0.4	0.0	6.4	SATISFACTORY
F037	38.1	23.3	-	17.5	34.3	22.4	34.2	25.8	57.7	36.8	34.2	POOR
F038	6.1	6.8	9.3	12.5	14.4	19.5	27.8	14.1	13.7	6.2	13.1	MODERATE
F042	7.7	13.7	16.5	14.4	9.4	-	12.6	23.8	29.3	18.7	14.4	MODERATE
F046	3.9	13.3	12.1	10.9	14.0	12.9	15.1	15.9	22.4	11.2	13.1	MODERATE
F048	9.8	17.7	32.0	19.3	17.8	19.3	8.6	22.8	5.4	7.7	17.8	MODERATE
F063	13.5	-	-	-	7.3	11.3	9.6	8.9	18.4	29.2	11.3	SATISFACTORY
F068	1.8	10.6	28.6	3.4	11.8	0.7	9.3	0.0	18.6	13.8	10.0	SATISFACTORY
F073	25.8	-	-	-	6.6	-	-	-	-	57.5	25.8	MODERATE
F074	-	21.1	19.3	21.7	19.0	-	-	16.6	29.7	17.4	19.3	MODERATE
F090	-	-	5.6	-	-	-	-	-	-	2.5	4.0	GOOD
F093	-	-	-	50.3	61.5	36.3	46.7	30.6	15.7	15.8	36.3	POOR
F094	-	-	-	13.5	35.4	18.4	23.1	5.0	8.7	18.3	18.3	MODERATE
F095	-	-	-	6.8	-	-	6.4	-	10.1	8.7	7.7	SATISFACTORY
F113	-	-	-	-	-	37.5	28.9	10.6	13.8	10.9	13.8	MODERATE
F122	-	-	-	-	-	-	-	-	0.0	0.0	0.0	GOOD
F133	-	-	-	-	-	-	7.3	11.3	10.9	5.4	9.1	SATISFACTORY
F135	-	-	-	-	-	-	-	-	18.2	12.1	15.2	MODERATE
F139	-	-	-	-	-	-	-	-	49.3	70.4	59.9	POOR
F140	-	-	-	-	-	-	-	-	-	0.0	-	-
F141	-	-	-	-	-	-	-	-	-	9.0	-	-
F143	-	-	-	-	-	-	-	-	-	4.6	-	-
F144	-	-	-	-	-	-	-	-	-	45.2	-	-
F145	-	-	-	-	-	-	-	-	-	49.3	-	-
F146	-	-	-	-	-	-	-	-	-	0.0	-	-
F147	-	-	-	-	-	-	-	-	-	49.2	-	-
INTERLAB MEDIAN	7.6	10.6	12.5	13.5	13.7	12.9	13.3	11.3	13.9	12.6		

STUDY DATES: 0064(05-JAN-1994), 0065(05-JUL-1994), 0066(04-JAN-1995), 0067(05-JUL-1995), 0068(01-MAR-1996), 0069(01-SEP-1996), 0070(03-MAR-1997), 0071(02-SEP-1997), 0072(02-MAR-1998), 0073(01-SEP-1998)

Table 3b

SUMMARY OF STUDY-TO-STUDY PERFORMANCE

Total Phosphorus

LAB CODE	% BIASED PARAMETERS & FLAGGED RESULTS ON STUDIES 0064	0065	0066	0067	0068	0069	0070	0071	0072	0073	MEDIAN SCORE	COMMENTS
F002	5.6	11.1	15.0	27.8	5.0	81.2	5.0	50.0	0.0	0.0	8.3	SATISFACTORY
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	15.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	GOOD
F006	87.5	57.1	92.9	90.0	14.3	100.0	78.6	22.2	77.8	14.3	78.2	POOR
F007	5.6	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GOOD
F009	90.0	93.8	-	-	-	-	75.0	11.1	0.0	25.0	50.0	POOR
F010	0.0	10.0	0.0	20.0	0.0	-	50.0	0.0	0.0	0.0	0.0	GOOD
F014	0.0	10.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GOOD
F015	50.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	GOOD
F025	0.0	6.2	0.0	-	-	-	6.2	0.0	0.0	62.5	0.0	GOOD
F026	0.0	0.0	0.0	5.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	GOOD
F032	0.0	6.2	5.0	0.0	5.0	6.2	12.5	0.0	5.6	0.0	5.0	SATISFACTORY
F036	70.0	0.0	-	0.0	70.0	0.0	5.6	10.0	16.7	15.0	10.0	SATISFACTORY
F038	0.0	0.0	50.0	15.0	15.0	0.0	10.0	50.0	0.0	0.0	5.0	SATISFACTORY
F042	5.0	0.0	0.0	0.0	0.0	-	20.0	0.0	0.0	15.0	0.0	GOOD
F048	0.0	0.0	15.0	10.0	0.0	10.0	75.0	0.0	0.0	11.1	5.0	SATISFACTORY
F060	-	-	-	-	-	-	-	-	0.0	16.7	8.3	SATISFACTORY
F069	5.0	-	-	-	-	87.5	78.6	0.0	0.0	68.8	36.9	POOR
F072	-	0.0	-	-	-	-	-	0.0	0.0	0.0	0.0	GOOD
F074	-	-	15.0	-	-	-	-	0.0	0.0	0.0	0.0	GOOD
F094	-	-	-	5.6	-	-	-	0.0	0.0	81.2	2.8	GOOD
F095	-	-	-	0.0	-	-	-	-	5.0	5.0	5.0	SATISFACTORY
F113	-	-	-	-	-	25.0	100.0	-	0.0	10.0	17.5	MODERATE
F133	-	-	-	-	-	-	10.0	5.0	15.0	0.0	7.5	SATISFACTORY
F139	-	-	-	-	-	-	-	-	42.9	30.0	36.4	POOR
F140	-	-	-	-	-	-	-	-	-	5.6	-	-
F141	-	-	-	-	-	-	-	-	-	0.0	-	-
F145	-	-	-	-	-	-	-	-	-	15.0	-	-
F146	-	-	-	-	-	-	-	-	-	5.6	-	-
INTERLAB MEDIAN	0.0	6.2	0.0	5.0	0.0	0.0	10.0	0.0	0.0	5.6		

STUDY DATES: 0064(05-JAN-1994), 0065(05-JUL-1994), 0066(04-JAN-1995), 0067(05-JUL-1995), 0068(01-MAR-1996), 0069(01-SEP-1996), 0070(03-MAR-1997), 0071(02-SEP-1997), 0072(02-MAR-1998), 0073(01-SEP-1998)

Table 4a Sample design for the major ions & nutrients portion

Sample Number	Sample Name	Source (Province/State)	Expected Conductance (µS/cm 25°C)
FP73 MI-1	Huron-03	Lake Huron, Ontario	222.
FP73 MI-2	HH-90	Hamilton Harbour, Ontario	496.
FP73 MI-3	Grand-94	Grand River, Dunneville, Ontario	833.
FP73 MI-4	Pemb-97	Pembina River, Manitoba	711.
FP73 MI-5	Rich-95	Richelieu River, Quebec	272.
FP73 MI-6	Humb-95	Humber Bay, Lake Ontario, Ontario	322.
FP73 MI-7	White-98	Whitemouth River, Manitoba	184.
FP73 MI-8	Swan-98	Swan River, Manitoba	443.
FP73 MI-9	Fisher-98	Fisher River, Manitoba	590.
FP73 MI-10	French-98	Frenchman River, Saskatchewan	669.

Table 4b Sample design for the Total Phosphorus portion

Sample Number	Sample Name	Design Value (mg/L)
FP73 TP-1	PHOS-731	Blank
FP73 TP-2	AUX-98†	0.003
FP73 TP-3	PHOS-732†	0.059
FP73 TP-4	LONG-01	0.006
FP73 TP-5	MIRAM-97P†	0.037
FP73 TP-6	PHOS-734	0.136
FP73 TP-7	PHOS-736	0.220
FP73 TP-8	PHOS-737	0.295
FP73 TP-9	PHOS-738	0.342
FP73 TP-10	PHOS-739	0.409

Note: † Natural samples
Samples are preserved with 0.2% H_2SO_4

Table 5a

Summary of Interlaboratory Median Values for Major Ions & Nutrients - Study 0073

PARAMETER		SAMPLE NUMBER					
		HURON-03 SAMPLE 1	HH-90 SAMPLE 2	GRAND-94 SAMPLE 3	PEMB-97 SAMPLE 4	RICH-95 SAMPLE 5	HUMB-95 SAMPLE 6
Ammonia	mg/L N	0.0080	0.3500	0.0050	0.0050	0.0050	0.0050
Boron	mg/L	0.0162	0.0800	0.0560	0.0969	0.0140	0.0220
Calcium	mg/L	28.985	43.850	93.750	58.750	27.850	37.850
Chloride	mg/L	6.3600	62.000	78.000	11.800	18.500	24.400
Colour	Hazen Unit	1.4000	4.3500	15.000	29.500	12.000	1.7000
Diss Inorg Carbon	mg/L C	20.530	21.620	47.155	44.800	18.320	23.290
Diss Organic Carbon	mg/L C	1.9000	3.4000	4.1200	9.4650	3.4700	1.5950
Fluoride	mg/L	0.0900	0.5100	0.1800	0.1700	0.1000	0.1330
Magnesium	mg/L	7.7900	10.670	24.350	33.300	7.8950	8.5550
Nitrate + Nitrite	mg/L N	0.3530	1.4100	3.5300	0.1700	3.1140	0.4775
Potassium	mg/L	0.9175	3.7600	3.9800	10.400	2.3700	1.5600
Silicates	mg/L SiO2	1.6232	0.8000	2.4250	13.923	2.3226	0.5930
Sodium	mg/L	3.6800	36.000	47.000	43.600	13.200	13.700
Specific Conductance	uS/cm	222.000	496.000	832.850	711.000	272.000	322.000
Sulfate	mg/L	17.000	52.000	107.100	173.000	18.000	27.050
Total Alkalinity	mg/L CaCO3	86.515	90.200	205.650	190.000	76.340	96.200
Total Hardness	mg/L	106.000	154.900	337.900	289.000	103.000	131.500
Total Kjeldahl N	mg/L N	0.1635	0.6700	0.4100	0.6800	0.3600	0.1500
Total N	mg/L N	0.5020	2.0188	3.8600	0.8400	3.4100	0.6100
Turbidity	JTU/NTU	0.1200	0.1000	0.1700	0.1700	0.1600	0.0960
pH	pH Units	8.0650	7.9450	8.3350	7.9550	7.9850	8.0700

		WHITE-97 SAMPLE 7	SWAN-98 SAMPLE 8	FISHER-98 SAMPLE 9	FRENCH-98 SAMPLE 10
Ammonia	mg/L N	0.0065	0.0050	0.0050	0.0050
Boron	mg/L	0.0135	0.0448	0.0821	0.0637
Calcium	mg/L	27.700	57.550	57.500	53.950
Chloride	mg/L	0.3000	2.3000	2.5700	4.2200
Colour	Hazen Unit	79.800	42.950	80.000	17.900
Diss Inorg Carbon	mg/L C	22.800	40.000	75.000	60.000
Diss Organic Carbon	mg/L C	17.995	14.000	19.733	8.6550
Fluoride	mg/L	0.0900	0.1400	0.1800	0.3300
Magnesium	mg/L	8.0450	19.000	44.985	32.950
Nitrate + Nitrite	mg/L N	0.0150	0.1300	0.0720	0.1260
Potassium	mg/L	0.4500	3.9400	5.8600	7.7500
Silicates	mg/L SiO2	11.441	10.107	7.7350	15.550
Sodium	mg/L	1.7220	10.700	9.7700	45.900
Specific Conductance	uS/cm	184.000	443.000	590.000	669.000
Sulfate	mg/L	0.3312	61.290	21.100	106.000
Total Alkalinity	mg/L CaCO3	95.500	173.000	320.000	255.905
Total Hardness	mg/L	103.000	225.000	335.000	272.500
Total Kjeldahl N	mg/L N	0.6340	0.6000	1.0500	0.6000
Total N	mg/L N	0.6400	0.7100	1.1100	0.7600
Turbidity	JTU/NTU	0.2850	1.3000	0.3800	0.2250
pH	pH Units	7.9050	8.1450	8.2250	8.1850

Table 5b

Summary of Interlaboratory Median Values for Total Phosphorus - Study 0073

PARAMETER	Units	SAMPLE NUMBER					
		PHOS-731 SAMPLE 1	AUX-98 SAMPLE 2	PHOS-732 SAMPLE 3	LONG-01 SAMPLE 4	MIRAM-97p SAMPLE 5	PHOS-734 SAMPLE 6
Total Phosphorus	mg/L P	0.0020	0.0030	0.0590	0.0067	0.0360	0.1400

PHOS-736 SAMPLE 7	PHOS-737 SAMPLE 8	PHOS-738 SAMPLE 9	PHOS-739 SAMPLE 10
0.2200	0.2990	0.3450	0.4030

Appendix A

Glossary of Terms
Quantifying Bias in NWRI QA Studies

GLOSSARY OF TERMS

Used for the Evaluation of Interlaboratory Results

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

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

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

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

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

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

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

Satisfactory: Fully acceptable, 'good results'.

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

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

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

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

For a sample whose **target value** is at or below the **lower limit for use of basic acceptable error**, the **basic acceptable error** is used to determine the range of acceptable deviations.

> For example: Suppose that the **lower limit for use of the basic acceptable error** has been set as 10 μg/L and the **basic acceptable error** is 1.0 μg/L, if a **target** (median) **value** for a sample is 5 μg/L, then any **reported result** within the range 5 ± 1.0 or 4.0 to 6.0 μg/L would be considered acceptable. The **BAE** would define the acceptable result within the 0-10 μg/L range.

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

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

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

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

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

References:

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

June 1996

Quantifying Bias in NWRI QA Studies

Introduction

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

Degree of Bias

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

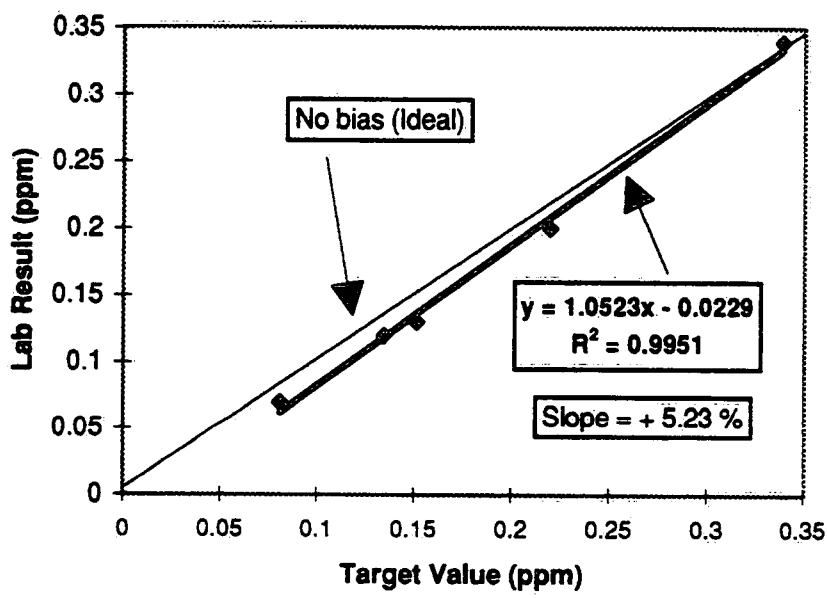
[1] Systematic bias is often identified with the comparison of data to a certified standard.

Parameter Performance Graph and Bias

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

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

Figure 2 **Parameter Performance**



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

Conclusion

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

June 1996

NWRI Ecosystem Interlaboratory QA Program

Bias Critical Values
Major Ions & Nutrients and Total Phosphorus

Parameter	%
Conductance	2.5
Colour	25
Turbidity	50
Boron	10
pH	10
DOC	7.5
DIC	7.5
Total Alkalinity	3
Nitrate + Nitrite	5
Ammonia	7.5
Total Nitrogen	10
TKN	10
Fluoride	5
Total Hardness	5
Sodium	5
Magnesium	5
Silicates	5
Sulfate	5
Chloride	5
Potassium	5
Calcium	5
Total Phosphorus	5

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Appendix B

Data & Evaluation Summary

a) Major Ions and Nutrients
b) Total Phosphorus

PARAMETER: 00392 Specific Conductance uS/cm

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= 0.0400

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	221.0	15.50	496.0	18.50	837.0	21.00	716.0	22.00	273.0	21.00	323.0	21.50
F003	226.	31.00	500.	23.50	847.	30.00	726.	33.50	275.	25.50	326.	29.00
F004	225.	28.50	504.	29.00	848.	32.00	725.	32.00	275.	25.50	326.	29.00
F006	226.	31.00	499.	20.50	833.	19.00	700.	11.00	275.	25.50	315.	9.00
F007	217.1	9.00	488.1	7.00	823.8	12.00	687.8	4.00	268.3	11.00	320.4	13.00
F009	224.	26.50	500.	23.50	821.	11.00	705.	14.00	270.	12.50	321.	15.00
F010	223.	23.50	500.	23.50	840.	22.00	715.	21.00	274.	22.50	325.	26.00
F011	231.	33.50	512.	36.00	857.	36.00	737.	36.00	282.	35.50	335.	36.00
F014	218.	10.50	502.	27.00	802.	4.00	703.	13.00	259. L	3.00	307. L	4.00
F014p	215.	6.00	480.	4.50	808.	5.50	691.	5.50	263.	4.50	314.	6.50
F015	222.	19.00	508.	33.50	852.	35.00	731.	35.00	272.	18.50	321.	15.00
F019	220.	13.50	492.	9.50	819.	10.00	702.	12.00	268.	10.00	317.	11.00
F025	225.	28.50	504.	29.00	849.	33.00	724.	29.50	276.	28.00	328.	31.50
F026	204. EL	2.00	454. EL	2.00	758. EL	2.00	650. EL	2.00	251. EL	2.00	298. VL	2.00
F031	224.	26.50	501.	26.00	844.	25.50	720.	24.00	274.	22.50	325.	26.00
F032	212.	3.00	480.	4.50	808.	5.50	691.	5.50	263.	4.50	315.	9.00
F036	223.	23.50	493.	12.00	834.	20.00	712.	19.50	272.	18.50	322.	19.00
F037	216.	7.50	470. L	3.00	770. VL	3.00	665. VL	3.00	264.	6.00	311.	5.00
F038	213.	4.00	482.	6.00	809.	7.00	694.	7.00	266.	7.00	314.	6.50
F042	216.	7.50	490.	8.00	824.	13.00	706.	16.00	267.	8.00	315.	9.00
F046	220.	13.50	493.	12.00	831.	16.00	709.	17.00	270.	12.50	320.	12.00
F048	221.	15.50	494.	15.00	832.	17.00	712.	19.50	271.	15.50	321.	15.00
F063	222.	19.00	493.	12.00	816.	9.00	697.	9.00	272.	18.50	322.	19.00
F073	222.	19.00	499.	20.50	847.	30.00	719.	23.00	272.	18.50	324.	23.50
F074	222.	19.00	492.	9.50	828.	15.00	710.	18.00	271.	15.50	322.	19.00
F090	226.	31.00	504.	29.00	850.	34.00	726.	33.50	278.	29.00	328.	31.50
F094	231.	33.50	506.	31.00	844.	25.50	724.	29.50	280.	33.00	331.	33.50
F095	223.	23.50	495.	16.00	846.	28.00	724.	29.50	279.	30.50	324.	23.50
F113	218.	10.50	495.6	17.00	832.7	18.00	705.7	15.00	267.2	9.00	321.3	17.00
F133	223.	23.50	500.	23.50	845.	27.00	722.	25.00	275.	25.50	326.	29.00
F135	234. H	36.50	508.	33.50	842.	23.50	723.	26.50	282.	35.50	331.	33.50
F140	219.	12.00	507.	32.00	847.	30.00	698.	10.00	280.	33.00	325.	26.00
F141	232.	35.00	510.	35.00	842.	23.50	724.	29.50	280.	33.00	334.	35.00
F143	214.6	5.00	493.3	14.00	811.1	8.00	694.5	8.00	270.4	14.00	304.3 L	3.00
F144	195.3 EL	1.00	441. EL	1.00	743. EL	1.00	640. EL	1.00	242. EL	1.00	290. EL	1.00
F145	222.	19.00	496.	18.50	827.	14.00	723.	26.50	279.	30.50	323.	21.50
F147	234. H	36.50	518. H	37.00	880. H	37.00	746. H	37.00	286. H	37.00	337. H	37.00
MEDIAN	222.0000		496.0000		833.0000		712.0000		272.0000		322.0000	
1CRIT	10.8400		21.8000		35.2800		30.4400		12.8400		14.8400	
N	34		35		35		35		35		35	
MEAN	221.0794		495.4572		829.2744		708.9143		271.8257		321.0000	
3STDEV	16.8040		34.4041		64.7524		53.9088		19.9544		23.4712	

PARAMETER: 00392 Specific Conductance uS/cm

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	185.0	22.50	446.0	23.00	596.0	23.00	669.0	18.50
F003	187.	30.50	449.	26.50	603.	31.00	679.	33.50
F004	186.	27.50	451.	30.00	602.	30.00	676.	32.00
F006	182.	14.00	420. L	3.00	577.	11.00	652.	10.00
F007	178.4	6.00	439.1	11.00	461.7 EL	1.00	659.8	13.00
F009	182.	14.00	443.	17.50	648. EH	37.00	657.	12.00
F010	186.	27.50	450.	28.50	590.	18.50	670.	21.50
F011	191.	36.50	462.	36.00	612.	35.00	688.	36.00
F014	178.	5.00	445.	20.50	593.	21.00	670.	21.50
F014p	177.	3.50	428.	5.00	568.	5.00	642.	5.00
F015	184.	18.50	458.	35.00	607.	33.00	683.	35.00
F019	182.	14.00	443.	17.50	592.	20.00	670.	21.50
F025	185.	22.50	450.	28.50	596.	23.00	675.	29.50
F026	170. EL	2.00	412. VL	2.00	546. VL	3.00	620. VL	2.00
F031	185.	22.50	448.	25.00	598.	26.00	675.	29.50
F032	179.	7.00	432.	8.00	573.	7.00	646.	7.00
F036	184.	18.50	442.	14.50	588.	16.00	664.	16.00
F037	179.8	8.00	424.	4.00	555. L	4.00	621. VL	3.00
F038	177.	3.50	429.	6.00	571.	6.00	645.	6.00
F042	180.	9.00	438.	9.00	583.	13.00	651.	9.00
F046	181.	10.50	442.	14.50	585.	14.00	660.	14.00
F048	183.	16.50	443.	17.50	590.	18.50	665.	17.00
F063	185.	22.50	441.	13.00	575.	9.00	649.	8.00
F073	183.	16.50	446.	23.00	599.	28.50	673.	26.00
F074	181.	10.50	439.	10.00	574.	8.00	654.	11.00
F090	187.	30.50	452.	31.00	604.	32.00	679.	33.50
F094	190.	34.50	453.	32.50	598.	26.00	674.	27.00
F095	185.	22.50	445.	20.50	598.	26.00	672.	24.50
F113	181.3	12.00	440.3	12.00	588.7	17.00	663.6	15.00
F133	185.	22.50	449.	26.50	599.	28.50	675.	29.50
F135	190.	34.50	454.	34.00	608.	34.00	675.	29.50
F140	186.	27.50	443.	17.50	587.	15.00	670.	21.50
F141	188.	33.00	453.	32.50	582.	12.00	672.	24.50
F143	187.1	32.00	431.8	7.00	576.4	10.00	628.2 L	4.00
F144	165.6 EL	1.00	397. EL	1.00	527. EL	2.00	600. EL	1.00
F145	186.	27.50	446.	23.00	596.	23.00	669.	18.50
F147	191.	36.50	476. EH	37.00	635. VH	36.00	719. EH	37.00
MEDIAN	184.0000		443.0000		590.0000		669.0000	
1CRIT	9.3200		19.6800		25.5600		28.7200	
N	34		35		35		35	
MEAN	183.1059		442.4914		587.7744		662.6171	
3STDEV	12.2823		31.5112		58.2181		49.1865	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	206.50	20.650	10					Flow through cell
F003	294.00	29.400	10					Conductivity Probe
F004	295.50	29.550	10		BIASED HIGH*	1.91	-1.5562	02041
F006	154.00	15.400	10	L				electrode
F007	87.00	8.700	10	EL				
F009	183.00	18.300	10	EH				Conductivimeter
F010	234.50	23.450	10					Conduct. meter
F011	356.50	35.650	10		BIASED HIGH	2.72	3.4951	
F014	129.50	12.950	10	L L				
F014p	51.00	5.100	10		BIASED LOW	-3.29	-0.0974	
F015	277.50	27.750	10					meter
F019	139.00	13.900	10					
F025	283.00	28.300	10					Cond. Meter
F026	21.00	2.100	10	ELELELELELVLELVLVLVL	BIASED LOW	-8.82	3.8506	Cell
F031	253.50	25.350	10					Cond meter
F032	61.00	6.100	10		BIASED LOW	-3.01	-0.1215	Electrode
F036	177.50	17.750	10					Electrode
F037	46.50	4.650	10	L VLVL L VL	BIASED LOW	-9.14	16.6111	V.W.R.
F038	59.00	5.900	10		BIASED LOW	-2.86	-0.7137	METER
F042	101.50	10.150	10					Cond. meter
F046	136.00	13.600	10					Meter
F048	167.00	16.700	10					Electrode
F063	139.00	13.900	10					meter
F073	228.50	22.850	10					
F074	135.50	13.550	10					Automated
F090	315.00	31.500	10		BIASED HIGH*	1.97	-0.2569	unstirred, 25C
F094	306.00	30.600	10		BIASED HIGH*	0.36	7.1138	Conductivity Meter
F095	244.50	24.450	10					Titralyzer
F113	142.50	14.250	10					meter - YSI 3200
F133	260.50	26.050	10					COND. METER
F135	321.00	32.100	10	H	BIASED HIGH*	0.19	9.5074	APHA 2510-B
F140	224.50	22.450	10					Conductimetry
F141	293.00	29.300	10					Cond. meter
F143	105.00	10.500	10	L L				electrometric
F144	11.00	1.100	10	ELELELELELELELELELEL	BIASED LOW	-10.41	-0.8215	APHA 2510
F145	222.00	22.200	10					meter
F147	368.00	36.800	10	H H H H H H EHVHEH	BIASED HIGH	6.48	-2.8269	meter

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 2.50

OVERALL AVERAGE
RANK IS 19.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F144	11.00	1.100	10	ELELELELELELELELELEL	BIASED LOW	-10.41	-0.8215	APHA 2510
F026	21.00	2.100	10	ELELELELELVLELVLVLVL	BIASED LOW	-8.82	3.8506	Cell
F037	46.50	4.650	10	LVLVLLVL	BIASED LOW	-9.14	16.6111	V.W.R.
F014p	51.00	5.100	10		BIASED LOW	-3.29	-0.0974	
F038	59.00	5.900	10		BIASED LOW	-2.86	-0.7137	METER
F032	61.00	6.100	10		BIASED LOW	-3.01	-0.1215	Electrode
F007	87.00	8.700	10	EL				
F042	101.50	10.150	10					Cond. meter
F143	105.00	10.500	10	LL				electrometric
F014	129.50	12.950	10	LL				
F074	135.50	13.550	10					Automated
F046	136.00	13.600	10					Meter
F019	139.00	13.900	10					
F063	139.00	13.900	10					meter
F113	142.50	14.250	10					meter - YSI 3200
F006	154.00	15.400	10	L				electrode
F048	167.00	16.700	10					Electrode
F036	177.50	17.750	10					Electrode
F009	183.00	18.300	10	EH				Conductivimeter
F002	206.50	20.650	10					Flow through cell
F145	222.00	22.200	10					meter
F140	224.50	22.450	10					Conductimetry
F073	228.50	22.850	10					
F010	234.50	23.450	10					Conduct. meter
F095	244.50	24.450	10					Titralyzer
F031	253.50	25.350	10					Cond meter
F133	260.50	26.050	10					COND. METER
F015	277.50	27.750	10					meter
F025	283.00	28.300	10					Cond. Meter
F141	293.00	29.300	10					Cond. meter
F003	294.00	29.400	10					Conductivity Probe
F004	295.50	29.550	10		BIASED HIGH*	1.91	-1.5562	02041
F094	306.00	30.600	10		BIASED HIGH*	0.36	7.1138	Conductivity Meter
F090	315.00	31.500	10		BIASED HIGH*	1.97	-0.2569	unstirred, 25C
F135	321.00	32.100	10	H	BIASED HIGH*	0.19	9.5074	APHA 2510-B
F011	356.50	35.650	10		BIASED HIGH	2.72	3.4951	
F147	368.00	36.800	10	HHHHHHEHVHEH	BIASED HIGH	6.48	-2.8269	meter

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 2.50

OVERALL AVERAGE
RANK IS 19.000

PARAMETER: 00292 Colour Hazen Unit

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 5.0000 BASIC ACCEPTABLE ERROR= 5.0000 CONCENTRATION ERROR INCREMENT= 0.1500

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<5.0	0.00	<5.0	0.00	10.0	4.50	25.0	5.50	10.0	4.50	<5.0	0.00
F003	1.3	4.00	4.1	8.00	14.6	9.00	28.4	9.00	11.6	8.00	1.6	6.00
F007	<4.	0.00	5.	13.00	15.	12.50	29.	10.00	13.	14.00	<4.	0.00
F010	<1.	0.00	2.	2.50	9.	2.50	21.	3.00	8.	2.00	<1.	0.00
F011	<5.	0.00	<5.	0.00	10.	4.50	30.	12.00	20. EH	19.50	5.	10.50
F014	0. EL	1.00	5.	13.00	5. EL	1.00	20. L	1.50	5. EL	1.00	0.	1.00
F025	5. EH	10.50	10. EH	16.00	20.	19.50	40. H	19.50	20. EH	19.50	10. EH	12.00
F031	1.9	8.00	4.6	9.50	16.4	17.00	32.0	15.00	12.0	11.00	1.8	7.00
F032	1.6	7.00	4.6	9.50	15.	12.50	31.	14.00	11.8	9.00	1.4	4.50
F036	1.4	6.00	3.6	5.00	12.8	8.00	27.2	8.00	10.6	7.00	1.4	4.50
F038	<5.	0.00	<5.	0.00	11.	6.00	24.	4.00	10.	4.50	<5.	0.00
F042	2.	9.00	4.	6.50	15.	12.50	30.	12.00	13.	14.00	2.	8.50
F046	<5.	0.00	5.	13.00	15.	12.50	35.	16.50	12.	11.00	<5.	0.00
F048	1.38	5.00	3.46	4.00	12.74	7.00	25.73	7.00	10.15	6.00	1.09	3.00
F063	<2.	0.00	2.	2.50	9.	2.50	20. L	1.50	9.	3.00	<2.	0.00
F094	<3.	0.00	5.	13.00	15.	12.50	25.	5.50	15.	16.50	<3.	0.00
F095	1.	2.50	4.	6.50	16.	16.00	30.	12.00	12.	11.00	2.	8.50
F141	<1.0	0.00	<1.0 EL	0.00	17.	18.00	37.	18.00	13.	14.00	<1.0	0.00
F145	5. EH	10.50	5.	13.00	15.	12.50	35.	16.50	15.	16.50	5.	10.50
F147	1.	2.50	1. EL	1.00	20.	19.50	40. H	19.50	17.	18.00	1.	2.00
MEDIAN	1.4000		4.3500		15.0000		29.5000		12.0000		1.7000	
1CRIT	5.0000		5.0000		6.5000		8.6750		6.0500		5.0000	
N	8		14		17		16		17		10	
MEAN	1.4475		4.0971		13.4435		29.0831		11.9500		2.2290	
3STDEV	1.0405		3.0053		7.7647		12.7099		6.6900		4.2663	

PARAMETER: 00292 Colour Hazen Unit

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	70.0	6.50	35.0	4.00	70.0	4.50	15.0	5.00
F003	68.8	5.00	36.4	6.00	70.4	6.00	17.0	8.00
F007	82.	12.00	47.	15.00	81.	13.00	19.	15.00
F010	57. L	2.00	31. L	2.00	59. L	2.00	12.	2.00
F011	70.	6.50	40.	8.00	80.	9.50	10. EL	1.00
F014	60. L	3.00	40.	8.00	70.	4.50	20.	17.50
F025	100. H	17.00	50.	17.00	80.	9.50	20.	17.50
F031	83.0	13.00	42.7	10.00	86.8	16.00	18.3	14.00
F032	84.2	15.00	44.4	13.00	85.6	15.00	17.8	10.00
F036	79.6	10.00	43.2	11.00	80.8	12.00	16.	7.00
F038	65.	4.00	34.	3.00	66.	3.00	14.	4.00
F042	79.	9.00	44.	12.00	80.	9.50	18.	12.00
F046	80.	11.00	50.	17.00	90.	17.50	18.	12.00
F048	71.94	8.00	35.44	5.00	70.63	7.00	15.94	6.00
F063	52. VL	1.00	26. VL	1.00	58. L	1.00	13.	3.00
F094	100. H	17.00	40.	8.00	80.	9.50	17.5	9.00
F095	84.	14.00	45.	14.00	84.	14.00	18.	12.00
F141	109. VH	19.00	53.	19.00	110. VH	19.00	20.	17.50
F145	100. H	17.00	50.	17.00	90.	17.50	20.	17.50
F147	110. VH	20.00	54. H	20.00	125. EH	20.00	23.	20.00
MEDIAN	79.8000		42.9500		80.0000		17.9000	
1CRIT	16.2200		10.6925		16.2500		6.9350	
N	18		18		18		18	
MEAN	80.1967		42.2856		79.6795		17.1967	
3STDEV	42.6176		18.4067		33.2441		7.1066	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	34.50	4.929	7					AAII Colormetric
F003	69.00	6.900	10					Spectrophot.
F007	104.50	13.062	8					
F010	18.00	2.250	8	L L L	BIASED LOW	-25.68	-1.2761	Colorimetry
F011	71.50	8.938	8	EH EL				
F014	51.50	5.150	10	EL ELL EL L				
F025	158.00	15.800	10	EHEH H EHEHH	BIASED HIGH*	5.85	5.3765	Visual Comparison
F031	120.50	12.050	10					Spectro
F032	109.50	10.950	10					TCU
F036	78.50	7.850	10					TCU
F038	28.50	4.071	7		BIASED LOW*	-17.26	-0.7610	Spectrophotometry
F042	105.00	10.500	10					colorimetric
F046	110.50	13.812	8					Colour Meter
F048	58.00	5.800	10					Colorimetric
F063	15.50	1.938	8	L VLVLL	BIASED LOW	-31.11	-0.6146	auto-colour
F094	91.00	11.375	8	H				Apparent
F095	110.50	11.050	10					Hach 4000 V
F141	124.50	17.786	7	EL VH VH	BIASED HIGH	42.74	-5.2277	Colourimeter
F145	148.50	14.850	10	EH H	BIASED HIGH*	17.14	0.6632	Visual Comp
F147	142.50	14.250	10	EL H VHH EH				Vis. Comp.

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

OVERALL AVERAGE
RANK IS 9.777

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F063	15.50	1.938	8	LVLVLL	BIASED LOW	-31.11	-0.6146	auto-colour
F010	18.00	2.250	8	LLL	BIASED LOW	-25.68	-1.2761	Colorimetry
F038	28.50	4.071	7		BIASED LOW*	-17.26	-0.7610	Spectrophotometry
F002	34.50	4.929	7					AAII Colormetric
F014	51.50	5.150	10	ELELLELL				
F048	58.00	5.800	10					Colorimetric
F003	69.00	6.900	10					Spectrophot.
F036	78.50	7.850	10					TCU
F011	71.50	8.938	8	EHEL				
F042	105.00	10.500	10					colorimetric
F032	109.50	10.950	10					TCU
F095	110.50	11.050	10					Hach 4000 V
F094	91.00	11.375	8	H				Apparent
F031	120.50	12.050	10					Spectro
F007	104.50	13.062	8					
F046	110.50	13.812	8					Colour Meter
F147	142.50	14.250	10	ELHVHHEH				Vis. Comp.
F145	148.50	14.850	10	EHH	BIASED HIGH*	17.14	0.6632	Visual Comp
F025	158.00	15.800	10	EHEHHEHEHH	BIASED HIGH*	5.85	5.3765	Visual Comparison
F141	124.50	17.786	7	ELVHVH	BIASED HIGH	42.74	-5.2277	Colourimeter

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

OVERALL AVERAGE
RANK IS 9.777

PARAMETER: 00192 Turbidity JTU/NTU

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.2000 BASIC ACCEPTABLE ERROR= 0.2500 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.1	7.00	0.09	7.00	0.17	12.00	0.19	13.50	0.16	10.50	0.07	6.00
F004	0.16	10.00	0.08	5.50	0.17	12.00	0.18	12.00	0.13	8.50	0.06	4.50
F006	0.30	11.00	0.02	2.00	0.24	17.00	0.32	18.00	0.30	17.00	0.04	2.50
F010	0.1	7.00	0.1	9.00	0.1	5.50	0.2	16.00	0.2	13.50	0.1	12.50
F011	<0.1	0.00	<0.1	0.00	0.1	5.50	0.1	5.00	0.1	4.50	<0.1	0.00
F014	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00
F015	0.08	3.00	0.06	3.00	0.11	8.50	0.14	10.00	0.11	6.00	0.08	8.00
F025	0.9 VH	14.00	0.8 VH	15.00	0.6 EH	20.00	0.5 H	20.00	0.6 VH	19.00	0.5 VH	18.50
F031	<0.02	0.00	<0.02	0.00	0.04	1.00	0.06	1.00	0.04	1.00	0.04	2.50
F032	0.05W	0.00	0.05W	0.00	0.07T	3.00	0.07T	2.00	0.06T	3.00	0.06T	4.50
F042	0.34	12.00	0.39 H	14.00	0.35	19.00	0.38	19.00	0.22	15.00	0.30	17.00
F046	0.10	7.00	0.11	10.00	0.17	12.00	0.20	16.00	0.16	10.50	0.11	15.00
F048	0.08	3.00	0.08	5.50	0.11	8.50	0.13	9.00	0.12	7.00	0.08	8.00
F093	7.8 EH	16.00	5.0 EH	17.00	0.1	5.50	0.1	5.00	0.2	13.50	0.1	12.50
F094	<0.1	0.00	0.2	12.00	0.2	15.00	0.1	5.00	0.1	4.50	0.1	12.50
F095	0.380 H	13.00	0.095	8.00	0.172	14.00	0.125	8.00	0.240	16.00	0.092	10.00
F113	0.01	1.00	0.01	1.00	0.05	2.00	0.1	5.00	0.05	2.00	0.	1.00
F122	0.09	5.00	0.23	13.00	0.21	16.00	0.20	16.00	0.35	18.00	0.27	16.00
F133	0.08	3.00	0.12	11.00	0.16	10.00	0.19	13.50	0.17	12.00	0.08	8.00
F135	0.14	9.00	0.07	4.00	0.28	18.00	0.16	11.00	0.13	8.50	0.10	12.50
F141	<0.1	0.00	<0.1	0.00	0.1	5.50	0.1	5.00	<0.1	0.00	<0.1	0.00
F145	1.6 EH	15.00	1.2 EH	16.00	1.5 EH	21.00	1.5 EH	22.00	1.2 EH	20.00	1.5 EH	20.00
F147	<0.2	0.00	<0.2	0.00	<0.2	0.00	1.0 EH	21.00	3.8 EH	21.00	0.5 VH	18.50
MEDIAN	0.1200		0.1000		0.1700		0.1700		0.1600		0.0960	
1CRIT	0.2500		0.2500		0.2500		0.2500		0.2500		0.2500	
N	14		15		19		20		19		18	
MEAN	0.3179		0.2430		0.1822		0.2243		0.2421		0.1490	
3STDEV	1.2442		0.9533		0.3676		0.6178		0.7699		0.4233	

PARAMETER: 00192 Turbidity JTU/NTU

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.27	11.00	0.62 VL	1.00	0.29	3.00	0.25	12.50
F004	0.37	15.00	1.59	19.00	0.49	18.00	0.31	18.00
F006	0.22	5.00	0.96	4.00	0.35	6.50	0.30	16.50
F010	0.4	17.50	1.2	9.00	0.4	14.00	0.2	9.50
F011	0.3	12.00	1.1	7.00	0.3	4.50	0.2	9.50
F014	<0.1	0.00	0.8 L	3.00	0.2	1.00	<0.1	0.00
F015	0.26	10.00	1.52	18.00	0.38	12.00	0.20	9.50
F025	0.7 EH	21.00	1.9 VH	22.00	1.0 VH	21.00	0.6 H	20.00
F031	0.18	1.00	1.30	11.50	0.28	2.00	0.13	3.00
F032	0.22T	5.00	1.51	17.00	0.38	12.00	0.15T	4.00
F042	0.43	19.00		0.00	0.42	15.50	0.43	19.00
F046	0.33	14.00	1.25	10.00	0.37	9.00	0.25	12.50
F048	0.22	5.00	1.42	14.00	0.35	6.50	0.16	5.00
F093	0.2	2.50	1.3	11.50	0.7 H	20.00	0.3	16.50
F094	0.5	20.00	1.5	15.50	0.6	19.00	0.2	9.50
F095	0.246	8.00	1.38	13.00	0.458	17.00	0.172	6.00
F113	0.25	9.00	1.06	6.00	0.37	9.00	0.12	2.00
F122	0.38	16.00	1.18	8.00	0.38	12.00	0.26	14.50
F133	0.32	13.00	1.50	15.50	0.42	15.50	0.26	14.50
F135	0.24	7.00	1.04	5.00	0.37	9.00	0.18	7.00
F141	0.2	2.50	1.6	20.00	0.3	4.50	0.1	1.00
F145	1.2 EH	22.00	1.8 H	21.00	1.8 EH	22.00	1.5 EH	21.00
F147	0.4	17.50	0.7 VL	2.00	6.4 EH	23.00	4.9 EH	22.00
MEDIAN	0.2850		1.3000		0.3800		0.2250	
1CRIT	0.2585		0.3600		0.2680		0.2525	
N	20		20		21		20	
MEAN	0.3228		1.2855		0.4956		0.3086	
3STDEV	0.3611		0.8300		0.9984		0.8818	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	83.50	8.350	10	VL				
F004	122.50	12.250	10					02081
F006	99.50	9.950	10					NTU
F010	113.50	11.350	10					Nephelometry
F011	48.00	6.857	7					
F014	4.00	2.000	2	L	INSUFFICIENT DATA			
F015	88.00	8.800	10					Nephelometer
F025	190.50	19.050	10	VHVHEHH VHVHEHVHVHH	BIASED HIGH*	7.54	0.4867	Turbidity Meter
F031	23.00	2.875	8		BIASED LOW*	8.70	-0.1198	meter
F032	50.50	6.312	8					FTU
F042	149.50	16.611	9	H				nephelometric
F046	116.00	11.600	10					Turbidimeter
F048	71.50	7.150	10					
F093	120.00	12.000	10	EHEH H				Ratio Turbidimeter
F094	113.00	12.556	9					Nephelometric
F095	113.00	11.300	10	H				Hach 2100 AN
F113	38.00	3.800	10		BIASED LOW*	-11.39	-0.0644	ASTM Monitek
F122	134.50	13.450	10					Hach 18900, 25C
F133	116.00	11.600	10					NEPHELOMETRIC
F135	91.00	9.100	10					APHA 2130-B
F141	38.50	6.417	6					Turbidimeter
F145	200.00	20.000	10	EHEHEHEHEHEHEHH EHEH	BIASED HIGH	-65.02	1.3749	Nephelometric
F147	125.00	17.857	7	EHEHVH VLEHEH	BIASED HIGH	-216.91	2.9655	Neph.

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 50.00

OVERALL AVERAGE
RANK IS 10.917

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	4.00	2.000	2	L	INSUFFICIENT DATA			
F031	23.00	2.875	8		BIASED LOW*	8.70	-0.1198	meter
F113	38.00	3.800	10		BIASED LOW*	-11.39	-0.0644	ASTM Monitek
F032	50.50	6.312	8					FTU
F141	38.50	6.417	6					Turbidimeter
F011	48.00	6.857	7					
F048	71.50	7.150	10					
F002	83.50	8.350	10	VL				
F015	88.00	8.800	10					Nephelometer
F135	91.00	9.100	10					APHA 2130-B
F006	99.50	9.950	10					NTU
F095	113.00	11.300	10	H				Hach 2100 AN
F010	113.50	11.350	10					Nephelometry
F046	116.00	11.600	10					Turbidimeter
F133	116.00	11.600	10					NEPHELOMETRIC
F093	120.00	12.000	10	EHEHH				Ratio Turbidimeter
F004	122.50	12.250	10					02081
F094	113.00	12.556	9					Nephelometric
F122	134.50	13.450	10					Hach 18900, 25C
F042	149.50	16.611	9	H				nephelometric
F147	125.00	17.857	7	EHEHVHVLEHEH	BIASED HIGH	-216.91	2.9655	Neph.
F025	190.50	19.050	10	VHVHEHHVHVHEHVHVHH	BIASED HIGH*	7.54	0.4867	Turbidity Meter
F145	200.00	20.000	10	EHEHEHEHEHEHEHHEHEH	BIASED HIGH	-65.02	1.3749	Nephelometric

* NOTE: INDICATED BIAS STATEMENT IS FOR CAUTION ONLY AND NOT COUNTED IN STUDY STATISTICS
PERCENT SLOPE USED FOR CAUTION COMPARISON= 50.00

OVERALL AVERAGE
RANK IS 10.917

PARAMETER: 01092 pH pH Units

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 5.5000 BASIC ACCEPTABLE ERROR= 0.2500 CONCENTRATION ERROR INCREMENT= 0.0000

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	8.09	21.00	8.00	24.50	8.29	11.50	7.89	15.00	7.75	2.00	8.06	17.00
F003	8.08	20.00	7.95	19.50	8.33	18.00	7.85	9.50	8.01	22.00	8.06	17.00
F006	7.9	8.00	7.7	2.00	8.2	3.50	7.7 L	1.00	7.8	5.00	7.9	2.50
F007	8.24	34.00	8.16	35.50	8.49	33.50	8.28 H	34.00	8.19	35.50	8.3	36.00
F009	8.07	19.00	7.84	10.50	8.32	16.00	7.74	2.00	8.02	23.50	8.10	21.00
F010	7.97	12.50	7.97	22.00	8.27	9.50	8.10	28.00	7.99	20.00	8.03	13.00
F011	7.95	11.00	7.87	14.00	8.29	11.50	7.94	18.00	7.91	13.50	7.98	5.00
F014	8.06	18.00	7.98	23.00	8.37	23.50	8.01	23.50	8.00	21.00	8.13	23.00
F014p	8.17	29.00	8.16	35.50	8.41	27.50	8.29 H	35.00	8.11	28.50	8.20	29.00
F015	8.05	17.00	7.86	12.00	8.32	16.00	7.85	9.50	8.04	26.00	8.11	22.00
F019	7.9	8.00	7.8	6.50	8.2	3.50	7.8	4.50	7.8	5.00	7.9	2.50
F025	7.84	6.00	7.69 L	1.00	8.25	8.00	7.75	3.00	7.68 L	1.00	7.90	2.50
F026	8.17	29.00	8.14	33.50	8.54	36.00	8.36 VH	36.00	8.12	30.50	8.20	29.00
F031	8.13	24.50	7.94	18.00	8.37	23.50	7.84	7.00	8.11	28.50	8.18	27.00
F032	8.17	29.00	8.08	30.00	8.42	29.00	8.11	29.50	8.15	33.00	8.23	33.00
F036	7.99	15.00	7.8	6.50	8.35	21.50	7.84	7.00	7.98	18.00	8.06	17.00
F037	8.11	22.00	7.95	19.50	8.39	25.00	7.84	7.00	8.02	23.50	8.14	24.00
F038	7.81 L	3.00	7.87	14.00	8.15	1.50	8.06	25.50	7.94	16.00	8.04	14.50
F042	7.98	14.00	7.79	4.00	8.21	5.00	7.98	20.00	7.78	3.00	7.99	6.50
F046	7.82	4.00	7.78	3.00	8.24	7.00	7.88	13.00	7.90	11.50	8.01	11.50
F048	8.24	34.00	8.022	26.00	8.453	31.00	7.931	17.00	8.175	34.00	8.246	34.00
F063	7.83	5.00	7.87	14.00	8.22	6.00	8.00	21.50	7.87	10.00	8.00	9.00
F073	8.23	32.00	8.1	32.00	8.15	1.50	7.88	13.00	7.81	7.00	7.99	6.50
F074	8.50 EH	37.00	8.48 EH	37.00	8.71 EH	37.00	8.61 EH	37.00	8.45 EH	37.00	8.54 EH	37.00
F090	8.420 H	36.00	8.036	27.00	8.345	20.00	8.080	27.00	7.988	19.00	8.089	20.00
F093	8.01	16.00	7.88	16.00	8.34	19.00	7.87	11.00	7.91	13.50	8.04	14.50
F094	7.8 L	1.50	7.8	6.50	8.3	13.50	7.8	4.50	7.9	11.50	8.	9.00
F095	8.13	24.50	8.04	28.00	8.41	27.50	8.11	29.50	8.12	30.50	8.21	31.00
F113	8.24	34.00	8.14	33.50	8.48	32.00	8.22 H	33.00	8.19	35.50	8.27	35.00
F133	8.20	31.00	8.07	29.00	8.44	30.00	8.06	25.50	8.13	32.00	8.22	32.00
F135	7.8 L	1.50	7.8	6.50	8.3	13.50	8.0	21.50	7.8	5.00	7.9	2.50
F140	8.14	26.50	8.09	31.00	8.49	33.50	8.12	31.00	8.10	27.00	8.17	26.00
F141	8.12	23.00	8.00	24.50	8.51	35.00	8.16	32.00	7.85	8.00	8.20	29.00
F143	7.9	8.00	7.82	9.00	8.27	9.50	7.93	16.00	7.86	9.00	8.00	9.00
F144	8.14	26.50	7.96	21.00	8.4	26.00	7.88	13.00	7.97	17.00	8.08	19.00
F145	7.97	12.50	7.91	17.00	8.32	16.00	8.01	23.50	7.93	15.00	8.01	11.50
F147	7.94	10.00	7.84	10.50	8.35	21.50	7.97	19.00	8.03	25.00	8.15	25.00
MEDIAN	8.0700		7.9500		8.3400		7.9700		7.9880		8.0800	
1CRIT	0.2500		0.2500		0.2500		0.2500		0.2500		0.2500	
N	34		35		34		35		35		36	
MEAN	8.0591		7.9434		8.3496		7.9837		7.9787		8.0860	
3STDEV	0.4294		0.3729		0.2748		0.4644		0.3810		0.3298	

PARAMETER: 01092 pH pH Units

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	7.95	23.50	8.14	19.00	8.22	17.50	8.17	17.00
F003	7.73	3.00	8.05	5.00	8.15	5.00	8.07	4.00
F006	7.7	2.00	7.9	1.00	8.1	3.00	8.0	1.50
F007	8.21 H	36.00	8.41 H	36.00	8.51 H	35.00	8.49 H	35.00
F009	7.77	7.50	8.09	9.50	8.14	4.00	8.09	5.00
F010	8.02	30.00	8.22	26.00	8.36	28.00	8.32	27.50
F011	7.77	7.50	8.12	15.50	8.24	22.50	8.19	20.50
F014	7.96	27.00	8.20	23.50	8.29	25.00	8.26	25.00
F014p	8.14	34.00	8.34	33.00	8.43	32.00	8.35	30.00
F015	7.82	14.50	8.13	17.50	8.19	10.00	8.14	12.00
F019	7.8	11.50	8.0	3.00	8.0	1.00	8.0	1.50
F025	7.65 L	1.00	8.02	4.00	8.17	6.50	8.14	12.00
F026	8.09	33.00	8.38	35.00	8.53 H	36.00	8.50 H	36.00
F031	7.94	21.50	8.15	20.00	8.23	20.50	8.17	17.00
F032	8.03	31.00	8.29	30.50	8.36	28.00	8.35	30.00
F036	7.76	5.50	8.13	17.50	8.21	15.00	8.17	17.00
F037	7.82	14.50	8.17	22.00	8.21	15.00	8.16	14.00
F038	7.93	20.00	8.11	13.50	8.21	15.00	8.2	22.00
F042	7.81	13.00	8.08	8.00	8.24	22.50	8.11	9.50
F046	7.79	9.50	8.07	7.00	8.18	8.50	8.14	12.00
F048	7.953	25.00	8.266	28.00	8.296	26.00	8.239	24.00
F063	7.90	17.50	8.10	11.50	8.20	12.00	8.22	23.00
F073	7.91	19.00	7.99	2.00	8.09	2.00	8.04	3.00
F074	8.49 EH	37.00	8.66 EH	37.00	8.76 EH	37.00	8.73 EH	37.00
F090	7.959	26.00	8.062	6.00	8.226	19.00	8.163	15.00
F093	7.76	5.50	8.09	9.50	8.17	6.50	8.10	7.00
F094	7.8	11.50	8.1	11.50	8.2	12.00	8.1	7.00
F095	8.06	32.00	8.29	30.50	8.38	30.00	8.35	30.00
F113	8.15	35.00	8.36	34.00	8.46	33.00	8.42	34.00
F133	7.98	28.50	8.16	21.00	8.23	20.50	8.19	20.50
F135	7.9	17.50	8.2	23.50	8.2	12.00	8.1	7.00
F140	7.98	28.50	8.28	29.00	8.39	31.00	8.32	27.50
F141	7.83	16.00	8.31	32.00	8.47	34.00	8.39	33.00
F143	7.79	9.50	8.12	15.50	8.22	17.50	8.18	19.00
F144	7.75	4.00	8.11	13.50	8.18	8.50	8.11	9.50
F145	7.95	23.50	8.21	25.00	8.25	24.00	8.29	26.00
F147	7.94	21.50	8.25	27.00	8.36	28.00	8.38	32.00
MEDIAN	7.9100		8.1400		8.2260		8.1800	
1CRIT	0.2500		0.2500		0.2500		0.2500	
N	35		35		35		34	
MEAN	7.9043		8.1714		8.2655		8.2239	
3STDEV	0.3847		0.3271		0.3408		0.3633	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	168.00	16.800	10					ph Meter
F003	123.00	12.300	10					pH Electrode
F006	29.50	2.950	10	L	BIASED LOW	23.93	-2.1275	stirred
F007	350.50	35.050	10	H H H H H	BIASED HIGH	-10.72	1.1101	
F009	118.00	11.800	10					Stirred
F010	216.50	21.650	10					Stirred electrode
F011	139.00	13.900	10					
F014	232.50	23.250	10					
F014p	313.50	31.350	10	H	BIASED HIGH	-27.38	2.3917	
F015	156.50	15.650	10					Auto pH meter
F019	47.00	4.700	10		BIASED LOW	-6.40	0.3546	Stirred
F025	45.00	4.500	10	L L L	BIASED LOW	59.13	-4.9548	pH Meter
F026	334.00	33.400	10	VH H H	BIASED HIGH	11.76	-0.7300	electrode
F031	207.50	20.750	10					Stirred,
F032	303.00	30.300	10		BIASED HIGH	-5.53	0.5817	Unstirred
F036	140.00	14.000	10					Unstirred
F037	186.50	18.650	10					ACCUMET
F038	145.00	14.500	10	L				pH METER
F042	105.50	10.550	10					unstirred
F046	87.00	8.700	10					pH Meter
F048	279.00	27.900	10					Electrode
F063	129.50	12.950	10					pH meter
F073	118.00	11.800	10					
F074	370.00	37.000	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	-30.71	2.9919	Auto - Stirred
F090	215.00	21.500	10	H				unstirred, 25C
F093	118.50	11.850	10					Meter (stirred)
F094	88.50	8.850	10	L				pH Meter
F095	293.50	29.350	10					Titralyzer
F113	339.00	33.900	10	H	BIASED HIGH	-9.85	1.0058	unstirred, Ross el
F133	270.00	27.000	10					ELECTRODE
F135	110.50	11.050	10	L				APHA 4500-H stirrd
F140	291.00	29.100	10					I.S.E.
F141	266.50	26.650	10					pH meter
F143	122.00	12.200	10					electrometric
F144	158.00	15.800	10					APHA 4500-H
F145	194.00	19.400	10					Electrometric
F147	219.50	21.950	10					S. Pot.

OVERALL AVERAGE
RANK IS 19.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F006	29.50	2.950	10	L	BIASED LOW	23.93	-2.1275	stirred
F025	45.00	4.500	10	LLL	BIASED LOW	59.13	-4.9548	pH Meter
F019	47.00	4.700	10		BIASED LOW	-6.40	0.3546	Stirred
F046	87.00	8.700	10					pH Meter
F094	88.50	8.850	10	L				pH Meter
F042	105.50	10.550	10					unstirred
F135	110.50	11.050	10	L				APHA 4500-H stirrd
F073	118.00	11.800	10					
F009	118.00	11.800	10					Stirred
F093	118.50	11.850	10					Meter (stirred)
F143	122.00	12.200	10					electrometric
F003	123.00	12.300	10					pH Electrode
F063	129.50	12.950	10					pH meter
F011	139.00	13.900	10					
F036	140.00	14.000	10					Unstirred
F038	145.00	14.500	10	L				pH METER
F015	156.50	15.650	10					Auto pH meter
F144	158.00	15.800	10					APHA 4500-H
F002	168.00	16.800	10					ph Meter
F037	186.50	18.650	10					ACCUMET
F145	194.00	19.400	10					Electrometric
F031	207.50	20.750	10					Stirred,
F090	215.00	21.500	10	H				unstirred, 25C
F010	216.50	21.650	10					Stirred electrode
F147	219.50	21.950	10					S. Pot.
F014	232.50	23.250	10					
F141	266.50	26.650	10					pH meter
F133	270.00	27.000	10					ELECTRODE
F048	279.00	27.900	10					Electrode
F140	291.00	29.100	10					I.S.E.
F095	293.50	29.350	10					Titralyzer
F032	303.00	30.300	10		BIASED HIGH	-5.53	0.5817	Unstirred
F014p	313.50	31.350	10	H	BIASED HIGH	-27.38	2.3917	
F026	334.00	33.400	10	VHHH	BIASED HIGH	11.76	-0.7300	electrode
F113	339.00	33.900	10	H	BIASED HIGH	-9.85	1.0058	unstirred, Ross el
F007	350.50	35.050	10	HHHHH	BIASED HIGH	-10.72	1.1101	
F074	370.00	37.000	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	-30.71	2.9919	Auto - Stirred

OVERALL AVERAGE
RANK IS 19.000

pH

PARAMETER: 06192 Total Alkalinity mg/L CaCO3

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= 0.0400

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	83.4	3.00	87.6	5.00	200.5	6.00	186.3	4.00	74.2	5.00	93.6	6.00
F003	85.4	11.00	90.4	17.50	208.	25.50	190.	14.50	75.9	13.00	95.3	15.00
F006	87.	21.00	91.	22.00	206.	17.00	192.	21.50	77.	20.50	97.	22.00
F007	84.1	6.00	88.	6.50	201.9	9.00	187.5	7.00	75.	9.50	94.8	12.00
F010	92. H	31.00	94.	29.00	217. H	31.00	199.	30.00	80.	29.00	101.	31.00
F011	86.5	16.00	90.4	17.50	208.	25.50	193.	24.50	76.5	17.00	96.8	19.50
F014	87.3	24.00	90.9	20.00	207.	21.00	193.	24.50	77.5	23.50	97.4	25.00
F014p	86.0	14.00	89.9	15.00	204.	12.50	190.	14.50	76.8	18.00	96.6	18.00
F015	91.4	30.00	93.1	28.00	211.	30.00	196.	28.00	81. H	30.00	99.4	30.00
F019	84.	4.50	87.	3.50	192. L	2.00	187.	5.50	72.	2.00	91.	3.00
F025	86.0	14.00	91.0	22.00	207.	21.00	190.	14.50	77.6	25.50	96.8	19.50
F026	86.53	17.00	91.545	26.00	209.495	28.00	196.07	29.00	79.30	28.00	98.31	28.00
F031	85.	10.00	89.	12.00	205.	14.00	200. H	31.50	75.	9.50	94.	8.50
F032	91.	29.00	90.6	19.00	208.	25.50	194.	27.00	77.6	25.50	97.6	27.00
F036	87.	21.00	91.1	24.00	207.	21.00	192.	21.50	77.5	23.50	97.5	26.00
F038	86.	14.00	90.	16.00	201.	7.50	190.	14.50	77.	20.50	96.	16.00
F042	84.2	7.00	88.7	11.00	204.	12.50	188.	9.50	74.4	6.00	92.6	4.00
F046	88.1	26.00	98.7 EH	31.00	207.	21.00	193.	24.50	81.3 H	31.00	99.1	29.00
F048	87.39	25.00	91.24	25.00	205.23	15.00	190.97	19.00	78.39	27.00	97.10	24.00
F063	87.	21.00	87.	3.50	200.	4.50	190.	14.50	76.	14.50	95.	13.00
F074	84.5	8.00	88.5	10.00	202.8	10.00	187.8	8.00	74.9	7.00	94.1	10.00
F093	81.0 L	2.00	84.0 L	2.00	196.0	3.00	183.0	2.00	74.0	4.00	87.0 EL	1.00
F094	87.	21.00	91.	22.00	208.	25.50	193.	24.50	77.	20.50	97.	22.00
F095	84.6	9.00	88.2	8.00	201.	7.50	187.	5.50	75.1	12.00	94.4	11.00
F113	85.7	12.00	89.13	13.00	205.3	16.00	190.3	18.00	76.18	16.00	96.4	17.00
F133	84.	4.50	88.	6.50	200.	4.50	185.	3.00	75.	9.50	93.	5.00
F135	86.7	18.00	89.4	14.00	206.5	18.00	190.0	14.50	76.0	14.50	95.2	14.00
F141	87.	21.00	95.	30.00	210.	29.00	191.	20.00	77.	20.50	97.	22.00
F143	88.3	27.00	88.3	9.00	203.	11.00	188.	9.50	75.	9.50	94.	8.50
F144	96. EH	32.00	100. EH	32.00	220. EH	32.00	200. H	31.50	84. EH	32.00	108. EH	32.00
F145	78.8 EL	1.00	81.2 EL	1.00	188. EL	1.00	179. EL	1.00	70. EL	1.00	90.4 L	2.00
F147	88.5	28.00	92.1	27.00	207.0	21.00	189.0	11.00	73.2	3.00	93.8	7.00
MEDIAN	86.5150		90.2000		205.6500		190.0000		76.3400		96.2000	
1CRIT	4.9206		5.0680		9.6860		9.0600		4.5136		5.3080	
N	30		30		30		29		30		30	
MEAN	86.4207		90.1605		204.9575		190.4117		76.4457		95.7403	
3STDEV	6.9864		8.1141		14.0400		10.2218		6.3387		7.0873	

PARAMETER: 06192 Total Alkalinity mg/L CaCO3

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	94.6	12.00	170.4	9.00	312.2	6.00	251.0	7.50
F003	93.4	5.00	171.	11.50	320.	18.50	252.	9.00
F006	97.	22.50	176.	24.50	320.	18.50	257.	18.50
F007	94.7	13.00	170.9	10.00	317.	9.50	253.7	11.00
F010	105. EH	31.00	187. EH	32.00	348. EH	31.00	273. EH	32.00
F011	96.7	21.00	176.	24.50	325.	27.00	260.	25.50
F014	97.9	28.50	178.	31.00	324.	26.00	260.	25.50
F014p	97.2	24.50	173.	16.00	320.	18.50	257.	18.50
F015	95.2	16.00	177.	29.50	328.	29.50	263.	29.00
F019	94.	8.50	163. L	1.00	317.	9.50	248.	4.00
F025	96.2	20.00	173.	16.00	320.	18.50	255.	14.50
F026	97.475	27.00	176.43	28.00	326.125	28.00	264.375	31.00
F031	92.	3.00	170.	7.00	320.	18.50	264.	30.00
F032	97.2	24.50	177.	29.50	322.	24.00	260.	25.50
F036	97.9	28.50	176.	24.50	322.	24.00	259.	23.00
F038	96.	18.50	173.	16.00	318.	13.00	256.	17.00
F042	96.0	18.50	171.	11.50	314.	7.00	251.	7.50
F046	100.	30.00	176.	24.50	321.	22.00	261.	28.00
F048	97.21	26.00	173.97	20.00	319.03	15.00	255.81	16.00
F063	94.	8.50	170.	7.00	310.	4.00	254.	12.00
F074	93.5	6.00	172.9	14.00	317.8	12.00	253.3	10.00
F093	87.0 EL	1.00	164.0 L	2.00	504.0 EH	32.00	248.0	4.00
F094	97.	22.50	176.	24.50	322.	24.00	258.	21.50
F095	94.5	11.00	170.	7.00	311.	5.00	250.	6.00
F113	94.95	14.00	173.9	19.00	317.7	11.00	257.32	20.00
F133	94.	8.50	168.	4.00	308.	2.00	247.	2.00
F135	95.8	17.00	173.3	18.00	318.9	14.00	254.7	13.00
F141	95.	15.00	175.	21.00	320.	18.50	258.	21.50
F143	94.	8.50	172.	13.00	316.	8.00	255.	14.50
F144	108. EH	32.00	176.	24.50	328.	29.50	260.	25.50
F145	90. L	2.00	164.4 L	3.00	295. EL	1.00	239. EL	1.00
F147	93.1	4.00	168.3	5.00	308.7	3.00	248.0	4.00
MEDIAN	95.5000		173.0000		320.0000		255.9050	
1CRIT	5.2800		8.3800		14.2600		11.6962	
N	30		30		30		30	
MEAN	95.7178		172.7500		319.7152		255.7068	
3STDEV	7.9195		10.6199		21.9126		14.3434	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	63.50	6.350	10		BIASED LOW*	-2.09	-0.2368	H2SO4 titration
F003	140.50	14.050	10					Pot. Titn
F006	208.00	20.800	10					Titrn
F007	93.50	9.350	10					
F010	307.00	30.700	10	H H EHEHEHEH	BIASED HIGH	8.37	-2.6340	Titration-conduct.
F011	218.00	21.800	10					
F014	249.00	24.900	10					
F014p	169.50	16.950	10					
F015	280.00	28.000	10	H	BIASED HIGH*	2.13	1.1981	Potent. titration
F019	43.50	4.350	10	L L	BIASED LOW*	-1.48	-3.0773	Titrimetric
F025	185.50	18.550	10					Titration
F026	270.00	27.000	10		BIASED HIGH*	2.57	-0.4458	Titro
F031	144.00	14.400	10	H				Titration
F032	256.50	25.650	10		BIASED HIGH*	0.56	1.6732	Titration
F036	237.00	23.700	10					Titration
F038	153.00	15.300	10					Titration
F042	94.50	9.450	10					Gran plot titr.
F046	267.00	26.700	10	EH H	BIASED HIGH*	-1.14	5.3986	Titration
F048	212.00	21.200	10					
F063	102.50	10.250	10					titr. pH 4.5
F074	95.00	9.500	10					Automated Gran
F093	53.00	5.300	10	L L ELELL EH	BIASED LOW	47.62	-63.8130	Titration pH 4.90
F094	228.00	22.800	10					Autotitrator
F095	82.00	8.200	10					Titralyzer
F113	156.00	15.600	10					Gran titration
F133	49.50	4.950	10		BIASED LOW	-4.01	1.6474	TITRIMETRIC
F135	155.00	15.500	10					APHA 2320-B
F141	218.50	21.850	10					Titrimetry
F143	118.50	11.850	10					autotitrator
F144	303.00	30.300	10	EHEHEHH EHEHEH	BIASED HIGH*	-1.29	11.1163	APHA 2320
F145	14.00	1.400	10	ELELELELELL L L ELEL	BIASED LOW	-7.16	0.0220	Titrimetric
F147	113.00	11.300	10					Titn pH4.5

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

OVERALL AVERAGE
RANK IS 16.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F145	14.00	1.400	10	ELELELELELLLLELEL	BIASED LOW	-7.16	0.0220	Titrimetric
F019	43.50	4.350	10	LL	BIASED LOW*	-1.48	-3.0773	Titrimetric
F133	49.50	4.950	10		BIASED LOW	-4.01	1.6474	TITRIMETRIC
F093	53.00	5.300	10	LLELELLEH	BIASED LOW	47.62	-63.8130	Titration pH 4.90
F002	63.50	6.350	10		BIASED LOW*	-2.09	-0.2368	H2SO4 titration
F095	82.00	8.200	10					Titralyzer
F007	93.50	9.350	10					
F042	94.50	9.450	10					Gran plot titr.
F074	95.00	9.500	10					Automated Gran
F063	102.50	10.250	10					titr. pH 4.5
F147	113.00	11.300	10					Titn pH4.5
F143	118.50	11.850	10					autotitrator
F003	140.50	14.050	10					Pot. Titn
F031	144.00	14.400	10	H				Titration
F038	153.00	15.300	10					Titration
F135	155.00	15.500	10					APHA 2320-B
F113	156.00	15.600	10					Gran titration
F014p	169.50	16.950	10					
F025	185.50	18.550	10					Titration
F006	208.00	20.800	10					Titrn
F048	212.00	21.200	10					
F011	218.00	21.800	10					
F141	218.50	21.850	10					Titrimetry
F094	228.00	22.800	10					Autotitrator
F036	237.00	23.700	10					Titration
F014	249.00	24.900	10					
F032	256.50	25.650	10		BIASED HIGH*	0.56	1.6732	Titration
F046	267.00	26.700	10	EHH	BIASED HIGH*	-1.14	5.3986	Titration
F026	270.00	27.000	10		BIASED HIGH*	2.57	-0.4458	Titro
F015	280.00	28.000	10	H	BIASED HIGH*	2.13	1.1981	Potent. titration
F144	303.00	30.300	10	EHEHEHHEHEHEH	BIASED HIGH*	-1.29	11.1163	APHA 2320
F010	307.00	30.700	10	HHEHEHEHEH	BIASED HIGH	8.37	-2.6340	Titration-conduct.

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

OVERALL AVERAGE
RANK IS 16.500

Total Alkalinity

PARAMETER: 05091 Boron mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0050 BASIC ACCEPTABLE ERROR= 0.0050 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F009	<0.05	0.00	0.075	3.00	0.065	7.00	0.104	8.00	<0.05	0.00	<0.05	0.00
F010	0.015	3.00	0.080	5.50	0.056	5.00	0.093	5.00	0.020 H	6.00	0.026	5.00
F014	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00
F015	0.02	5.00	0.08	5.50	0.05	2.00	0.09	4.00	0.01	1.50	0.02	2.50
F038	<0.1	0.00	<0.1	0.00	<0.1	0.00	0.1	7.00	<0.1	0.00	<0.1	0.00
F046	0.0174	4.00	0.0846	7.00	0.0564	6.00	0.0969	6.00	0.0180	5.00	0.0281	6.00
F094	<0.05	0.00	0.09	9.00	0.07 H	8.00	0.15 VH	10.00	<0.05	0.00	<0.05	0.00
F095	0.014	2.00	0.074	2.00	0.051	4.00	0.084	3.00	0.015	4.00	0.024	4.00
F133	0.010 L	1.00	0.070	1.00	0.050	2.00	0.080 L	1.00	0.010	1.50	0.020	2.50
F141	<0.05	0.00	0.076	4.00	0.050	2.00	0.083	2.00	<0.05	0.00	<0.05	0.00
F144	<0.07	0.00	<0.07	0.00	<0.07	0.00	0.17 VH	11.00	<0.07	0.00	<0.07	0.00
F145	0.022	6.00	0.087	8.00	0.088 EH	9.00	0.144 VH	9.00	0.013	3.00	0.018	1.00
MEDIAN	0.0162		0.0800		0.0560		0.0969		0.0140		0.0220	
1CRIT	0.0061		0.0125		0.0101		0.0142		0.0059		0.0067	
N	4		7		8		9		3		4	
MEAN	0.0166		0.0795		0.0560		0.1050		0.0153		0.0225	
3STDEV	-		0.0137		0.0215		0.0702		-		-	

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F009	<0.05	0.00	0.055 H	6.00	0.108 VH	8.00	0.089 VH	8.00
F010	0.014	4.00	0.041	3.50	0.076	3.00	0.062	5.00
F014	<0.20	0.00	<0.20	0.00	<0.20	0.00	<0.20	0.00
F015	0.02 H	6.00	0.04	1.50	0.08	4.50	0.06	3.50
F038	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00
F046	0.0151	5.00	0.0448	5.00	0.0843	6.00	0.0655	6.00
F094	<0.05	0.00	0.08 VH	9.00	0.1 H	7.00	0.07	7.00
F095	0.013	3.00	0.041	3.50	0.073	1.00	0.055	1.00
F133	0.010	2.00	0.040	1.50	0.080	4.50	0.060	3.50
F141	<0.05	0.00	<0.05	0.00	0.074	2.00	0.056	2.00
F144	<0.07	0.00	0.07 VH	8.00	0.12 VH	9.00	0.14 EH	10.00
F145	0.006 L	1.00	0.06 VH	7.00	0.157 EH	10.00	0.112 VH	9.00
MEDIAN	0.0135		0.0448		0.0821		0.0637	
1CRIT	0.0058		0.0090		0.0127		0.0109	
N	4		6		8		8	
MEAN	0.0130		0.0520		0.0903		0.0718	
3STDEV	-		0.0322		0.0475		0.0539	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F009	40.00	6.667	6	H VHVH				ICP-MS
F010	45.00	4.500	10	H				ICP-OES
F014	0.00	-	0					ICP
F015	36.00	3.600	10	H				ICP
F038	7.00	7.000	1					ICP-OES
F046	56.00	5.600	10					ICAP
F094	50.00	8.333	6	H VH VHH				ICP
F095	27.50	2.750	10					ICP - OES
F133	20.50	2.050	10	L L				ICP-MS
F141	12.00	2.400	5					ICP-OES
F144	38.00	9.500	4	VH VHVHEH				APHA 4500-B B
F145	63.00	6.300	10	EHVH L VHEHVH				ICP-AES

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

OVERALL AVERAGE
RANK IS 4.817

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F014	0.00	-	0					ICP
F133	20.50	2.050	10	LL				ICP-MS
F141	12.00	2.400	5					ICP-OES
F095	27.50	2.750	10					ICP - OES
F015	36.00	3.600	10	H				ICP
F010	45.00	4.500	10	H				ICP-OES
F046	56.00	5.600	10					ICAP
F145	63.00	6.300	10	EHVHLVHEHVH				ICP-AES
F009	40.00	6.667	6	HVHVH				ICP-MS
F038	7.00	7.000	1					ICP-OES
F094	50.00	8.333	6	HVHVHH				ICP
F144	38.00	9.500	4	VHVHVHEH				APHA 4500-B B

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

OVERALL AVERAGE
RANK IS 4.817

Boron

PARAMETER: 06002 Diss Organic Carbon mg/L C

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= 0.7500 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	1.6	5.00	3.4	11.50	4.0	8.50	9.6	14.00	3.3	6.00	1.3	1.00
F003	2.0	12.50	3.4	11.50	4.8	17.00	9.6	14.00	3.8	16.50	2.1	16.50
F004	1.60	5.00	3.27	9.00	4.14	12.00	9.45	11.00	3.44	11.00	1.59	11.00
F006	3. H	19.00	4.	18.00	5.	18.00	10.	19.00	4.	18.00	2.5 H	20.00
F010	1.7	9.00	3.1	6.00	4.0	8.50	9.1	7.50	3.3	6.00	1.5	7.00
F014	2.2	15.00	3.7	15.50	4.7	15.50	9.7	16.50	3.5	12.50	1.7	14.00
F015	2.0	12.50	3.4	11.50	3.7	4.00	9.1	7.50	3.4	9.00	1.4	5.00
F025	2.3	16.00	3.7	15.50	4.7	15.50	9.6	14.00	3.8	16.50	2.2	18.00
F026	1.623	8.00	2.9625	4.00	3.9125	7.00	9.094	6.00	3.4205	10.00	1.542	9.00
F032	1.8	10.50	3.	5.00	3.8	5.50	8.9	5.00	3.3	6.00	1.5	7.00
F037	2.3027	17.00	4.2366	19.00	4.4132	13.00	9.7238	18.00	3.7433	15.00	1.8569	15.00
F042	1.80	10.50	3.20	7.00	4.10	11.00	9.30	10.00	3.20	4.00	1.60	12.00
F046	3.26 VH	20.00	4.75 VH	21.00	5.69 VH	21.00	10.7	20.00	4.67 H	21.00	2.66 H	21.00
F048	1.36	1.00	2.90	2.50	3.39	1.00	7.65 L	1.00	2.82	1.00	1.38	4.00
F063	3.4 VH	21.00	4.3 H	20.00	5.2 H	19.00	9.7	16.50	4.1	20.00	2.1	16.50
F073	1.502	3.00	2.77	1.00	3.42	2.00	7.93 L	2.00	2.84	2.00	1.36	2.50
F074	2.16	14.00	3.60	14.00	4.44	14.00	9.48	12.00	3.72	14.00	1.68	13.00
F094	1.4	2.00	3.4	11.50	3.8	5.50	8.8	4.00	3.5	12.50	1.5	7.00
F095	1.60	5.00	2.90	2.50	3.65	3.00	8.32	3.00	3.06	3.00	1.36	2.50
F113	1.62	7.00	3.23	8.00	4.09	10.00	9.12	9.00	3.31	8.00	1.58	10.00
F145	8.4 EH	22.00	9.8 EH	22.00	10.7 EH	22.00	19.5 EH	22.00	9.6 EH	22.00	7.9 EH	22.00
F147	2.31	18.00	3.73	17.00	5.60 VH	20.00	11.20 H	21.00	4.09	19.00	2.22	19.00
MEDIAN	1.9000		3.4000		4.1200		9.4650		3.4700		1.5950	
1CRIT	0.7500		0.8900		0.9620		1.4965		0.8970		0.7500	
N	20		20		20		20		20		20	
MEAN	2.0589		3.5090		4.3578		9.4209		3.5747		1.7664	
3STDEV	1.6926		1.4714		1.8920		2.1208		1.2366		1.1510	

PARAMETER: 06002 Diss Organic Carbon mg/L C

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	17.9	10.00	14.8	17.00	20.6	17.00	8.7	12.50
F003	17.4	6.00	14.7	16.00	19.5	9.50	9.6	18.50
F004	15.7	2.50	11.7 L	1.00	18.1	4.00	8.61	11.00
F006	19.	17.50	14.	11.50	20.	14.00	10.	20.00
F010	17.8	9.00	13.6	8.50	19.7	11.00	8.2	9.00
F014	19.2	19.00	14.9	18.00	21.7	20.00	9.3	17.00
F015	18.6	14.00	13.6	8.50	19.1	7.00	7.9	4.50
F025	17.7	8.00	13.7	10.00	19.5	9.50	8.8	15.00
F026	18.17	13.00	14.131	14.00	19.7665	12.00	8.7755	14.00
F032	17.5	7.00	13.3	6.00	19.	6.00	7.9	4.50
F037	17.9907	11.00	13.1792	5.00	19.265	8.00	8.1594	8.00
F042	18.7	15.00	14.1	13.00	20.1	16.00	8.50	10.00
F046	19.6	21.00	15.1	20.00	20.9	19.00	9.60	18.50
F048	14.9 L	1.00	12.0 L	3.00	16.5 L	1.00	7.07 L	1.00
F063	19.	17.50	15.	19.00	20.	14.00	8.7	12.50
F073	16.13	4.00	11.95 L	2.00	17.95	3.00	7.24	2.00
F074	18.72	16.00	14.16	15.00	20.64	18.00	8.88	16.00
F094	16.5	5.00	14.	11.50	18.6	5.00	8.	7.00
F095	15.7	2.50	12.3	4.00	17.9	2.00	7.98	6.00
F113	18.	12.00	13.4	7.00	20.	14.00	7.89	3.00
F145	22.3 EH	22.00	19.2 EH	22.00	22.7 H	22.00	14.3 EH	22.00
F147	19.56	20.00	15.82	21.00	22.40 H	21.00	10.31 H	21.00
MEDIAN	17.9953		14.0000		19.7332		8.6550	
1CRIT	2.3495		1.9500		2.5233		1.4155	
N	20		20		20		20	
MEAN	17.9435		13.8870		19.7361		8.6522	
3STDEV	3.4756		3.0214		3.4221		2.3171	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	102.50	10.250	10					Shimadzu TOC
F003	138.00	13.800	10					UV dig. IR
F004	77.50	7.750	10	L				06104
F006	175.00	17.500	10	H H	BIASED HIGH*	-2.28	0.9093	UV Persulfate
F010	81.50	8.150	10					Cond. meter
F014	163.00	16.300	10					
F015	83.50	8.350	10					
F025	138.00	13.800	10					Persulfate IR
F026	97.00	9.700	10					AA
F032	62.50	6.250	10					Colourimetry
F037	129.00	12.900	10					PERSULFATE IR
F042	108.50	10.850	10					IR
F046	202.50	20.250	10	VHVHVH H H	BIASED HIGH*	0.11	1.2505	Combustion IR
F048	16.50	1.650	10	L L L L L	BIASED LOW	-16.03	-0.0845	ND-IR
F063	176.00	17.600	10	VHH H	BIASED HIGH*	-1.74	0.8636	auto-UV-Persulfate
F073	23.50	2.350	10	L L	BIASED LOW	-9.23	-0.3458	Persulfate
F074	146.00	14.600	10					Persulphate IR
F094	71.00	7.100	10					Infrared
F095	33.50	3.350	10		BIASED LOW	-10.58	-0.0638	Skalar SFA
F113	88.00	8.800	10					UV-persulfate
F145	220.00	22.000	10	EHEHEHEHEHEHEHEHH EH	BIASED HIGH	-15.00	7.2713	Continuous Flow
F147	197.00	19.700	10	VHH H H	BIASED HIGH	9.61	0.4806	Colour

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

OVERALL AVERAGE
RANK IS 11.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F048	16.50	1.650	10	LLLLL	BIASED LOW	-16.03	-0.0845	ND-IR
F073	23.50	2.350	10	LL	BIASED LOW	-9.23	-0.3458	Persulfate
F095	33.50	3.350	10		BIASED LOW	-10.58	-0.0638	Skalar SFA
F032	62.50	6.250	10					Colourimetry
F094	71.00	7.100	10					Infrared
F004	77.50	7.750	10	L				06104
F010	81.50	8.150	10					Cond. meter
F015	83.50	8.350	10					
F113	88.00	8.800	10					UV-persulfate
F026	97.00	9.700	10					AA
F002	102.50	10.250	10					Shimadzu TOC
F042	108.50	10.850	10					IR
F037	129.00	12.900	10					PERSULFATE IR
F003	138.00	13.800	10					UV dig. IR
F025	138.00	13.800	10					Persulfate IR
F074	146.00	14.600	10					Persulphate IR
F014	163.00	16.300	10					
F006	175.00	17.500	10	HH	BIASED HIGH*	-2.28	0.9093	UV Persulfate
F063	176.00	17.600	10	VHHH	BIASED HIGH*	-1.74	0.8636	auto-UV-Persulfate
F147	197.00	19.700	10	VHHHH	BIASED HIGH	9.61	0.4806	Colour
F046	202.50	20.250	10	VHVHVHHH	BIASED HIGH*	0.11	1.2505	Combustion IR
F145	220.00	22.000	10	EHEHEHEHEHEHEHEHHEH	BIASED HIGH	-15.00	7.2713	Continuous Flow

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

OVERALL AVERAGE
RANK IS 11.500

PARAMETER: 06592 Diss Inorg Carbon mg/L C

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	19.2	4.00	20.1	4.00	46.1	5.50	43.5	5.00	17.6	3.50	21.8	2.00
F003	20.3	6.50	21.6	8.00	47.9	12.00	46.5	13.00	18.3	8.00	23.1	7.00
F010	21.	11.00	22.	11.50	49.	14.50	46.	11.00	17.6	3.50	24.	13.00
F015	20.3	6.50	21.2	5.00	47.2	11.00	44.7	8.00	18.0	5.50	22.5	4.50
F025	21.2	14.00	22.1	14.00	50.3	16.00	47.5	16.00	18.6	12.00	24.1	14.00
F026	19.595	5.00	21.345	7.00	47.155	9.00	46.13	12.00	18.32	9.00	23.215	8.00
F032	21.	11.00	22.	11.50	49.	14.50	45.6	10.00	18.6	12.00	23.4	10.50
F036	21.1	13.00	21.7	10.00	47.	8.00	46.6	14.00	18.6	12.00	23.4	10.50
F042	21.7	16.50	22.6	16.00	34.0 EL	1.00	32.6 EL	1.00	19.4	15.00	24.4	15.00
F046	20.5	8.00	21.3	6.00	46.9	7.00	44.3	6.00	18.0	5.50	22.5	4.50
F073	21.34	15.00	22.22	15.00	37.69 VL	2.00	34.12 VL	2.00	20.76 H	17.00	24.57	16.00
F074	21.00	11.00	22.08	13.00	47.16	10.00	44.40	7.00	19.08	14.00	23.52	12.00
F094	21.7	16.50	23.2	17.00	51.4	17.00	49.	17.00	20.	16.00	24.7	17.00
F095	16.7 VL	2.00	18.1 L	2.00	42.0	4.00	40.7	4.00	14.4 EL	1.00	18.9 EL	1.00
F113	20.53	9.00	21.62	9.00	48.27	13.00	47.03	15.00	18.09	7.00	23.09	6.00
F145	17.1 L	3.00	18.7 L	3.00	46.1	5.50	44.8	9.00	16.3	2.00	21.9	3.00
F147	16.00 VL	1.00	16.94 EL	1.00	41.87 L	3.00	39.05 L	3.00	18.58	10.00	23.29	9.00
MEDIAN	20.5300		21.6200		47.1550		44.8000		18.3200		23.2900	
1CRIT	2.5030		2.6120		5.1655		4.9300		2.2820		2.7790	
N	14		15		15		15		15		15	
MEAN	20.0618		21.2443		46.2430		44.0620		18.3380		23.2523	
3STDEV	4.2582		3.7569		9.5633		10.3955		2.4785		2.3964	

PARAMETER: 06592 Diss Inorg Carbon mg/L C

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	21.1	4.00	38.7	6.00	69.5	4.00	57.0	4.00
F003	22.7	8.00	41.1	11.00	80.3	17.00	59.1	6.00
F010	23.	10.00	42.	12.50	76.	12.00	62.	13.00
F015	22.1	6.00	40.0	9.00	74.0	7.00	60.3	10.00
F025	23.3	15.00	43.6	16.50	75.8	11.00	64.2	16.00
F026	23.29	14.00	42.05	14.00	76.41	13.00	61.76	12.00
F032	22.2	7.00	41.	10.00	75.4	10.00	61.2	11.00
F036	22.8	9.00	42.	12.50	77.2	14.00	62.8	14.00
F042	24.0	16.00	28.6 EL	1.00	39.3 EL	2.00	31.8 EL	1.00
F046	21.9	5.00	39.8	7.00	75.0	8.50	60.0	9.00
F073	23.06	13.00	30.67 VL	2.00	35.89 EL	1.00	38.47 EL	2.00
F074	23.04	12.00	39.96	8.00	73.44	6.00	59.16	7.00
F094	24.1	17.00	43.6	16.50	80.	16.00	66.	17.00
F095	19.0 L	2.00	37.0	4.00	77.3	15.00	59.5	8.00
F113	23.02	11.00	43.02	15.00	73.1	5.00	59.08	5.00
F145	20.6	3.00	38.	5.00	75.	8.50	62.9	15.00
F147	17.88 EL	1.00	33.17 VL	3.00	63.04 VL	3.00	52.22 L	3.00
MEDIAN	22.8000		40.0000		75.0000		60.0000	
1CRIT	2.7300		4.4500		7.9500		6.4500	
N	15		14		15		15	
MEAN	22.3407		39.1764		72.0327		58.6460	
3STDEV	3.7003		10.2198		28.5831		18.1775	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	42.00	4.200	10		BIASED LOW*	-5.69	0.2322	Shimadzu TOC
F003	96.50	9.650	10					IR
F010	112.00	11.200	10					Conduct. meter
F015	72.50	7.250	10					
F025	144.50	14.450	10		BIASED HIGH*	4.21	0.1445	Infrared
F026	103.00	10.300	10					AA
F032	107.50	10.750	10					Colourimetry
F036	117.00	11.700	10					Colourimetry
F042	84.50	8.450	10	ELEL ELELEL				IR
F046	66.50	6.650	10					Combustion IR
F073	85.00	8.500	10	VLVLH VLELEL				Persulfate
F074	100.00	10.000	10					IR Detector
F094	167.00	16.700	10		BIASED HIGH	8.59	-0.1902	Infrared
F095	43.00	4.300	10	VLL ELELL	BIASED LOW	8.78	-6.2703	Skalar SFA
F113	95.00	9.500	10					Phosphoric acid
F145	57.00	5.700	10	L L				Continuous Flow
F147	37.00	3.700	10	VLELL L ELVLVLL	BIASED LOW	-15.42	0.6103	Colour

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

OVERALL AVERAGE
RANK IS 9.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F147	37.00	3.700	10	VLELLLELVLVLL	BIASED LOW	-15.42	0.6103	Colour
F002	42.00	4.200	10		BIASED LOW*	-5.69	0.2322	Shimadzu TOC
F095	43.00	4.300	10	VLLELELL	BIASED LOW	8.78	-6.2703	Skalar SFA
F145	57.00	5.700	10	LL				Continuous Flow
F046	66.50	6.650	10					Combustion IR
F015	72.50	7.250	10					
F042	84.50	8.450	10	ELELELELEL				IR
F073	85.00	8.500	10	VLVLHVLELEL				Persulfate
F113	95.00	9.500	10					Phosphoric acid
F003	96.50	9.650	10					IR
F074	100.00	10.000	10					IR Detector
F026	103.00	10.300	10					AA
F032	107.50	10.750	10					Colourimetry
F010	112.00	11.200	10					Conduct. meter
F036	117.00	11.700	10					Colourimetry
F025	144.50	14.450	10		BIASED HIGH*	4.21	0.1445	Infrared
F094	167.00	16.700	10		BIASED HIGH	8.59	-0.1902	Infrared

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

OVERALL AVERAGE
RANK IS 9.000

Diss Inorg Carbon

PARAMETER: 07092 Nitrate + Nitrite mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0200 BASIC ACCEPTABLE ERROR= 0.0200 CONCENTRATION ERROR INCREMENT= 0.0800

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.36	21.50	1.4	14.50	3.41	7.00	0.16	10.00	3.1	16.00	0.46	9.00
F003	0.351	16.00	1.40	14.50	3.51	15.50	0.161	13.00	3.02	9.00	0.467	12.00
F004	0.366	25.00	1.45	25.00	3.63	25.50	0.180	24.00	3.20	27.00	0.493	24.00
F006	0.39	31.50	1.57 H	34.00	3.75	30.00	0.21 H	31.50	3.33	33.00	0.55 H	33.00
F007	0.38	29.50	1.41	17.00	3.52	17.00	0.17	17.00	3.26	30.00	0.49	22.50
F009	0.38	29.50	1.47	28.00	3.77	32.00	0.16	10.00	3.18	23.50	0.50	27.50
F010	0.44 VH	34.00	1.58 H	35.00	3.6	22.50	0.21 H	31.50	3.4 H	34.00	0.60 EH	34.50
F011	0.344	9.00	0.695 EL	1.00	0.597 EL	1.00	<0.008 EL	0.00	0.472 EL	1.00	0.405 L	2.00
F014	0.39	31.50	1.48	30.50	3.8	33.00	0.18	24.00	3.3	32.00	0.52	30.00
F015	0.364	23.00	1.44	23.00	3.63	25.50	0.154	7.00	3.19	25.50	0.546 H	32.00
F025	0.356	19.00	1.44	23.00	3.61	24.00	0.17	17.00	3.19	25.50	0.480	20.50
F026	0.3475	11.00	1.459	26.00	3.6935	27.00	0.173	21.50	3.135	20.00	0.4775	18.00
F031	0.35	13.50	1.38	12.00	3.88 H	34.00	0.19	28.50	3.24	29.00	0.51	29.00
F032	0.365	24.00	1.44	23.00	3.53	18.00	0.185	27.00	3.18	23.50	0.49	22.50
F036	0.36	21.50	1.41	17.00	3.54	19.00	0.184	26.00	3.13	19.00	0.496	26.00
F037	0.3283	6.00	1.2963	3.00	3.2345	3.00	0.1349 L	2.00	2.8063 L	3.00	0.4305	5.00
F038	0.372	26.00	1.46	27.00	3.6	22.50	0.18	24.00	3.16	22.00	0.495	25.00
F046	0.33	7.00	1.38	12.00	3.51	15.50	0.15	5.00	3.06	12.00	0.46	9.00
F048	0.376	27.00	1.38	12.00	3.38	5.00	0.193	30.00	3.00	6.50	0.462	11.00
F063	0.31	4.00	1.10 EL	2.00	3.00 EL	2.00	0.14	3.00	2.63 EL	2.00	0.37 EL	1.00
F068	0.345	10.00	1.424	19.00	3.592	21.00	0.171	19.50	3.158	21.00	0.473	17.00
F073	0.42 H	33.00	1.48	30.50	4.28 EH	35.00	0.26 EH	33.00	3.68 EH	35.00	0.54 H	31.00
F074	0.341	8.00	1.350	7.00	3.380	5.00	0.168	14.50	3.050	11.00	0.450	6.00
F094	0.35	13.50	1.43	20.00	3.44	9.50	0.173	21.50	2.98	4.00	0.471	15.00
F095	0.28 VL	2.00	1.30	4.00	3.38	5.00	0.16	10.00	3.09	15.00	0.46	9.00
F113	0.358	20.00	1.433	21.00	3.557	20.00	0.168	14.50	3.114	18.00	0.479	19.00
F133	0.35	13.50	1.34	6.00	3.44	9.50	0.13 L	1.00	3.02	9.00	0.47	13.00
F139	0.30 L	3.00	1.32	5.00	3.72	29.00	0.19	28.50	3.22	28.00	0.41 L	4.00
F140	0.353	17.50	1.37	9.50	3.49	12.50	0.160	10.00	3.07	13.50	0.471	15.00
F141	0.35	13.50	1.41	17.00	3.43	8.00	0.17	17.00	2.99	5.00	0.48	20.50
F143	0.311	5.00	1.36	8.00	3.48	11.00	0.152	6.00	3.02	9.00	0.407 L	3.00
F144	0.49 EH	35.00	1.5	33.00	3.5	14.00	0.4 EH	34.00	3.	6.50	0.6 EH	34.50
F145	0.258 EL	1.00	1.49	32.00	3.76	31.00	0.144	4.00	3.11	17.00	0.458	7.00
F146	0.353	17.50	1.37	9.50	3.49	12.50	0.160	10.00	3.07	13.50	0.471	15.00
F147	0.378	28.00	1.477	29.00	3.708	28.00	0.171	19.50	3.263	31.00	0.500	27.50
MEDIAN OR *TARGET												
CONC.	0.3530		1.4100		3.5300		0.1700		3.1140		0.4775	
1CRIT	0.0466		0.1312		0.3008		0.0320		0.2675		0.0566	
N	33		33		33		32		33		32	
MEAN	0.3560		1.4066		3.5444		0.1729		3.1111		0.4773	
3STDEV	0.0924		0.2417		0.5135		0.0701		0.4345		0.1041	

PARAMETER: 07092 Nitrate + Nitrite mg/L N

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	<0.02	0.00	0.13	16.50	0.07	14.50	0.13	23.00
F003	0.014	7.50	0.110	5.00	0.063	7.00	0.109	6.00
F004	0.014	7.50	0.135	23.00	0.069	12.50	0.131	26.00
F006	0.03	17.00	0.16 H	28.50	0.09	28.50	0.15	29.50
F007	<0.04	0.00	0.13	16.50	0.09	28.50	0.14	28.00
F009	<0.05	0.00	0.13	16.50	0.06	4.50	0.13	23.00
F010	0.04 H	18.00	0.17 H	30.00	0.09	28.50	0.12	11.50
F011	<0.008	0.00	<0.008 VL	0.00	<0.008 VL	0.00	<0.008 EL	0.00
F014	<0.05	0.00	0.16 H	28.50	0.09	28.50	0.15	29.50
F015	0.004	1.00	0.108	4.00	0.053	3.00	0.096 L	3.00
F025	0.012	3.50	0.125	11.00	0.062	6.00	0.117	8.50
F026	0.0185	14.00	0.1225	10.00	0.064	8.00	0.12	11.50
F031	0.01	2.00	0.15	27.00	0.08	23.50	0.13	23.00
F032	0.02	15.50	0.14	25.50	0.075	19.50	0.13	23.00
F036	0.012	3.50	0.134	21.50	0.072	16.50	0.128	19.00
F037	<0.05	0.00	0.1072	3.00	0.0672	11.00	0.0933 L	1.00
F038	0.02	15.50	0.139	24.00	0.081	25.50	0.134	27.00
F046	<0.05	0.00	0.12	7.50	0.073	18.00	0.12	11.50
F048	<0.02	0.00	0.913 EH	34.00	0.081	25.50	0.117	8.50
F063	<0.10	0.00	0.10 L	1.50	<0.10	0.00	0.10	4.50
F068		0.00	0.120	7.50	0.065	9.00	0.126	17.50
F073	0.06 VH	19.50	0.23 VH	31.00	0.21 EH	31.00	0.22 EH	32.00
F074	0.017	12.50	0.127	12.00	0.069	12.50	0.121	14.00
F094	0.016	11.00	0.129	13.00	0.066	10.00	0.161 H	31.00
F095	0.06 VH	19.50	0.27 VH	32.00	0.26 EH	32.00	0.35 EH	33.00
F113	0.013	5.50	0.132	20.00	0.072	16.50	0.129	20.00
F133	<0.01	0.00	0.10 L	1.50	0.05	2.00	0.10	4.50
F139	<0.03	0.00	0.14	25.50	0.08	23.50	0.13	23.00
F140	0.015	9.50	0.130	16.50	0.077	21.50	0.125	15.50
F141	<0.03	0.00	0.13	16.50	0.06	4.50	0.12	11.50
F143	0.013	5.50	0.121	9.00	0.070	14.50	0.112	7.00
F144	0.5 EH	21.00	0.43 EH	33.00	0.48 EH	33.00	<0.20	0.00
F145	<0.01	0.00	0.112	6.00	0.045 L	1.00	0.095 L	2.00
F146	0.015	9.50	0.130	16.50	0.077	21.50	0.125	15.50
F147	0.017	12.50	0.134	21.50	0.075	19.50	0.126	17.50
MEDIAN OR *TARGET CONC.	*0.0150		0.1300		0.0720		0.1260	
1CRIT	0.0200		0.0288		0.0242		0.0285	
N	19		31		31		31	
MEAN	0.0219		0.1486		0.0826		0.1272	
3STDEV	0.0441		0.1828		0.1253		0.0673	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	132.00	14.667	9					IC
F003	105.50	10.550	10					Cd reduction
F004	219.50	21.950	10					07110
F006	296.50	29.650	10	H H H H	BIASED HIGH	6.08	0.0260	AA
F007	206.00	22.889	9					
F009	194.50	21.611	9					TRAACS
F010	279.50	27.950	10	VHH H H EHH H	BIASED HIGH*	4.32	0.0446	Colorimetry
F011	14.00	2.800	5	ELELELELL VLVLEL	BIASED LOW	-95.33	0.4197	
F014	267.50	29.722	9	H	BIASED HIGH	6.48	0.0089	
F015	147.00	14.700	10	H L				IC Anions
F025	158.00	15.800	10					IC
F026	167.00	16.700	10					AA
F031	221.50	22.150	10	H				IC
F032	221.50	22.150	10					Colourimetry
F036	189.00	18.900	10					Colourimetry
F037	37.00	4.111	9	L L L	BIASED LOW	-8.69	-0.0076	I.C. WATERS
F038	238.50	23.850	10					IC
F046	97.50	10.833	9					Colorimetry
F048	159.50	17.722	9	EH				IC
F063	20.00	2.500	8	ELEL ELEL L	BIASED LOW	-15.14	-0.0189	auto-Cd reduction
F068	141.50	15.722	9					IC, Dionex
F073	311.00	31.100	10	H EHEHEHH VHVHEHEH	BIASED HIGH	17.48	0.0338	Dionex DX500
F074	102.50	10.250	10					Colour - AA
F094	148.50	14.850	10	H				IC - Colorimetry
F095	161.50	16.150	10	VL VHVHEHEH				Skalar SFA
F113	174.50	17.450	10					FIA - Lachat 8000
F133	60.00	6.667	9	L L	BIASED LOW*	-2.24	-0.0192	I.C.
F139	169.50	18.833	9	L L				I.C.
F140	141.00	14.100	10					IC
F141	113.50	12.611	9					IC
F143	78.00	7.800	10	L	BIASED LOW*	-1.67	-0.0195	IC
F144	244.00	27.111	9	EH EH EHEHEHEH	BIASED HIGH	-11.93	0.3037	APHA
F145	101.00	11.222	9	EL L L				Auto, Cd-redn
F146	141.00	14.100	10					IC
F147	234.00	23.400	10					IC

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

OVERALL AVERAGE
RANK IS 17.252

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F063	20.00	2.500	8	ELELELELL	BIASED LOW	-15.14	-0.0189	auto-Cd reduction
F011	14.00	2.800	5	ELELELELLVLVLEL	BIASED LOW	-95.33	0.4197	
F037	37.00	4.111	9	LLL	BIASED LOW	-8.69	-0.0076	I.C. WATERS
F133	60.00	6.667	9	LL	BIASED LOW*	-2.24	-0.0192	I.C.
F143	78.00	7.800	10	L	BIASED LOW*	-1.67	-0.0195	IC
F074	102.50	10.250	10					Colour - AA
F003	105.50	10.550	10					Cd reduction
F046	97.50	10.833	9					Colorimetry
F145	101.00	11.222	9	ELLL				Auto, Cd-redn
F141	113.50	12.611	9					IC
F140	141.00	14.100	10					IC
F146	141.00	14.100	10					IC
F002	132.00	14.667	9					IC
F015	147.00	14.700	10	HL				IC Anions
F094	148.50	14.850	10	H				IC - Colorimetry
F068	141.50	15.722	9					IC, Dionex
F025	158.00	15.800	10					IC
F095	161.50	16.150	10	VLVHVHEHEH				Skalar SFA
F026	167.00	16.700	10					AA
F113	174.50	17.450	10					FIA - Lachat 8000
F048	159.50	17.722	9	EH				IC
F139	169.50	18.833	9	LL				I.C.
F036	189.00	18.900	10					Colourimetry
F009	194.50	21.611	9					TRAACS
F004	219.50	21.950	10					07110
F031	221.50	22.150	10	H				IC
F032	221.50	22.150	10					Colourimetry
F007	206.00	22.889	9					
F147	234.00	23.400	10					IC
F038	238.50	23.850	10					IC
F144	244.00	27.111	9	EHEHEHEHEHEH	BIASED HIGH	-11.93	0.3037	APHA
F010	279.50	27.950	10	VHHHHEHHH	BIASED HIGH*	4.32	0.0446	Colorimetry
F006	296.50	29.650	10	HHHH	BIASED HIGH	6.08	0.0260	AA
F014	267.50	29.722	9	H	BIASED HIGH	6.48	0.0089	
F073	311.00	31.100	10	HEHEHEHHVHVHEHEH	BIASED HIGH	17.48	0.0338	Dionex DX500

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

OVERALL AVERAGE
RANK IS 17.252

PARAMETER: 07192 Ammonia mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0050 BASIC ACCEPTABLE ERROR= 0.0050 CONCENTRATION ERROR INCREMENT= 0.1250

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.010	9.00	0.351	21.00	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F004	0.005	6.00	0.322	10.00	0.011 H	6.00	0.015 VH	9.00	0.005T	5.50	0.005T	4.00
F006	<0.02	0.00	0.48 EH	31.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F010	<0.02	0.00	0.35	18.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F011	0.003	3.00	0.286 L	3.00	0.003	4.00	0.007	6.00	<0.002	0.00	<0.002	0.00
F014	<0.010	0.00	0.32	9.00	<0.010	0.00	<0.010	0.00	<0.010	0.00	<0.010	0.00
F015	0.015 H	10.00	0.353	22.00	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F019	<0.02	0.00	0.35	18.00	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F025	<0.01	0.00	0.31	8.00	<0.01	0.00	<0.01	0.00	<0.01	0.00	0.01	5.50
F026	0.0021 L	2.00	0.3063	7.00	0.0005	1.00	0.0011	2.00	0.0008	2.00	0.0005	2.00
F031	<0.05	0.00	0.37	24.00	<0.05	0.00	<0.05	0.00	<0.05	0.00	<0.05	0.00
F032	0.002W	1.00	0.344	14.00	0.002W	0.00	0.002W	0.00	0.002W	0.00	0.002W	0.00
F036	0.006T	8.00	0.348	15.00	0.004T	5.00	0.008T	8.00	0.004T	4.00	0.002W	0.00
F038	<0.005	0.00	0.288 L	4.00	<0.005	0.00	0.007	6.00	<0.005	0.00	<0.005	0.00
F042	0.02W	0.00	0.41 H	28.00	0.02W	0.00	0.02W	0.00	0.02W	0.00	0.02W	0.00
F046	0.041 VH	12.00	0.38	25.50	0.033 VH	7.00	0.034 VH	10.00	0.032 VH	7.00	0.034 VH	7.00
F048	<0.020	0.00	0.228 VL	1.00	<0.020	0.00	<0.020	0.00	<0.020	0.00	<0.020	0.00
F063	0.005	6.00	0.38	25.50	<0.005	0.00	0.006	4.00	0.005	5.50	<0.005	0.00
F068		0.00	0.447 VH	30.00		0.00		0.00		0.00		0.00
F074	<0.005	0.00	0.340	12.50	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F093	0.025 VH	11.00	0.300 L	5.50	0.040 VH	8.00	0.050 VH	11.00	0.040 VH	9.50	0.010	5.50
F094	<0.005	0.00	0.36	23.00	<0.005	0.00	0.007	6.00	0.038 VH	8.00	<0.005	0.00
F095	<0.05	0.00	0.30 L	5.50	<0.05	0.00	<0.05	0.00	<0.05	0.00	<0.05	0.00
F113	0.004	4.00	0.339	11.00	0.001	2.00	0.001	1.00	0.	1.00	0.	1.00
F140	<0.005	0.00	0.350	18.00	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F141	<0.05	0.00	0.34	12.50	<0.05	0.00	<0.05	0.00	<0.05	0.00	<0.05	0.00
F143	0.005	6.00	0.35	18.00	0.0028	3.00	0.0028	3.00	0.0027	3.00	0.0022	3.00
F144	0.05 VH	13.00	0.4 H	27.00	0.16 EH	11.00	0.38 EH	13.00	0.09 VH	11.00	<0.05	0.00
F145	0.13 EH	15.00	0.42 H	29.00	0.05 VH	9.00	<0.02	0.00	0.04 VH	9.50	<0.02	0.00
F146	<0.005	0.00	0.350	18.00	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F147	0.112 EH	14.00	0.252 VL	2.00	0.106 VH	10.00	0.090 VH	12.00	0.111 EH	12.00	0.098 EH	8.00
MEDIAN OR *TARGET												
CONC.	*0.0080		0.3500		*0.0050		*0.0050		*0.0050		*0.0050	
1CRIT	0.0051		0.0481		0.0058		0.0052		0.0067		0.0053	
N	13		29		9		11		10		6	
MEAN	0.0218		0.3454		0.0279		0.0207		0.0257		0.0103	
3STDEV	0.0898		0.1248		0.0979		0.0784		0.0806		0.0336	

PARAMETER: 07192 Ammonia mg/L N

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F004	0.007	7.50	0.010	7.00	0.020 VH	11.00	0.014 VH	7.00
F006	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F010	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F011	0.006	6.00	0.009	6.00	0.009	6.00	0.007	4.50
F014	<0.010	0.00	<0.010	0.00	<0.010	0.00	<0.010	0.00
F015	0.008	9.00	0.007	5.00	0.012 H	10.00	0.012 H	6.00
F019	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F025	<0.01	0.00	<0.01	0.00	<0.01	0.00	<0.01	0.00
F026	0.0033	2.00	0.0023	3.00	0.0029	3.00	0.0007	2.00
F031	<0.05	0.00	<0.05	0.00	<0.05	0.00	<0.05	0.00
F032	0.002W	0.00	0.002W	0.00	0.002W	1.50	0.002W	0.00
F036	0.002W	0.00	0.002W	0.00	0.002W	1.50	0.002W	0.00
F038	0.005	4.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F042	0.02W	0.00	0.02W	0.00	0.02W	0.00	0.02W	0.00
F046	<0.02	0.00	0.029 VH	9.00	<0.02	0.00	0.030 VH	8.00
F048	<0.020	0.00	<0.020	0.00	<0.020	0.00	<0.020	0.00
F063	0.007	7.50	0.013 VH	8.00	0.010	8.00	<0.005	0.00
F068		0.00		0.00		0.00		0.00
F074	0.005	4.00	<0.005	0.00	0.010	8.00	<0.005	0.00
F093	0.050 VH	10.00	0.040 VH	10.00	0.080 VH	12.00	0.040 VH	9.00
F094	<0.005	0.00	0.006	4.00	0.01	8.00	0.007	4.50
F095	<0.05	0.00	<0.05	0.00	<0.05	0.00	<0.05	0.00
F113	0.005	4.00	0.002	2.00	0.004	5.00	0.	1.00
F140	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F141	<0.05	0.00	<0.05	0.00	<0.05	0.00	<0.05	0.00
F143	0.0018	1.00	0.0018	1.00	0.0033	4.00	0.0025	3.00
F144	0.73 EH	12.00	0.5 EH	12.00	0.63 EH	14.00	0.22 EH	11.00
F145	<0.02	0.00	<0.02	0.00	<0.02	0.00	<0.02	0.00
F146	<0.005	0.00	<0.005	0.00	<0.005	0.00	<0.005	0.00
F147	0.106 VH	11.00	0.112 VH	11.00	0.090 VH	13.00	0.084 VH	10.00
MEDIAN OR *TARGET CONC.	0.0065		*0.0050		*0.0050		*0.0050	
1CRIT	0.0052		0.0056		0.0056		0.0059	
N	10		10		11		9	
MEAN	0.0202		0.0230		0.0228		0.0219	
3STDEV	0.0945		0.0955		0.0892		0.0754	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	30.00	15.000	2		INSUFFICIENT DATA			Alkaline phenol
F004	73.00	7.300	10	H VH VHVH	BIASED LOW	-8.47	0.0013	07540
F006	31.00	31.000	1	EH	INSUFFICIENT DATA			AA
F010	18.00	18.000	1		INSUFFICIENT DATA			Colorimetry
F011	38.50	4.812	8	L	BIASED LOW	-18.02	-0.0010	
F014	9.00	9.000	1		INSUFFICIENT DATA			
F015	62.00	10.333	6	H H H				Colorimetric
F019	18.00	18.000	1		INSUFFICIENT DATA			Colormetric
F025	13.50	6.750	2		INSUFFICIENT DATA			Phenate
F026	26.00	2.600	10	L	BIASED LOW	-10.57	-0.0071	AA
F031	24.00	24.000	1		INSUFFICIENT DATA			SIE, Autotit
F032	16.50	5.500	3		INSUFFICIENT DATA			Colourimetry
F036	41.50	6.917	6					Colourimetry
F038	14.00	4.667	3	L	INSUFFICIENT DATA			COLOR - AUTO
F042	28.00	28.000	1	H	INSUFFICIENT DATA			colorimetric
F046	85.50	10.688	8	VH VHVHVHVH VH VH				Colorimetry
F048	1.00	1.000	1	VL	INSUFFICIENT DATA			IC
F063	64.50	9.214	7	VH				auto-phenate
F068	30.00	30.000	1	VH	INSUFFICIENT DATA			IC, Dionex
F074	24.50	8.167	3		INSUFFICIENT DATA			Colour - AA
F093	91.50	9.150	10	VHL VHVHVH VHVHVHVH				Distilled-Nessler
F094	53.50	8.917	6	VH				Colorimetry
F095	5.50	5.500	1	L	INSUFFICIENT DATA			Skalar SFA
F113	32.00	3.200	10		BIASED LOW*	-1.06	-0.0077	FIA - Lachat 8000
F140	18.00	18.000	1		INSUFFICIENT DATA			Colourimetric
F141	12.50	12.500	1		INSUFFICIENT DATA			ISE
F143	45.00	4.500	10		BIASED LOW*	1.94	-0.0072	phenate, auto
F144	124.00	13.778	9	VHH EHEHVH EHEHEHEH	BIASED HIGH	-86.71	0.3448	APHA 4500-NH3 C
F145	62.50	15.625	4	EHH VH VH	INSUFFICIENT DATA			Automated Phen
F146	18.00	18.000	1		INSUFFICIENT DATA			Colourimetric
F147	103.00	10.300	10	EHVLVHVHEHEHVHVHVHVH				Colour

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

OVERALL AVERAGE
RANK IS 8.734

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F048	1.00	1.000	1	VL	INSUFFICIENT DATA			IC
F026	26.00	2.600	10	L	BIASED LOW	-10.57	-0.0071	AA
F113	32.00	3.200	10		BIASED LOW*	-1.06	-0.0077	FIA - Lachat 8000
F143	45.00	4.500	10		BIASED LOW*	1.94	-0.0072	phenate, auto
F038	14.00	4.667	3	L	INSUFFICIENT DATA			COLOR - AUTO
F011	38.50	4.812	8	L	BIASED LOW	-18.02	-0.0010	
F032	16.50	5.500	3		INSUFFICIENT DATA			Colourimetry
F095	5.50	5.500	1	L	INSUFFICIENT DATA			Skalar SFA
F025	13.50	6.750	2		INSUFFICIENT DATA			Phenate
F036	41.50	6.917	6					Colourimetry
F004	73.00	7.300	10	HVHVHVH	BIASED LOW	-8.47	0.0013	07540
F074	24.50	8.167	3		INSUFFICIENT DATA			Colour - AA
F094	53.50	8.917	6	VH				Colorimetry
F014	9.00	9.000	1		INSUFFICIENT DATA			
F093	91.50	9.150	10	VHLVHVHVHVHVHVHVH				Distilled-Nessler
F063	64.50	9.214	7	VH				auto-phenate
F147	103.00	10.300	10	EHVLVHVHEHEHVHVHVHVH				Colour
F015	62.00	10.333	6	HHH				Colorimetric
F046	85.50	10.688	8	VHVHVHVHVHVHVH				Colorimetry
F141	12.50	12.500	1		INSUFFICIENT DATA			ISE
F144	124.00	13.778	9	VHHEHEHVHEHEHEHEH	BIASED HIGH	-86.71	0.3448	APHA 4500-NH3 C
F003	30.00	15.000	2		INSUFFICIENT DATA			Alkaline phenol
F145	62.50	15.625	4	EHHVHVH	INSUFFICIENT DATA			Automated Phen
F140	18.00	18.000	1		INSUFFICIENT DATA			Colourimetric
F010	18.00	18.000	1		INSUFFICIENT DATA			Colorimetry
F019	18.00	18.000	1		INSUFFICIENT DATA			Colormetric
F146	18.00	18.000	1		INSUFFICIENT DATA			Colourimetric
F031	24.00	24.000	1		INSUFFICIENT DATA			SIE, Autotit
F042	28.00	28.000	1	H	INSUFFICIENT DATA			colorimetric
F068	30.00	30.000	1	VH	INSUFFICIENT DATA			IC, Dionex
F006	31.00	31.000	1	EH	INSUFFICIENT DATA			AA

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

OVERALL AVERAGE
RANK IS 8.734

Ammonia

PARAMETER: 07392 Total Kjeldahl N mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0400 BASIC ACCEPTABLE ERROR= 0.0400 CONCENTRATION ERROR INCREMENT= 0.1500

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.167	8.00	0.666	7.00	0.446	11.00	0.746	12.00	0.227 VL	4.00	0.180	10.00
F006	<0.1 L	0.00	0.6	3.00	0.1 VL	2.00	0.8	13.00	0.2 VL	2.00	<0.1	0.00
F014	0.20	10.50	0.72	11.00	0.41	7.00	0.68	7.50	0.46 H	13.00	<0.20	0.00
F025	0.19	9.00	0.69	9.00	0.79 EH	14.50	0.38 VL	1.00	0.38	10.00	0.17	9.00
F032	0.14	5.50	0.7	10.00	0.42	9.00	0.7	10.50	0.38	10.00	0.14	6.00
F038	0.14	5.50	0.8	13.00	0.38	4.00	0.66	5.00	0.34	5.00	0.11	2.00
F046	0.36 VH	12.00	0.99 VH	14.00	0.67 VH	13.00	1.07 EH	14.00	0.43	12.00	0.27 VH	12.00
F063	0.20	10.50	0.63	4.00	0.41	7.00	0.70	10.50	0.36	8.00	0.15	7.50
F074	0.139	4.00	0.470 L	1.00	0.000 EL	1.00	0.672	6.00	0.000 VL	1.00	0.120	3.00
F094	0.43 VH	13.00	0.75	12.00	0.43	10.00	0.63	3.00	0.7 VH	14.00	0.26 VH	11.00
F095	0.07 VL	1.00	0.56	2.00	0.32	3.00	0.64	4.00	0.21 VL	3.00	0.07 L	1.00
F141	0.16	7.00	0.67	8.00	0.41	7.00	0.68	7.50	0.38	10.00	0.15	7.50
F143	0.133	3.00	0.656	6.00	0.407	5.00	0.694	9.00	0.354	7.00	0.124	4.00
F145	0.58 EH	14.00	1. VH	15.00	0.79 EH	14.50	1.31 EH	15.00	1.97 EH	15.00	0.79 EH	13.00
F147	0.119	2.00	0.635	5.00	0.476	12.00	0.536 L	2.00	0.349	6.00	0.139	5.00
MEDIAN	0.1635		0.6700		0.4100		0.6800		0.3600		0.1500	
1CRIT	0.0585		0.1345		0.0955		0.1360		0.0880		0.0565	
N	12		13		12		13		13		11	
MEAN	0.1982		0.6975		0.4066		0.7083		0.3669		0.1648	
3STDEV	0.2782		0.3110		0.3661		0.3596		0.3697		0.1535	

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.634	8.00	0.602	9.00	1.14	12.00	0.600	7.00
F006	0.7	12.50	0.3 EL	1.00	0.8 L	2.00	0.2 EL	1.00
F014	0.68	11.00	0.60	7.50	1.06	9.00	0.60	7.00
F025	0.56	3.00	0.64	12.50	1.05	8.00	0.70	12.00
F032	0.7	12.50	0.6	7.50	1.2	13.00	0.64	10.00
F038	0.6	4.00	0.57	4.00	1.	3.00	0.61	9.00
F046	0.91 VH	14.00	0.88 VH	14.00	1.56 EH	15.00	0.86 VH	15.00
F063	0.64	9.00	0.63	11.00	1.08	10.00	0.65	11.00
F074	0.648	10.00	0.578	5.00	1.046	7.00	0.579	4.00
F094	0.62	6.50	0.64	12.50	1.09	11.00	0.71	13.00
F095	0.55	2.00	0.53	3.00	1.02	4.00	0.53	3.00
F141	0.62	6.50	0.58	6.00	1.04	5.00	0.60	7.00
F143	0.602	5.00	0.606	10.00	1.044	6.00	0.593	5.00
F145	1.15 EH	15.00	1.24 EH	15.00	1.47 VH	14.00	0.79 VH	14.00
F147	0.548	1.00	0.397 VL	2.00	0.635 EL	1.00	0.405 VL	2.00
MEDIAN	0.6340		0.6000		1.0500		0.6000	
1CRIT	0.1291		0.1240		0.1915		0.1240	
N	13		13		13		13	
MEAN	0.6511		0.6041		1.0800		0.6159	
3STDEV	0.2612		0.3003		0.4275		0.2664	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	88.00	8.800	10	VL				Blk dig. Alk. phen
F006	36.50	4.562	8	L VL VL ELL EL				Blk Dig.
F014	83.50	9.278	9	H				
F025	88.00	8.800	10	EHVL				Block Dig - Phen
F032	94.00	9.400	10					Colourimetry
F038	54.50	5.450	10					SIE - DIG.
F046	135.00	13.500	10	VHVHVHEH VHVHVHEHVH	BIASED HIGH	41.15	0.0494	Dig. Dist. Color
F063	88.50	8.850	10					auto-Kjeldahl
F074	42.00	4.200	10	L EL VL				UV Dig. - Colour
F094	106.00	10.600	10	VH VHVH				Colorimetry
F095	26.00	2.600	10	VL VLL	BIASED LOW*	7.15	-0.1198	Skalar SFA
F141	71.50	7.150	10					Technicon
F143	60.00	6.000	10					dig. phenate, auto
F145	144.50	14.450	10	EHVHEHEHEHEHEHEHVHVH	BIASED HIGH	-38.83	0.7837	Auto
F147	38.00	3.800	10	L VLELVL	BIASED LOW	-40.11	0.1054	Dig. Colour

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

OVERALL AVERAGE
RANK IS 7.864

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F095	26.00	2.600	10	VLVLL	BIASED LOW*	7.15	-0.1198	Skalar SFA
F147	38.00	3.800	10	LVLELVL	BIASED LOW	-40.11	0.1054	Dig. Colour
F074	42.00	4.200	10	LELVL				UV Dig. - Colour
F006	36.50	4.562	8	LVLVLELLEL				Blk Dig.
F038	54.50	5.450	10					SIE - DIG.
F143	60.00	6.000	10					dig. phenate, auto
F141	71.50	7.150	10					Technicon
F003	88.00	8.800	10	VL				Blk dig. Alk. phen
F025	88.00	8.800	10	EHVL				Block Dig - Phen
F063	88.50	8.850	10					auto-Kjeldahl
F014	83.50	9.278	9	H				
F032	94.00	9.400	10					Colourimetry
F094	106.00	10.600	10	VHVHVH				Colorimetry
F046	135.00	13.500	10	VHVHVHEHVHVHVHEHVH	BIASED HIGH	41.15	0.0494	Dig. Dist. Color
F145	144.50	14.450	10	EHVHEHEHEHEHEHEHVHVH	BIASED HIGH	-38.83	0.7837	Auto

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

OVERALL AVERAGE
RANK IS 7.864

Total Kjeldahl N

PARAMETER: 07293 Total N mg/L N

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0500 BASIC ACCEPTABLE ERROR= 0.0500 CONCENTRATION ERROR INCREMENT= 0.1500

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.43	2.00	1.62 L	1.00	3.23 L	2.00	0.45 VL	1.00	2.96	2.00	0.56	3.00
F003	0.502	8.00	2.02	9.00	3.93	11.00	0.878	10.50	3.41	8.50	0.624	10.00
F004	0.511	10.00	2.04	10.00	3.86	8.00	0.878	10.50	3.41	8.50	0.589	6.00
F010	0.47	4.00	1.93	5.00	3.8	7.00	0.53 VL	2.00	3.4	7.00	0.61	8.50
F015	0.46	3.00	1.9	4.00	3.6	3.00	1.1 VH	13.00	3.6	13.00	0.68	12.00
F025	0.55	12.00	2.13	11.00	4.40	14.00	0.55 VL	3.00	3.57	12.00	0.65	11.00
F026	0.5244	11.00	2.0188	8.00	3.7412	6.00	0.8892	12.00	3.1860	3.00	0.6037	7.00
F038	0.51	9.00	2.26	13.00	3.98	12.00	0.84	7.50	3.5	11.00	0.61	8.50
F042	0.485	7.00	2.01	7.00	3.74	5.00	0.864	9.00	3.19	4.00	0.556	2.00
F046	0.69 VH	13.00	2.37 H	14.00	4.18	13.00	1.22 VH	14.00	3.49	10.00	0.73	13.50
F074	0.480	6.00	1.820	2.00	3.220 L	1.00	0.840	7.50	2.855 L	1.00	0.570	4.00
F094	0.78 VH	14.00	2.18	12.00	3.87	9.00	0.8	5.50	3.68	14.00	0.73	13.50
F095	0.35 L	1.00	1.86	3.00	3.70	4.00	0.80	5.50	3.30	5.00	0.53	1.00
F113	0.475	5.00	2.	6.00	3.894	10.00	0.7925	4.00	3.313	6.00	0.5813	5.00
F145	0.838 EH	15.00	2.49 H	15.00	4.55 H	15.00	1.464 EH	15.00	5.08 EH	15.00	1.248 EH	15.00
MEDIAN	0.5020		2.0188		3.8600		0.8400		3.4100		0.6100	
1CRIT	0.1178		0.3453		0.6215		0.1685		0.5540		0.1340	
N	13		13		13		13		13		13	
MEAN	0.5283		2.0414		3.8404		0.8447		3.3853		0.6226	
3STDEV	0.2835		0.4563		0.8032		0.5284		0.5667		0.1700	

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.23 EL	1.00	0.34 VL	2.00	0.38 VL	2.00	0.35 EL	1.00
F003	0.646	9.00	0.703	5.00	1.01	3.50	0.711	6.00
F004	0.652	10.00	0.707	7.00	1.01	3.50	0.707	5.00
F010	0.27 VL	2.00	0.33 VL	1.00	0.21 EL	1.00	0.42 VL	2.00
F015	0.69	13.00	0.74	9.00	1.2	12.00	0.77	9.00
F025	0.57	3.00	0.77	11.50	1.11	8.00	0.82	11.00
F026	0.6654	12.00	0.7527	10.00	1.1713	11.00	0.7908	10.00
F038	0.62	7.00	0.71	8.00	1.08	6.00	0.74	7.00
F042	0.609	5.00	0.693	4.00	1.09	7.00	0.760	8.00
F046	0.91 VH	14.00	1.00 VH	14.00	1.63 VH	15.00	0.98 H	15.00
F074	0.665	11.00	0.705	6.00	1.115	9.00	0.700	4.00
F094	0.64	8.00	0.77	11.50	1.16	10.00	0.87	12.00
F095	0.61	6.00	0.80	13.00	1.28	13.00	0.88	13.00
F113	0.5913	4.00	0.685	3.00	1.0275	5.00	0.6612	3.00
F145	1.15 EH	15.00	1.35 EH	15.00	1.515 VH	14.00	0.885	14.00
MEDIAN	0.6400		0.7100		1.1100		0.7600	
1CRIT	0.1385		0.1490		0.2090		0.1565	
N	13		13		13		13	
MEAN	0.6260		0.7212		1.0884		0.7473	
3STDEV	0.3909		0.4062		0.7264		0.3523	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	17.00	1.700	10	L L VL ELVLVLEL	BIASED LOW*	-8.42	-0.2693	AAII, UV Dig.
F003	80.50	8.050	10					Auto dig. Hydrazin
F004	78.50	7.850	10					07657
F010	39.50	3.950	10	VL VLVLELVL	BIASED LOW*	8.12	-0.3665	Colorimetry
F015	91.00	9.100	10	VH				Colorimetric
F025	96.50	9.650	10	VL				Calculation
F026	90.00	9.000	10					Autoclave, AA
F038	89.00	8.900	10					Calculation
F042	58.00	5.800	10					Pers. dig. color
F046	135.50	13.550	10	VHH VH VHVHVHH	BIASED HIGH*	-0.98	0.2880	Calculation
F074	51.50	5.150	10	L L				UV Dig. - Colour
F094	109.50	10.950	10	VH				Calculation
F095	64.50	6.450	10	L				Calculation
F113	51.00	5.100	10					Per. NaOH - FIA
F145	148.00	14.800	10	EHH H EHEHEHEHEHVH	BIASED HIGH	20.97	0.3077	Calculation

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

OVERALL AVERAGE
RANK IS 8.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	17.00	1.700	10	LLVLELVLVLEL	BIASED LOW*	-8.42	-0.2693	AAII, UV Dig.
F010	39.50	3.950	10	VLVLVLELVL	BIASED LOW*	8.12	-0.3665	Colorimetry
F113	51.00	5.100	10					Per. NaOH - FIA
F074	51.50	5.150	10	LL				UV Dig. - Colour
F042	58.00	5.800	10					Pers. dig. color
F095	64.50	6.450	10	L				Calculation
F004	78.50	7.850	10					07657
F003	80.50	8.050	10					Auto dig. Hydrazin
F038	89.00	8.900	10					Calculation
F026	90.00	9.000	10					Autoclave, AA
F015	91.00	9.100	10	VH				Colorimetric
F025	96.50	9.650	10	VL				Calculation
F094	109.50	10.950	10	VH				Calculation
F046	135.50	13.550	10	VHHVHVHVHVHH	BIASED HIGH*	-0.98	0.2880	Calculation
F145	148.00	14.800	10	EHHHEHEHEHEHEHVH	BIASED HIGH	20.97	0.3077	Calculation

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

OVERALL AVERAGE
RANK IS 8.000

Total N

PARAMETER: 09092 Fluoride mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

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

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.08	9.50	0.51	14.00	0.18	11.50	0.17	12.50	0.10	14.00	0.13	11.50
F006	0.1	18.00	0.6 H	24.00	0.2	17.50	0.2	21.50	0.1	14.00	0.1 L	3.00
F009	0.09	14.00	0.54	21.00	0.20	17.50	0.18	17.50	0.10	14.00	0.15	19.50
F010	0.09	14.00	0.54	21.00	0.21	20.00	0.18	17.50	0.13 H	21.50	0.15	19.50
F011	0.09	14.00	0.5	11.50	0.18	11.50	0.17	12.50	0.1	14.00	0.13	11.50
F014	<0.10	0.00	0.499	10.00	0.176	9.00	0.164	9.00	0.101	18.00	0.133	13.00
F014p	<0.100	0.00	0.479	6.00	0.159	3.00	0.148	4.00	<0.100	0.00	0.118	8.00
F015	0.1	18.00	0.65 EH	25.00	0.25 VH	22.50	0.2	21.50	0.11	19.00	0.14	15.50
F025	0.12 H	21.00	0.49	8.50	0.25 VH	22.50	0.22 H	23.00	0.14 H	23.00	0.17 H	22.00
F031	0.09	14.00	0.51	14.00	0.18	11.50	0.17	12.50	0.10	14.00	0.14	15.50
F032	0.14 VH	22.00	0.56	23.00	0.22 H	21.00	0.18	17.50	0.13 H	21.50	0.2 VH	23.50
F037	0.11	20.00	0.52	17.50	0.2	17.50	0.19	20.00	0.12	20.00	0.15	19.50
F038	0.1	18.00	0.51	14.00	0.2	17.50	0.17	12.50	0.09	9.50	0.14	15.50
F046	0.078	7.00	0.52	17.50	0.18	11.50	0.16	7.50	0.086	8.00	0.11	6.00
F048	0.08	9.50	0.50	11.50	0.16	5.50	0.18	17.50	0.07 L	2.00	0.15	19.50
F068	0.07	5.50	0.472	5.00	0.143 L	2.00	0.134 L	2.00	0.077	3.00	0.102	4.00
F073	0.201 EH	23.00	0.511	16.00	0.341 EH	24.00	0.35 EH	25.00	0.25 EH	24.00	0.276 EH	25.00
F094	0.09	14.00	0.49	8.50	0.19	14.50	0.17	12.50	0.1	14.00	0.2 VH	23.50
F095	0.08	9.50	0.54	21.00	0.19	14.50	0.17	12.50	0.10	14.00	0.14	15.50
F133	0.066	3.50	0.523	19.00	0.175	8.00	0.158	6.00	0.079	4.00	0.122	10.00
F135	0.07	5.50	0.45	2.50	0.16	5.50	0.14	3.00	0.08	5.50	0.11	6.00
F139	0.06 L	2.00	0.45	2.50	0.16	5.50	0.16	7.50	0.08	5.50	0.11	6.00
F141	0.08	9.50	0.47	4.00	0.16	5.50	0.15	5.00	0.09	9.50	0.12	9.00
F143	0.027 EL	1.00	0.484	7.00	0.089 VL	1.00	0.092 VL	1.00	0.060 L	1.00	0.083 VL	1.00
F145	0.066	3.50	0.435 L	1.00	0.347 EH	25.00	0.31 EH	24.00	0.082	7.00	0.099 L	2.00
MEDIAN	0.0900		0.5100		0.1800		0.1700		0.1000		0.1330	
1CRIT	0.0270		0.0690		0.0360		0.0350		0.0280		0.0313	
N	21		23		23		23		22		23	
MEAN	0.0881		0.5073		0.1941		0.1771		0.0984		0.1354	
3STDEV	0.0564		0.1018		0.1234		0.1028		0.0544		0.0813	

PARAMETER: 09092 Fluoride mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	0.09	13.50	0.15	17.00	0.19	20.00	0.34	18.00
F006	0.1	19.00	0.1 L	3.00	0.2	23.00	0.3	6.00
F009	0.09	13.50	0.15	17.00	0.18	14.50	0.34	18.00
F010	0.11	21.00	0.16	21.50	0.18	14.50	0.34	18.00
F011	0.09	13.50	0.16	21.50	0.19	20.00	0.37	24.00
F014	<0.10	0.00	0.140	13.50	0.168	9.00	0.319	9.00
F014p	<0.100	0.00	0.126	9.00	0.156	7.00	0.308	7.00
F015	0.1	19.00	0.16	21.50	0.19	20.00	0.34	18.00
F025	0.12 H	22.00	0.16	21.50	0.19	20.00	0.33	12.00
F031	0.09	13.50	0.14	13.50	0.17	10.50	0.33	12.00
F032	0.09	13.50	0.16	21.50	0.18	14.50	0.35	22.50
F037	0.1	19.00	0.16	21.50	0.19	20.00	0.34	18.00
F038	0.09	13.50	0.13	11.00	0.18	14.50	0.32	10.00
F046	0.056 L	2.00	0.11	5.50	0.15	5.00	0.35	22.50
F048	0.07	6.50	0.15	17.00	0.18	14.50	0.34	18.00
F068	0.07	6.50	0.106 L	4.00	0.129 L	3.00	0.262 L	3.00
F073	0.176 EH	23.00	0.233 EH	25.00	0.267 EH	25.00	0.429 EH	25.00
F094	0.09	13.50	0.14	13.50	0.21	24.00	0.33	12.00
F095	0.09	13.50	0.14	13.50	0.18	14.50	0.34	18.00
F133	0.068	4.00	0.128	10.00	0.165	8.00	0.332	14.00
F135	0.07	6.50	0.12	7.50	0.15	5.00	0.28	4.00
F139	0.06 L	3.00	0.11	5.50	0.17	10.50	0.31	8.00
F141	0.08	9.00	0.12	7.50	0.15	5.00	0.29	5.00
F143	0.013 EL	1.00	0.050 EL	1.00	0.055 EL	1.00	0.214 EL	1.00
F145	0.07	6.50	0.098 L	2.00	0.123 VL	2.00	0.256 L	2.00
MEDIAN	0.0900		0.1400		0.1800		0.3300	
1CRIT	0.0270		0.0320		0.0360		0.0510	
N	21		23		23		23	
MEAN	0.0854		0.1356		0.1727		0.3225	
3STDEV	0.0481		0.0619		0.0633		0.0839	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	141.50	14.150	10					Automated ISE
F006	149.00	14.900	10	H L L				ISE
F009	166.50	16.650	10					Technicon
F010	188.50	18.850	10	H				Colori.-alizarin
F011	154.00	15.400	10					
F014	90.50	11.312	8					
F014p	44.00	6.286	7					
F015	200.00	20.000	10	EHVH	BIASED HIGH	25.43	-0.0172	IC Anions
F025	195.50	19.550	10	H VHH H H H	BIASED HIGH	-13.76	0.0532	ISE -Auto
F031	131.00	13.100	10					SIE
F032	200.50	20.050	10	VH H H VH	BIASED HIGH*	3.21	0.0225	Colourimetry
F037	193.00	19.300	10					SIE
F038	136.00	13.600	10					IC
F046	92.50	9.250	10	L				IC
F048	121.50	12.150	10	L				Electrode
F068	38.00	3.800	10	L L L L L	BIASED LOW	-6.21	-0.0238	IC, Dionex
F073	235.00	23.500	10	EH EHEHEHEHEHEHEHEH	BIASED HIGH	-25.87	0.1608	Dionex DX500
F094	150.00	15.000	10	VH				ISE
F095	146.50	14.650	10					IC
F133	86.50	8.650	10					I.S.E.
F135	51.00	5.100	10		BIASED LOW	-10.43	-0.0092	APHA 4500-F-C
F139	56.00	5.600	10	L L	BIASED LOW	-6.59	-0.0126	I.C.
F141	69.00	6.900	10					ISE
F143	16.00	1.600	10	EL VLVLL VLELELELEL	BIASED LOW*	3.74	-0.0828	IC
F145	75.00	7.500	10	L EHEH L L VLL				IC

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

OVERALL AVERAGE
RANK IS 12.763

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F143	16.00	1.600	10	ELVLVLLVLELELELEL	BIASED LOW*	3.74	-0.0828	IC
F068	38.00	3.800	10	LLLLL	BIASED LOW	-6.21	-0.0238	IC, Dionex
F135	51.00	5.100	10		BIASED LOW	-10.43	-0.0092	APHA 4500-F-C
F139	56.00	5.600	10	LL	BIASED LOW	-6.59	-0.0126	I.C.
F014p	44.00	6.286	7					
F141	69.00	6.900	10					ISE
F145	75.00	7.500	10	LEHEHLLVLL				IC
F133	86.50	8.650	10					I.S.E.
F046	92.50	9.250	10	L				IC
F014	90.50	11.312	8					
F048	121.50	12.150	10	L				Electrode
F031	131.00	13.100	10					SIE
F038	136.00	13.600	10					IC
F003	141.50	14.150	10					Automated ISE
F095	146.50	14.650	10					IC
F006	149.00	14.900	10	HLL				ISE
F094	150.00	15.000	10	VH				ISE
F011	154.00	15.400	10					
F009	166.50	16.650	10					Technicon
F010	188.50	18.850	10	H				Colori.-alizarin
F037	193.00	19.300	10					SIE
F025	195.50	19.550	10	HVHHHHH	BIASED HIGH	-13.76	0.0532	ISE -Auto
F015	200.00	20.000	10	EHVH	BIASED HIGH	25.43	-0.0172	IC Anions
F032	200.50	20.050	10	VHHHVH	BIASED HIGH*	3.21	0.0225	Colourimetry
F073	235.00	23.500	10	EHEHEHEHEHEHEHEHEH	BIASED HIGH	-25.87	0.1608	Dionex DX500

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

OVERALL AVERAGE
RANK IS 12.763

Fluoride

PARAMETER: 11091 Sodium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0400

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	3.8	26.00	35.09	10.00	45.63	9.00	42.83	10.00	12.81	8.00	13.56	15.00
F003	3.68	18.00	36.1	19.50	47.9	24.00	45.1	26.50	12.9	9.50	13.4	12.00
F006	4.	33.50	34. L	5.50	44. L	5.00	41. L	4.00	13.	12.50	13.	6.50
F007	3.95	31.00	24.2 EL	1.00	46.5	14.50	38.4 VL	3.00	13.2	17.50	13.7	19.50
F009	3.57	8.00	35.1	11.00	46.	11.00	43.	11.00	12.3	4.00	13.0	6.50
F010	3.67	16.50	36.0	17.50	48.9	29.00	45.4	29.00	13.68	29.00	14.09	28.00
F011	3.7	20.00	36.7	26.00	45.4	7.00	41.6	7.00	13.1	14.50	13.4	12.00
F014	3.66	15.00	35.5	13.00	46.9	17.00	43.5	15.50	13.5	25.00	13.9	26.00
F015	3.6	10.50	35.7	14.00	46.4	13.00	43.5	15.50	13.	12.50	13.3	9.00
F019	3.6	10.50	37.4	30.00	47.6	22.00	45.5	30.00	13.7	30.00	14.1	29.50
F025	3.6	10.50	40.5 VH	35.00	51.6 VH	34.00	47.0 VH	33.00	14.5 H	33.00	15.6 VH	34.00
F026	3.726	22.00	35.970	16.00	47.505	21.00	44.160	22.00	13.325	20.00	13.625	16.00
F031	3.4	3.00	34.7	8.00	44.3 L	6.00	42.0	8.00	12.7	7.00	13.2	8.00
F032	3.78	24.00	36.	17.50	46.6	16.00	43.5	15.50	13.5	25.00	13.8	23.00
F036	3.61	13.00	36.4	24.50	47.3	19.00	44.5	24.00	13.2	17.50	13.5	14.00
F037	3.481	4.00	37.89	32.00	49.02	31.00	45.92 H	31.00	12.28	3.00	12.08 VL	3.00
F038	3.7	20.00	35.	9.00	45.6	8.00	44.	20.50	13.1	14.50	13.4	12.00
F042	3.51	5.00	33.3 L	4.00	42.8 VL	3.00	41.5	6.00	12.5	5.00	12.9	5.00
F046	3.87	27.00	36.2	22.00	47.4	20.00	44.4	23.00	13.5	25.00	13.9	26.00
F048	3.67	16.50	34.5	7.00	46.2	12.00	43.5	15.50	13.2	17.50	13.7	19.50
F063	3.20	2.00	30.4 VL	3.00	38.5 EL	1.00	37.5 VL	2.00	11.4 VL	2.00	11.6 VL	2.00
F068	3.643	14.00	35.86	15.00	45.76	10.00	43.43	13.00	12.91	11.00	13.32	10.00
F074	3.55	6.50	34.00 L	5.50	43.30 VL	4.00	41.10 L	5.00	12.60	6.00	12.80	4.00
F093	3.90	29.00	37.6	31.00	48.9	29.00	45.1	26.50	13.9	31.00	14.1	29.50
F094	4.	33.50	39. VH	34.00	54. EH	35.00	49. VH	34.00	15. VH	34.00	15. H	33.00
F095	3.7	20.00	36.2	22.00	47.0	18.00	43.6	18.00	13.4	22.00	13.8	23.00
F113	3.9	29.00	36.9	27.00	48.1	25.00	43.2	12.00	13.6	28.00	13.9	26.00
F133	3.60	10.50	36.1	19.50	46.5	14.50	43.7	19.00	13.35	21.00	13.65	17.00
F135	3.9	29.00	36.2	22.00	48.3	26.50	44.9	25.00	12.9	9.50	14.5	31.50
F139	2.924 EL	1.00	29.6 EL	2.00	39.63 EL	2.00	36.73 EL	1.00	10.87 EL	1.00	11.06 EL	1.00
F141	3.79	25.00	37.1	29.00	48.3	26.50	45.3	28.00	13.5	25.00	13.8	23.00
F143	3.74	23.00	36.4	24.50	47.8	23.00	44.	20.50	13.5	25.00	13.7	19.50
F144	4.46 EH	35.00	35.2	12.00	48.9	29.00	42.7	9.00	13.2	17.50	13.7	19.50
F145	3.55	6.50	37.	28.00	50.1 H	32.00	50.2 VH	35.00	15.6 EH	35.00	15.9 EH	35.00
F147	3.96	32.00	38.30 H	33.00	50.50 H	33.00	46.20 H	32.00	14.00	32.00	14.50	31.50
MEDIAN	3.6800		36.0000		47.0000		43.6000		13.2000		13.7000	
1CRIT	0.6072		1.9000		2.3400		2.2040		0.9880		1.0080	
N	33		33		33		33		33		33	
MEAN	3.6973		35.6791		46.8680		43.6376		13.2198		13.6220	
3STDEV	0.5292		5.6760		6.9440		6.6276		1.9350		2.1758	

PARAMETER: 11091 Sodium mg/L

SAMPLE LAB NO	7 = WHITE-97 REPORTED VALUE	RANK	8 = SWAN-98 REPORTED VALUE	RANK	9 = FISHER-98 REPORTED VALUE	RANK	10 = FRENCH-98 REPORTED VALUE	RANK
F002	1.83	27.00	10.71	22.00	9.96	25.00	44.35	8.00
F003	1.70	11.00	10.5	14.00	9.78	19.00	46.1	20.00
F006	2.	33.50	10.	5.00	9.	5.00	43. L	5.00
F007	1.73	19.00	10.8	24.50	49.1 EH	35.00	0.04 EL	1.00
F009	1.65	6.00	10.1	7.00	9.3	8.00	45.	10.00
F010	1.71	15.00	11.3	32.50	10.76 H	33.00	49.1 H	30.00
F011	1.72	17.00	10.6	16.00	9.69	15.00	44.2	7.00
F014	1.77	24.50	10.7	19.50	9.77	18.00	45.5	15.00
F015	1.6	3.50	10.3	9.00	9.2	7.00	45.4	13.50
F019	1.7	11.00	10.8	24.50	9.9	24.00	47.1	27.00
F025	3.5 EH	35.00	13.0 EH	35.00	10.6	32.00	50.1 VH	33.00
F026	1.714	16.00	10.52	15.00	9.672	14.00	45.54	16.00
F031	1.5	2.00	10.4	11.50	9.5	11.00	45.4	13.50
F032	1.76	22.00	10.7	19.50	9.76	17.00	46.	19.00
F036	1.68	8.00	10.4	11.50	9.51	12.00	45.9	18.00
F037	1.706	14.00	9.068 VL	3.00	8.483 VL	3.00	49.81 VH	32.00
F038	1.7	11.00	10.7	19.50	9.7	16.00	45.3	12.00
F042	1.66	7.00	10.1	7.00	8.70 L	4.00	43.5 L	6.00
F046	1.90	29.50	10.9	28.00	9.98	26.00	46.7	24.00
F048	1.74	20.00	10.68	17.00	9.81	22.00	47.64	28.00
F063	1.60	3.50	8.83 EL	1.00	8.32 VL	2.00	39.2 VL	3.00
F068	1.722	18.00	10.31	10.00	9.586	13.00	45.05	11.00
F074	1.62	5.00	9.95	4.00	9.15	6.00	42.00 VL	4.00
F093	1.94	31.50	11.1	31.00	10.1	28.50	46.9	25.00
F094	2.	33.50	11.	30.00	10.	27.00	52. VH	34.00
F095	1.7	11.00	10.8	24.50	9.8	21.00	46.3	22.00
F113	1.77	24.50	10.9	28.00	10.2	30.50	46.3	22.00
F133	1.70	11.00	10.45	13.00	9.35	9.00	45.7	17.00
F135	1.9	29.50	10.8	24.50	10.1	28.50	48.8 H	29.00
F139	1.32 EL	1.00	8.86 EL	2.00	8. EL	1.00	38.08 VL	2.00
F141	1.76	22.00	10.9	28.00	9.85	23.00	47.0	26.00
F143	1.76	22.00	10.7	19.50	9.79	20.00	46.3	22.00
F144	1.78	26.00	10.1	7.00	9.4	10.00	44.4	9.00
F145	1.94	31.50	11.5	34.00	10.8 H	34.00	52.8 VH	35.00
F147	1.89	28.00	11.30	32.50	10.20	30.50	49.5 VH	31.00
MEDIAN	1.7220		10.7000		9.7700		45.9000	
1CRIT	0.5289		0.8880		0.8508		2.2960	
N	33		33		33		33	
MEAN	1.7531		10.5439		9.6885		45.8536	
3STDEV	0.3451		1.6336		1.6673		8.3428	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	160.00	16.000	10					Flame Photoem
F003	173.50	17.350	10					ICP
F006	115.50	11.550	10	L L L L				ICP
F007	166.00	16.600	10	EL VL EHEL				
F009	82.50	8.250	10					ICP-MS
F010	259.50	25.950	10	H H				ICP-OES
F011	141.50	14.150	10					
F014	188.50	18.850	10					ICP
F015	107.50	10.750	10					ICP
F019	238.50	23.850	10					ICAP
F025	314.50	31.450	10	VHVHVHH VHEHEH VH	BIASED HIGH	7.96	0.6801	ICP
F026	178.00	17.800	10					Flame AAS
F031	78.00	7.800	10	L	BIASED LOW*	-3.40	-0.0503	ICP, Extble
F032	198.50	19.850	10					AAS
F036	161.50	16.150	10					AAS
F037	156.00	15.600	10	H VL VLVLVH				ICP-MS
F038	142.50	14.250	10					FAES
F042	52.00	5.200	10	L VL L L	BIASED LOW	-6.63	0.0136	Flame AA, AIR
F046	250.50	25.050	10					ICAP
F048	175.00	17.500	10					IC
F063	21.50	2.150	10	VLELVLVLVL ELVLVL	BIASED LOW	-15.90	0.1088	FAA
F068	125.00	12.500	10					IC, Dionex
F074	50.00	5.000	10	L VLL VL	BIASED LOW	-7.48	0.1653	AAS
F093	292.00	29.200	10		BIASED HIGH*	3.15	0.1170	ICP
F094	328.00	32.800	10	VHEHVHVHH VH	BIASED HIGH	13.93	-0.5649	ICP
F095	201.50	20.150	10					IC
F113	252.00	25.200	10					FAAS, PE-5100
F133	151.50	15.150	10					ICP-MS
F135	255.00	25.500	10	H				APHA-Na-B
F139	14.00	1.400	10	ELELELELELELELELVL	BIASED LOW	-15.93	-0.2309	ICP-OES
F141	255.50	25.550	10					ICO-OES
F143	219.00	21.900	10					ICP
F144	174.00	17.400	10	EH				APHA 3500-Na D
F145	306.00	30.600	10	H VHEHEH H VH	BIASED HIGH	10.68	0.0061	ICP-AES
F147	315.50	31.550	10	H H H VH	BIASED HIGH	7.26	-0.1275	ICP

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

OVERALL AVERAGE
RANK IS 18.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	14.00	1.400	10	ELELELELELELELELELVL	BIASED LOW	-15.93	-0.2309	ICP-OES
F063	21.50	2.150	10	VLELVLVLVLELVLVL	BIASED LOW	-15.90	0.1088	FAA
F074	50.00	5.000	10	LVLLVL	BIASED LOW	-7.48	0.1653	AAS
F042	52.00	5.200	10	LVLLL	BIASED LOW	-6.63	0.0136	Flame AA, AIR
F031	78.00	7.800	10	L	BIASED LOW*	-3.40	-0.0503	ICP, Extble
F009	82.50	8.250	10					ICP-MS
F015	107.50	10.750	10					ICP
F006	115.50	11.550	10	LLLL				ICP
F068	125.00	12.500	10					IC, Dionex
F011	141.50	14.150	10					
F038	142.50	14.250	10					FAES
F133	151.50	15.150	10					ICP-MS
F037	156.00	15.600	10	HVLVLVLVH				ICP-MS
F002	160.00	16.000	10					Flame Photoem
F036	161.50	16.150	10					AAS
F007	166.00	16.600	10	ELVLEHEL				
F003	173.50	17.350	10					ICP
F144	174.00	17.400	10	EH				APHA 3500-Na D
F048	175.00	17.500	10					IC
F026	178.00	17.800	10					Flame AAS
F014	188.50	18.850	10					ICP
F032	198.50	19.850	10					AAS
F095	201.50	20.150	10					IC
F143	219.00	21.900	10					ICP
F019	238.50	23.850	10					ICAP
F046	250.50	25.050	10					ICAP
F113	252.00	25.200	10					FAAS, PE-5100
F135	255.00	25.500	10	H				APHA-Na-B
F141	255.50	25.550	10					ICO-OES
F010	259.50	25.950	10	HH				ICP-OES
F093	292.00	29.200	10		BIASED HIGH*	3.15	0.1170	ICP
F145	306.00	30.600	10	HVHEHEHHVH	BIASED HIGH	10.68	0.0061	ICP-AES
F025	314.50	31.450	10	VHVHVHHVHEHEHVH	BIASED HIGH	7.96	0.6801	ICP
F147	315.50	31.550	10	HHHVH	BIASED HIGH	7.26	-0.1275	ICP
F094	328.00	32.800	10	VHEHVHVHHVH	BIASED HIGH	13.93	-0.5649	ICP

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

OVERALL AVERAGE
RANK IS 18.000

PARAMETER: 19091 Potassium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.1000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.88	13.00	3.6	11.50	3.72	12.00	9.79	8.00	2.09 L	3.00	1.35 L	5.00
F003	0.98	27.00	3.73	17.00	4.05	26.00	10.7	29.50	2.29	12.00	1.57	20.50
F006	1.0	31.00	3.7	15.00	3.9	15.50	10.2	10.50	2.4	21.50	1.6	27.00
F007	0.915	17.00	2.96 VL	1.00	3.21 VL	2.00	10.3	14.50	2.32	14.00	1.59	24.50
F009	0.85	8.00	3.50	6.50	3.68	10.00	9.5 L	3.00	2.14 L	4.00	1.41	9.00
F010	0.92	18.50	4.42 VH	33.00	4.92 EH	34.00	12.8 EH	34.00	2.53	31.00	1.65	31.00
F011	0.96	25.50	3.8	21.50	4.02	24.00	10.4	18.50	2.4	21.50	1.58	22.50
F014	0.994	29.00	3.95	27.00	4.18	28.00	10.4	18.50	2.56	32.00	1.64	29.50
F015	1.	31.00	4.	28.50	4.2	29.50	10.6	24.50	2.5	29.50	1.6	27.00
F019	<1.	0.00	4.	28.50	4.	21.50	11.	32.00	2. VL	2.00	1. EL	1.00
F025	0.8	3.00	3.3 VL	3.00	3.5 VL	3.50	10.3	14.50	2.2	7.00	1.2 VL	3.00
F026	0.841	6.00	3.491	5.00	3.665 L	9.00	9.645 L	5.00	2.161	5.00	1.358 L	6.00
F031	0.8	3.00	3.6	11.50	4.0	21.50	9.7 L	7.00	2.5	29.50	1.4	7.50
F032	0.95	22.00	3.78	19.00	3.98	17.50	10.5	21.00	2.35	16.00	1.56	18.50
F036	0.955	24.00	3.76	18.00	3.99	19.00	10.3	14.50	2.35	16.00	1.53	15.50
F037	0.879	12.00	3.572	10.00	3.584 L	6.00	10.67	27.00	2.225	9.50	1.411	10.00
F038	0.9	15.50	3.5	6.50	3.6 L	7.00	9.6 L	4.00	2.2	7.00	1.5	13.50
F042	0.92	18.50	4.03	30.00	4.34 H	32.00	10.0	9.00	2.43	26.50	1.57	20.50
F046	0.99	28.00	4.15 H	32.00	4.39 H	33.00	10.2	10.50	2.42	25.00	1.59	24.50
F048	0.860	9.50	3.53	8.00	4.21	31.00	10.52	22.00	2.48	28.00	1.49	12.00
F063	0.81	5.00	3.79	20.00	3.89	14.00	10.3	14.50	2.35	16.00	1.33 L	4.00
F068	0.878	11.00	3.564	9.00	3.664 L	8.00	9.678 L	6.00	2.225	9.50	1.463	11.00
F074	0.95	22.00	3.85	24.00	4.10	27.00	10.60	24.50	2.41	24.00	1.56	18.50
F093	1.3 EH	33.00	4.5 VH	34.00	3.7	11.00	10.7	29.50	2.6 H	33.00	1.7	33.00
F094	0.8	3.00	3.4 L	4.00	3.5 VL	3.50	9.2 VL	2.00	2.2	7.00	1.4	7.50
F095	0.9	15.50	3.7	15.00	3.9	15.50	10.3	14.50	2.3	13.00	1.5	13.50
F113	0.96	25.50	3.633	13.00	4.046	25.00	10.6	24.50	2.289	11.00	1.53	15.50
F133	0.95	22.00	3.70	15.00	3.88	13.00	10.60	24.50	2.40	21.50	1.58	22.50
F135	1.0	31.00	3.9	26.00	4.0	21.50	10.3	14.50	2.4	21.50	1.6	27.00
F139	0.655 VL	1.00	3.043 VL	2.00	3.132 VL	1.00	8.63 VL	1.00	1.941 VL	1.00	1.024 EL	2.00
F141	0.86	9.50	4.05	31.00	3.52 L	5.00	10.7	29.50	2.43	26.50	1.64	29.50
F143	0.898	14.00	3.84	23.00	3.98	17.50	10.7	29.50	2.38	19.00	1.66	32.00
F144	2.4 EH	34.00	7.4 EH	35.00	7.9 EH	35.00	14.5 EH	35.00	5.1 EH	35.00	3.5 EH	35.00
F145	0.845	7.00	3.87	25.00	4.2	29.50	11.9 VH	33.00	2.91 EH	34.00	1.89 VH	34.00
F147	0.93	20.00	3.80	21.50	4.00	21.50	10.48	20.00	2.37	18.00	1.54	17.00
MEDIAN	0.9175		3.7600		3.9800		10.4000		2.3700		1.5600	
1CRIT	0.1251		0.2956		0.3088		0.6940		0.2122		0.1636	
N	32		33		33		33		33		33	
MEAN	0.9211		3.7592		3.9248		10.3995		2.3579		1.5156	
3STDEV	0.2758		0.8680		0.9530		1.9635		0.5021		0.4602	

PARAMETER: 19091 Potassium mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.39	2.00	3.61 L	6.00	5.44	6.00	7.54	11.00
F003	0.53	31.00	4.05	25.50	5.98	26.00	8.00	29.50
F006	0.5	26.50	4.0	21.50	5.8	16.00	7.7	16.50
F007	0.437	14.00	3.16 EL	1.00	5.55	10.00	7.58	12.00
F009	0.41	7.50	3.6 L	4.50	5.3 L	3.00	7.0 L	4.00
F010	0.44	15.00	4.41 VH	34.00	6.55 VH	33.00	9.48 EH	34.00
F011	0.45	16.50	4.04	24.00	5.9	21.50	7.9	25.50
F014	0.480	22.50	4.21	31.00	6.27	32.00	7.24	8.00
F015	0.5	26.50	4.1	29.50	5.9	21.50	7.9	25.50
F019	<1.	0.00	4.	21.50	6.	27.50	8.	29.50
F025	<0.2 EL	0.00	3.9	14.00	5.9	21.50	7.6	13.50
F026	0.397	3.00	3.659	7.00	5.392 L	4.00	7.210 L	7.00
F031	0.5	26.50	3.9	14.00	5.5	8.00	7.6	13.50
F032	0.47	21.00	4.09	28.00	5.89	19.00	7.87	23.00
F036	0.455	18.00	3.95	19.00	5.75	15.00	7.8	19.00
F037	0.411	9.00	3.509 L	3.00	5.403 L	5.00	6.697 VL	2.00
F038	0.4	5.00	3.7	8.00	5.6	11.50	7.2 L	6.00
F042	0.42	10.00	4.10	29.50	6.00	27.50	7.90	25.50
F046	0.52	30.00	4.32 H	32.00	6.01	29.00	7.90	25.50
F048	0.43	12.50	4.00	21.50	5.91	24.00	7.85	22.00
F063	0.40	5.00	3.92	17.00	5.82	17.00	7.67	15.00
F068	0.421	11.00	3.735	9.00	5.451	7.00	7.301	9.00
F074	0.46	19.00	3.90	14.00	5.65	13.00	7.75	18.00
F093	0.5	26.50	3.9	14.00	6.1	30.00	8.2	32.00
F094	0.4	5.00	3.6 L	4.50	5.2 VL	2.00	7. L	4.00
F095	0.5	26.50	3.9	14.00	5.7	14.00	7.7	16.50
F113	0.45	16.50	3.872	11.00	5.95	25.00	7. L	4.00
F133	0.48	22.50	4.08	27.00	5.90	21.50	7.95	28.00
F135	0.5	26.50	3.8	10.00	5.6	11.50	7.4	10.00
F139	0.2306 EL	1.00	3.193 VL	2.00	4.692 EL	1.00	6.44 VL	1.00
F141	0.43	12.50	3.94	18.00	5.52	9.00	7.81	20.00
F143	0.462	20.00	4.05	25.50	6.16	31.00	8.09	31.00
F144	1.4 EH	33.00	7.3 EH	35.00	9.5 EH	35.00	11.9 EH	35.00
F145	0.559 H	32.00	4.34 H	33.00	6.66 VH	34.00	9.07 VH	33.00
F147	0.41	7.50	4.00	21.50	5.86	18.00	7.82	21.00
MEDIAN	0.4500		3.9400		5.8600		7.7500	
1CRIT	0.1000		0.3064		0.4216		0.5350	
N	31		33		33		33	
MEAN	0.4552		3.9205		5.8065		7.7190	
3STDEV	0.1333		0.7427		0.9792		1.6026	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	77.50	7.750	10	L L L	BIASED LOW*	-4.33	-0.0804	Flame Photoem
F003	244.00	24.400	10					ICP
F006	201.00	20.100	10					ICP
F007	110.00	11.000	10	VLVL EL				
F009	59.50	5.950	10	L L L L L	BIASED LOW	-9.06	0.0116	ICP-MS
F010	297.50	29.750	10	VHEHEH VHVHEH	BIASED HIGH	24.41	-0.2875	ICP-OES
F011	221.00	22.100	10					
F014	257.50	25.750	10					ICP-MS
F015	273.00	27.300	10					ICP
F019	163.50	20.438	8	VLEL				ICAP
F025	83.00	9.222	9	VLVL VLEL				ICP
F026	57.00	5.700	10	L L L L L	BIASED LOW	-6.81	-0.0378	Flame AAS
F031	142.00	14.200	10	L				ICP, Extble
F032	205.00	20.500	10					AAS
F036	178.00	17.800	10					AAS
F037	93.50	9.350	10	L L L VL				ICP-MS
F038	84.00	8.400	10	L L L				FAES
F042	229.00	22.900	10	H				Flame AA, AIR
F046	269.50	26.950	10	H H H				Flame Emission
F048	190.50	19.050	10					IC
F063	127.50	12.750	10	L				FAA
F068	90.50	9.050	10	L L				IC, Dionex
F074	204.00	20.400	10					AAS
F093	276.00	27.600	10	EHVH H	BIASED HIGH*	1.79	0.1480	ICP
F094	42.50	4.250	10	L VLVL L VLL	BIASED LOW	-11.19	0.0297	ICP
F095	158.00	15.800	10					IC
F113	171.00	17.100	10	L				FAAS PE-5100
F133	217.50	21.750	10					ICP-MS
F135	199.50	19.950	10					APHA 3500-K-B
F139	13.00	1.300	10	VLVLVLVLVLELELVLELVL	BIASED LOW	-15.47	-0.1666	ICP-OES
F141	190.50	19.050	10	L				ICO-OES
F143	242.50	24.250	10					ICP
F144	347.00	34.700	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	30.66	1.7344	APHA 3500-K D
F145	294.50	29.450	10	VHEHVHH H VHVH	BIASED HIGH	15.27	-0.1002	ICP-AES
F147	186.00	18.600	10					ICP

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

OVERALL AVERAGE
RANK IS 17.856

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	13.00	1.300	10	VLVLVLVLVLELELVLELVL	BIASED LOW	-15.47	-0.1666	ICP-OES
F094	42.50	4.250	10	LVLVLLVLL	BIASED LOW	-11.19	0.0297	ICP
F026	57.00	5.700	10	LLLLL	BIASED LOW	-6.81	-0.0378	Flame AAS
F009	59.50	5.950	10	LLLLL	BIASED LOW	-9.06	0.0116	ICP-MS
F002	77.50	7.750	10	LLL	BIASED LOW*	-4.33	-0.0804	Flame Photoem
F038	84.00	8.400	10	LLL				FAES
F068	90.50	9.050	10	LL				IC, Dionex
F025	83.00	9.222	9	VLVLVLEL				ICP
F037	93.50	9.350	10	LLLVL				ICP-MS
F007	110.00	11.000	10	VLVLEL				
F063	127.50	12.750	10	L				FAA
F031	142.00	14.200	10	L				ICP, Extble
F095	158.00	15.800	10					IC
F113	171.00	17.100	10	L				FAAS PE-5100
F036	178.00	17.800	10					AAS
F147	186.00	18.600	10					ICP
F048	190.50	19.050	10					IC
F141	190.50	19.050	10	L				ICO-OES
F135	199.50	19.950	10					APHA 3500-K-B
F006	201.00	20.100	10					ICP
F074	204.00	20.400	10					AAS
F019	163.50	20.438	8	VLEL				ICAP
F032	205.00	20.500	10					AAS
F133	217.50	21.750	10					ICP-MS
F011	221.00	22.100	10					
F042	229.00	22.900	10	H				Flame AA, AIR
F143	242.50	24.250	10					ICP
F003	244.00	24.400	10					ICP
F014	257.50	25.750	10					ICP-MS
F046	269.50	26.950	10	HHH				Flame Emission
F015	273.00	27.300	10					ICP
F093	276.00	27.600	10	EHVHH	BIASED HIGH*	1.79	0.1480	ICP
F145	294.50	29.450	10	VHEHVHHHVHVH	BIASED HIGH	15.27	-0.1002	ICP-AES
F010	297.50	29.750	10	VHEHEHVHVHEH	BIASED HIGH	24.41	-0.2875	ICP-OES
F144	347.00	34.700	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	30.66	1.7344	APHA 3500-K D

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

OVERALL AVERAGE
RANK IS 17.856

PARAMETER: 14091 Silicates mg/L SiO2

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.1000 BASIC ACCEPTABLE ERROR= 0.0250 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	1.58	7.00	0.78	7.00	2.30	4.50	12.6 VL	3.00	2.21	4.00	0.58	8.00
F010	1.49 L	3.00	0.65 VL	3.00	2.24 L	2.00	0.9 EL	1.00	2.26	5.00	0.49 VL	2.50
F011	1.77 H	18.00	0.865	18.00	2.48	16.00	15. H	18.00	2.55 H	19.00	0.638	17.00
F015	1.6	8.00	0.8	10.50	2.3	4.50	15.8 VH	19.00	2.3	7.50	0.6	13.50
F025	1.50 L	4.50	0.55 VL	1.00	2.25 L	3.00	13.4	5.00	2.40	16.00	0.50 VL	4.00
F026	1.608	9.00	0.7805	8.00	2.3555	7.00	13.8615	8.00	2.305	9.00	0.598	11.00
F032	1.6264	11.00	0.7704	6.00	2.354	6.00	13.91	10.00	2.3112	10.00	0.5564	5.00
F037	1.564	6.00	0.81	13.00	2.509	18.00	13.829	7.00	2.115 L	2.00	0.58	8.00
F038	1.5 L	4.50	0.7 L	4.00	2.4	9.00	13.3	4.00	2.2	3.00	0.6	13.50
F042	1.66	13.00	0.82	14.50	2.47	15.00	14.1	13.00	2.39	15.00	0.69 VH	18.00
F046	1.67	15.00	0.825	16.00	2.43	11.00	14.2	15.00	2.38	14.00	0.616	16.00
F048	0.65 EL	1.00	1.10 EH	20.00	2.42	10.00	10.54 EL	2.00	2.54 H	17.50	1.18 EH	20.00
F074	1.67	15.00	0.787	9.00	2.46	14.00	14.2	15.00	2.37	13.00	0.580	8.00
F093	1.62	10.00	0.75	5.00	2.37	8.00	14.2	15.00	2.29	6.00	0.49 VL	2.50
F094	1.7	17.00	0.8	10.50	2.5	17.00	14.3	17.00	2.3	7.50	0.6	13.50
F095	1.67	15.00	0.82	14.50	2.44	12.00	14.0	12.00	2.36	12.00	0.60	13.50
F113	1.643	12.00	0.809	12.00	2.443	13.00	13.935	11.00	2.334	11.00	0.579	6.00
F144	1.9 VH	20.00	1. VH	19.00	3.1 EH	20.00	13.7	6.00	3.1 EH	20.00	0.9 EH	19.00
F145	1.79 H	19.00	0.842	17.00	2.64 H	19.00	13.9	9.00	2.54 H	17.50	0.588	10.00
F147	1.08 EL	2.00	0.60 VL	2.00	1.80 EL	1.00	16.80 VH	20.00	1.50 EL	1.00	0.48 VL	1.00
MEDIAN	1.6232		0.8000		2.4250		13.9225		2.3226		0.5930	
1CRIT	0.1164		0.0670		0.1645		0.8543		0.1584		0.0546	
N	18		18		18		18		18		18	
MEAN	1.5967		0.7894		2.4090		13.8209		2.3420		0.5992	
3STDEV	0.4474		0.2474		0.2922		3.0679		0.3423		0.2624	

PARAMETER: 14091 Silicates mg/L SiO2

SAMPLE LAB NO	7 = WHITE-97 REPORTED VALUE	RANK	8 = SWAN-98 REPORTED VALUE	RANK	9 = FISHER-98 REPORTED VALUE	RANK	10 = FRENCH-98 REPORTED VALUE	RANK
F003	10.3 VL	3.50	9.18 L	2.00	7.35	3.00	14.1 VL	1.00
F010	11.3	8.00	10.0	10.00	7.7	8.00	15.2	4.50
F011	12.2 H	18.00	10.9 H	18.00	8.33 H	18.00	16.9 H	18.00
F015	12.6 VH	19.00	10.8 H	16.00	8.1	17.00	17.5 VH	20.00
F025	10.3 VL	3.50	8.90 VL	1.00	7.40	4.00	15.5	10.00
F026	11.4825	11.00	10.214	11.00	7.8965	13.00	15.2255	6.00
F032	11.342	9.00	9.8868	9.00	7.7468	12.00	15.4936	9.00
F037	11.916	17.00	10.868 H	17.00	7.73	10.00	16.442	17.00
F038	10.9	6.00	9.6	5.00	7.3	2.00	14.8	3.00
F042	10.8	5.00	9.59	4.00	7.70	8.00	15.3	8.00
F046	11.6	15.50	10.3	12.00	8.03	16.00	15.8	14.00
F048	9.94 VL	2.00	9.50	3.00	6.62 EL	1.00	15.2	4.50
F074	11.5	13.00	9.80	8.00	7.62	6.00	15.8	14.00
F093	11.4	10.00	10.4	13.00	7.74	11.00	15.6	11.00
F094	11.6	15.50	10.5	14.00	8.	14.00	15.9	16.00
F095	11.5	13.00	10.7	15.00	8.01	15.00	15.7	12.00
F113	10.976	7.00	9.642	6.00	7.49	5.00	15.296	7.00
F144	13.7 EH	20.00	11.2 VH	19.00	9.8 EH	20.00	15.8	14.00
F145	11.5	13.00	9.65	7.00	7.7	8.00	14.6	2.00
F147	9.60 VL	1.00	11.99 EH	20.00	8.99 EH	19.00	17.4 VH	19.00
MEDIAN	11.4412		10.1070		7.7350		15.5500	
1CRIT	0.7055		0.6254		0.4831		0.9520	
N	18		18		18		18	
MEAN	11.2865		10.1517		7.8241		15.6643	
3STDEV	1.9475		1.7057		1.1630		2.0109	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	43.00	4.300	10	VL VLL VL	BIASED LOW	-10.03	0.1130	Coli, Het Blue
F010	47.00	4.700	10	L VLL EL VL	BIASED LOW	-31.79	0.6854	Colorimetry
F011	178.00	17.800	10	H H H H H H H	BIASED HIGH	8.06	-0.0248	
F015	135.00	13.500	10	VH VHH VH				Colorimetric
F025	52.00	5.200	10	L VLL VLVLVL				Colorimetric
F026	93.00	9.300	10					AA
F032	87.00	8.700	10					Colourimetry
F037	115.00	11.500	10	L H				ICP-MS
F038	54.00	5.400	10	L L				COLOR - AUTO
F042	113.50	11.350	10	VH				Colorimetric
F046	144.50	14.450	10					ICAP
F048	81.00	8.100	10	ELEH ELH EHVL EL				Colorimetric
F074	115.00	11.500	10					Colour - FIA
F093	91.50	9.150	10	VL				ICP
F094	142.00	14.200	10					ICP
F095	134.00	13.400	10					ICP - OES
F113	90.00	9.000	10					FIA, Lachat 8000
F144	177.00	17.700	10	VHVHEH EHEHEHVHEH	BIASED HIGH*	2.26	0.6178	APHA 4500-Si D
F145	121.50	12.150	10	H H H				Auto
F147	86.00	8.600	10	ELVLELVHELVLVLEHEHVH				Colour

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

OVERALL AVERAGE
RANK IS 10.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	43.00	4.300	10	VLVLLVL	BIASED LOW	-10.03	0.1130	Coli, Het Blue
F010	47.00	4.700	10	LVLLELVL	BIASED LOW	-31.79	0.6854	Colorimetry
F025	52.00	5.200	10	LVLLVLVLVL				Colorimetric
F038	54.00	5.400	10	LL				COLOR - AUTO
F048	81.00	8.100	10	ELEHELHEHVLEL				Colorimetric
F147	86.00	8.600	10	ELVLELVHELVLVLEHEHVH				Colour
F032	87.00	8.700	10					Colourimetry
F113	90.00	9.000	10					FIA, Lachat 8000
F093	91.50	9.150	10	VL				ICP
F026	93.00	9.300	10					AA
F042	113.50	11.350	10	VH				Colorimetric
F074	115.00	11.500	10					Colour - FIA
F037	115.00	11.500	10	LH				ICP-MS
F145	121.50	12.150	10	HHH				Auto
F095	134.00	13.400	10					ICP - OES
F015	135.00	13.500	10	VHVHHVH				Colorimetric
F094	142.00	14.200	10					ICP
F046	144.50	14.450	10					ICAP
F144	177.00	17.700	10	VHVHEHEHEHEHVHEH	BIASED HIGH*	2.26	0.6178	APHA 4500-Si D
F011	178.00	17.800	10	HHHHHHH	BIASED HIGH	8.06	-0.0248	

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

OVERALL AVERAGE
RANK IS 10.500

PARAMETER: 16092 Sulfate mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	16.86	12.00	51.9	17.00	106.4	16.00	170.6	13.00	17.9	15.50	26.8	16.00
F003	15.9	3.00	51.7	15.00	107.	17.50	170.	11.50	17.2	6.00	25.9	8.00
F006	18.	32.00	47. L	2.00	96. VL	2.00	176.	24.50	18.	19.00	25.	5.50
F007	16.5	6.00	51.5	11.50	107.5	21.00	177.	28.00	17.8	13.50	26.9	17.00
F009	16.7	8.00	51.	8.00	105.	9.00	164.	6.00	17.5	9.00	26.4	10.00
F010	16.	5.00	48. L	3.00	99. L	4.00	163.	5.00	17.	5.00	26.	9.00
F011	17.	17.50	188. EH	36.00	127. EH	35.00	199. VH	35.00	20. H	33.50	28.	28.50
F014	18.0	32.00	54.9	29.00	115. H	33.00	186. H	34.00	19.4	32.00	29.0	32.00
F015	17.	17.50	52.	19.00	106.	14.00	127. EL	2.00	18.	19.00	27.	18.00
F025	16.8	10.00	50.9	6.50	105.	9.00	177.	28.00	17.3	7.00	26.7	13.50
F026	16.7521	9.00	49.109	5.00	99.5516 L	5.00	165.6665	8.00	16.3848 L	2.00	27.4576	25.00
F031	17.0	17.50	51.6	14.00	109.	28.50	173.	19.50	18.2	23.00	27.1	19.50
F032	18.5 H	34.00	51.5	11.50	106.	14.00	173.	19.50	18.	19.00	30. H	34.00
F036	17.1	23.00	53.	25.00	109.	28.50	177.	28.00	17.5	9.00	27.3	22.00
F037	15.9254	4.00	46.7132 L	1.00	97.2224 L	3.00	154.1496 VL	3.00	16.6657	3.00	25.8613	7.00
F038	15.6	1.00	50.9	6.50	108.	24.00	179.	31.00	16. L	1.00	24.8 L	4.00
F042	17.3	26.50	51.4	10.00	112.	31.50	176.	24.50	18.7	29.00	27.6	26.00
F046	16.9	14.50	51.3	9.00	107.	17.50	173.	19.50	17.9	15.50	26.6	12.00
F048	17.03	20.50	53.12	26.00	107.7	22.00	175.1	23.00	18.4	26.50	27.71	27.00
F063	17.6	29.00	53.8	28.00	109.	28.50	176.7	26.00	18.5	28.00	28.1	30.00
F068	17.03	20.50	51.56	13.00	105.6	11.00	171.8	16.00	18.25	24.00	27.4	24.00
F073	19.04 H	35.00	64.1 EH	35.00	134.6 EH	36.00	210.5 EH	36.00	20.09 H	35.00	31.33 VH	36.00
F074	16.55	7.00	51.87	16.00	102.51	6.00	162.77	4.00	17.76	12.00	28.40	31.00
F093	17.1	23.00	48.9	4.00	106.0	14.00	170.0	11.50	18.0	19.00	23.7 VL	2.00
F094	19.2 EH	36.00	58.2 VH	32.00	121. VH	34.00	185. H	33.00	20.5 VH	36.00	30.5 VH	35.00
F095	17.3	26.50	52.5	23.00	108.	24.00	165.	7.00	18.4	26.50	27.2	21.00
F113	16.872	13.00	60.913 VH	34.00	77.424 EL	1.00	10.42 EL	1.00	18.054	22.00	24.148 L	3.00
F133	17.31	28.00	52.19	21.00	107.4	20.00	168.6	9.00	18.31	25.00	27.37	23.00
F135	17.	17.50	56. H	31.00	112.	31.50	181.	32.00	20. H	33.50	28.	28.50
F139	17.73	30.00	59.48 VH	33.00	103.24	7.00	168.83	10.00	19.01	31.00	29.78 H	33.00
F140	17.1	23.00	52.0	19.00	108.	24.00	173.	19.50	18.0	19.00	26.7	13.50
F141	16.9	14.50	52.4	22.00	105.	9.00	171.	15.00	17.8	13.50	27.1	19.50
F143	15.7	2.00	52.	19.00	105.7	12.00	173.5	22.00	16.7	4.00	26.5	11.00
F144	18.	32.00	55.	30.00	109.	28.50	178.	30.00	19.	30.00	25.	5.50
F145	17.11	25.00	53.3	27.00	107.2	19.00	170.7	14.00	17.5	9.00	22.8 VL	1.00
F147	16.83	11.00	52.76	24.00	108.31	26.00	172.76	17.00	17.61	11.00	26.79	15.00
MEDIAN	17.0000		52.0000		107.1000		173.0000		18.0000		27.0500	
1CRIT	1.4600		3.5600		6.8660		10.8200		1.5200		2.0630	
N	34		34		34		34		34		34	
MEAN	17.0717		52.8765		107.2745		171.8875		18.0834		27.0240	
3STDEV	2.0730		10.2891		17.2069		32.9528		2.6555		4.4871	

PARAMETER: 16092 Sulfate mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.31	12.00	61.2	18.00	20.8	10.00	104.4	11.00
F003	3.3 VH	26.00	60.7	14.00	20.8	10.00	106.	21.00
F006	11. EH	28.00	56. L	2.00	31. EH	36.00	107.	27.50
F007	1.6 VH	23.00	61.5	21.50	20.4	4.00	106.8	25.00
F009	0.31	12.00	59.	5.00	20.8	10.00	99. L	4.00
F010	1.4 VH	22.00	60.	9.00	21.	15.00	100.	5.00
F011	5. EH	27.00	69. VH	34.00	22.	30.00	116. H	35.00
F014	0.371	18.00	62.1	26.00	21.4	25.00	111.	32.50
F015	<0.5	0.00	61.	17.00	21.	15.00	106.	21.00
F025	0.3	9.50	59.4	6.50	20.7	7.00	106.	21.00
F026	0.3324	15.00	57.2265	4.00	20.9755	12.00	96.5028 L	3.00
F031	<0.1	0.00	60.1	10.00	21.1	19.50	107.	27.50
F032	1.25T VH	21.00	62.	25.00	20.5	5.00	106.	21.00
F036	0.35	16.00	63.1	31.00	21.1	19.50	106.	21.00
F037	<1.0	0.00	56.2846 L	3.00	21.2184	24.00	93.466 VL	2.00
F038	<1.0	0.00	62.3	27.00	19. L	2.00	107.	27.50
F042	0.36	17.00	59.8	8.00	21.0	15.00	111.	32.50
F046	0.20	1.00	60.3	12.00	21.2	22.50	106.	21.00
F048	<0.90	0.00	63.79	32.00	22.3	31.00	101.8	7.00
F063	<1.	0.00	62.6	28.00	21.7	28.00	107.	27.50
F068	0.212	3.00	61.53	23.00	21.45	26.00	105.2	14.00
F073	0.533	20.00	75.49 EH	36.00	24.62 VH	34.00	125.53 EH	36.00
F074	0.38	19.00	60.53	13.00	20.79	8.00	103.38	10.00
F093	0.21	2.00	59.4	6.50	21.1	19.50	104.9	12.00
F094	2.5 VH	25.00	68.2 VH	33.00	26. EH	35.00	114. H	34.00
F095	0.3	9.50	60.9	16.00	21.8	29.00	108.	30.50
F113	0.246	4.00	2.14 EL	1.00	2.249 EL	1.00	4.067 EL	1.00
F133	0.29	7.00	61.38	19.00	21.49	27.00	105.7	17.00
F135	2. VH	24.00	63.	29.50	23. H	33.00	106.	21.00
F139	0.31	12.00	70.13 VH	35.00	22.83 H	32.00	100.26	6.00
F140	0.279	6.00	61.6	24.00	21.0	15.00	105.	13.00
F141	<0.3	0.00	61.4	20.00	21.2	22.50	102.	8.00
F143	0.291	8.00	61.5	21.50	20.0	3.00	105.3	15.50
F144	<1.0	0.00	63.	29.50	21.	15.00	108.	30.50
F145	0.273	5.00	60.2	11.00	21.1	19.50	103.2	9.00
F147	0.33	14.00	60.88	15.00	20.64	6.00	105.3	15.50
MEDIAN	0.3312		61.2900		21.1000		106.0000	
1CRIT	0.5000		4.1174		1.7060		6.8000	
N	26		34		34		34	
MEAN	0.8861		61.5015		21.3828		105.3003	
3STDEV	3.4199		8.8233		3.6763		12.9147	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	140.50	14.050	10					IC
F003	132.00	13.200	10	VH				Colormetric, MTB
F006	178.50	17.850	10	L VL EHL EH				AA
F007	170.50	17.050	10	VH				
F009	81.00	8.100	10	L	BIASED LOW	-5.22	0.7253	Dionex
F010	82.00	8.200	10	L L VH	BIASED LOW	-6.51	0.6461	Colori.-calmagite
F011	311.50	31.150	10	EHEHVHH EHVH H	BIASED HIGH	11.83	13.9150	
F014	293.50	29.350	10	H H	BIASED HIGH	7.16	-0.7449	
F015	142.50	15.833	9	EL				IC Anions
F025	118.00	11.800	10					IC
F026	88.00	8.800	10	L L L				DIONEX I.C.
F031	179.00	19.889	9					IC
F032	204.00	20.400	10	H H VH				IC
F036	223.00	22.300	10					Ion Chromatography
F037	50.00	5.556	9	L L VL L VL	BIASED LOW	-11.82	1.5338	I.C. WATERS
F038	124.00	13.778	9	L L L				IC
F042	220.00	22.000	10					IC
F046	144.50	14.450	10					IC
F048	215.00	23.889	9					IC
F063	253.00	28.111	9					IC
F068	174.50	17.450	10					IC, Dionex
F073	339.00	33.900	10	H EHEHEHH VH EHVHEH	BIASED HIGH	22.66	-0.9106	Dionex DX500
F074	126.00	12.600	10					IC
F093	113.50	11.350	10	VL				Dionex IC
F094	333.00	33.300	10	EHVHVHH VHVHVHVHEHH	BIASED HIGH	6.73	2.2999	ICP
F095	213.00	21.300	10					IC
F113	81.00	8.100	10	VHELEL L ELELEL	BIASED LOW	-90.65	16.2041	IC Dionex
F133	196.00	19.600	10					I.C.
F135	281.50	28.150	10	H H VH H	BIASED HIGH*	3.19	0.6519	APHA 4500 SO4-C
F139	229.00	22.900	10	VH H VHH				I.C.
F140	176.00	17.600	10					IC
F141	144.00	16.000	9					IC
F143	118.00	11.800	10					IC
F144	231.00	25.667	9					APHA 4500-SO4 D
F145	139.50	13.950	10	VL				IC
F147	154.50	15.450	10					IC

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

OVERALL AVERAGE
RANK IS 18.182

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F037	50.00	5.556	9	LLVLLVL	BIASED LOW	-11.82	1.5338	I.C. WATERS
F009	81.00	8.100	10	L	BIASED LOW	-5.22	0.7253	Dionex
F113	81.00	8.100	10	VHELELLELELEL	BIASED LOW	-90.65	16.2041	IC Dionex
F010	82.00	8.200	10	LLVH	BIASED LOW	-6.51	0.6461	Colori.-calmagite
F026	88.00	8.800	10	LLL				DIONEX I.C.
F093	113.50	11.350	10	VL				Dionex IC
F025	118.00	11.800	10					IC
F143	118.00	11.800	10					IC
F074	126.00	12.600	10					IC
F003	132.00	13.200	10	VH				Colormetric, MTB
F038	124.00	13.778	9	LLL				IC
F145	139.50	13.950	10	VL				IC
F002	140.50	14.050	10					IC
F046	144.50	14.450	10					IC
F147	154.50	15.450	10					IC
F015	142.50	15.833	9	EL				IC Anions
F141	144.00	16.000	9					IC
F007	170.50	17.050	10	VH				
F068	174.50	17.450	10					IC, Dionex
F140	176.00	17.600	10					IC
F006	178.50	17.850	10	LVLEHLEH				AA
F133	196.00	19.600	10					I.C.
F031	179.00	19.889	9					IC
F032	204.00	20.400	10	HHVH				IC
F095	213.00	21.300	10					IC
F042	220.00	22.000	10					IC
F036	223.00	22.300	10					Ion Chromatography
F139	229.00	22.900	10	VHHVHH				I.C.
F048	215.00	23.889	9					IC
F144	231.00	25.667	9					APHA 4500-SO4 D
F063	253.00	28.111	9					IC
F135	281.50	28.150	10	HHVHH	BIASED HIGH*	3.19	0.6519	APHA 4500 SO4-C
F014	293.50	29.350	10	HH	BIASED HIGH	7.16	-0.7449	
F011	311.50	31.150	10	EHEHVHHEHVHH	BIASED HIGH	11.83	13.9150	
F094	333.00	33.300	10	EHVHVHHVHVHVHVHEHH	BIASED HIGH	6.73	2.2999	ICP
F073	339.00	33.900	10	HEHEHEHHVHEHVHEH	BIASED HIGH	22.66	-0.9106	Dionex DX500

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

OVERALL AVERAGE
RANK IS 18.182

Sulfate

PARAMETER: 17092 Chloride mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.5000 CONCENTRATION ERROR INCREMENT= 0.0600

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	6.92	30.00	62.6	23.50	80.3	25.00	12.5	25.50	19.4	27.00	24.8	23.50
F003	6.05	6.00	61.0	15.50	78.1	20.00	11.6	12.00	18.2	11.00	24.2	16.00
F006	3. EL	1.00	61.	15.50	78.	18.00	8. VL	1.00	16. VL	1.00	23.	4.00
F007	6.26	11.50	62.38	22.00	82.52	33.00	11.8	17.00	18.5	17.50	24.42	20.00
F009	6.03	5.00	57. L	5.00	73.	5.00	11.2	10.00	18.5	17.50	23.5	6.00
F010	6.5	25.00	62.	18.50	80.	23.50	13. H	27.00	19.	22.50	24.	10.50
F011	6.3	15.00	59.5	9.00	76.9	13.00	11.8	17.00	18.3	13.00	24.	10.50
F014	6.44	22.00	64.4	30.00	82.3	31.50	12.5	25.50	19.7	29.00	25.8	28.50
F015	6.3	15.00	63.	26.00	80.	23.50	23. EH	34.00	19.	22.50	24.	10.50
F025	6.3	15.00	64.8	32.00	76.0	8.50	11.7	14.50	19.4	27.00	25.8	28.50
F026	6.8015	28.00	59.7918	11.00	76.5737	12.00	12.0115	20.00	18.2628	12.00	24.3226	17.00
F031	6.29	13.00	3.35 EL	1.00	77.4	15.00	21.4 EH	33.00	18.8	21.00	24.4	18.50
F032	6.2	10.00	60.6	13.50	76.	8.50	11.8	17.00	18.4	14.00	24.4	18.50
F036	6.47	23.00	62.1	20.00	78.8	22.00	11.7	14.50	18.5	17.50	24.	10.50
F037	6.882	29.00	63.7548	28.00	81.8152	29.00	8.1289 VL	2.00	20.1574 H	31.00	25.6136	27.00
F038	6.1	8.50	60.6	13.50	75.	6.00	11.1	8.00	18.5	17.50	24.8	23.50
F042	6.49	24.00	64.6	31.00	82.3	31.50	13.1 H	28.00	19.1	24.50	25.5	26.00
F046	6.09	7.00	62.6	23.50	78.2	21.00	11.1	8.00	18.6	20.00	24.6	22.00
F048	6.412	21.00	62.7	25.00	80.70	27.00	12.11	21.00	18.44	15.00	24.55	21.00
F063	6.6	26.00	62.2	21.00	81.4	28.00	14.2 VH	32.00	19.4	27.00	24.1	14.50
F068	6.305	17.00	61.43	17.00	78.05	19.00	11.49	11.00	18.156	10.00	23.8	7.50
F073	7.69 VH	33.00	86.4 EH	35.00	105.5 EH	35.00	13.58 VH	30.00	22.95 EH	34.00	31.28 EH	35.00
F074	15.92 EH	35.00	57.95	6.00	71.39 L	3.00	11.61	13.00	17.59	6.00	24.07	13.00
F093	6.36	18.00	62.0	18.50	76.1	10.00	10.2 L	3.00	16.9 L	4.50	23.8	7.50
F094	6.	4.00	59.9	12.00	76.4	11.00	11.1	8.00	17.6	7.00	24.1	14.50
F095	6.1	8.50	59.7	10.00	77.5	16.00	12.0	19.00	19.1	24.50	25.0	25.00
F113	6.37	19.00	51.687 VL	2.00	6.581 EL	1.00	161.102 EH	35.00	17.818	8.00	26.067	30.00
F133	6.26	11.50	59.09	8.00	75.68	7.00	11.00	6.00	17.88	9.00	23.30	5.00
F135	7.6 VH	32.00	63.7	27.00	80.4	26.00	12.4	24.00	20.6 H	32.00	26.7 H	32.00
F139	6.97	31.00	68.52 VH	34.00	82.26	30.00	13.33 H	29.00	20.93 VH	33.00	27.55 VH	33.00
F141	6.4	20.00	58.9	7.00	77.9	17.00	10.8	5.00	16.9 L	4.50	22.9	3.00
F143	6.65	27.00	65.1	33.00	77.3	14.00	12.2	22.00	19.9	30.00	26.3	31.00
F144	11. EH	34.00	64.	29.00	86. VH	34.00	14. VH	31.00	23. EH	35.00	30. EH	34.00
F145	5.48 L	2.00	56.5 L	4.00	71.4 L	4.00	12.3	23.00	16.6 L	3.00	22.6	2.00
F147	5.64	3.00	53.015 VL	3.00	66.51 EL	2.00	10.26 L	4.00	16.34 L	2.00	20.46 VL	1.00
MEDIAN	6.3600		62.0000		78.0000		11.8000		18.5000		24.4000	
1CRIT	0.8216		4.1600		5.1200		1.1480		1.5500		1.9040	
N	33		33		33		33		33		33	
MEAN	6.5533		61.1551		77.9454		12.4855		18.7098		24.7271	
3STDEV	2.7064		9.9800		11.3189		8.1799		3.8646		4.3045	

PARAMETER: 17092 Chloride mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.24	5.00	2.41	27.00	2.68	21.50	4.76	28.00
F003	0.86 H	26.00	2.61	31.00	3.11	31.00	4.47	22.00
F006	<2.	0.00	<2.	0.00	<2.	0.00	<2. EL	0.00
F007	0.74	23.50	2.37	23.00	2.85	28.00	4.31	20.00
F009	0.16	3.00	2.12	6.00	2.15	5.00	4.00	10.50
F010	<1.	0.00	2.	5.00	3.	30.00	5. H	31.50
F011	0.8	25.00	2.3	18.00	2.7	23.50	4.1	15.00
F014	0.256	7.00	2.24	15.00	2.57	17.50	4.21	17.00
F015	0.25	6.00	2.3	18.00	2.9	29.00	4.5	24.50
F025	<0.5	0.00	2.4	25.00	2.6	19.50	4.3	19.00
F026	0.3165	16.00	3.9632 EH	32.00	2.2899	8.00	4.0845	13.00
F031	0.39	19.00	2.35	22.00	2.68	21.50	4.49	23.00
F032	0.4T	20.00	2.2	13.00	2.4	12.00	4.	10.50
F036	0.26	8.00	2.26	16.00	2.43	13.00	4.08	12.00
F037	0.1068	1.00	1.7903	2.00	1.48 EL	1.00	3.04 VL	1.00
F038	<0.5	0.00	1.9	3.50	1.9 L	2.00	3.7	4.00
F042	0.21	4.00	2.17	11.00	2.17	6.00	4.23	18.00
F046	<0.2	0.00	2.13	7.00	2.44	14.00	4.20	16.00
F048	0.74	23.50	2.40	25.00	2.72	25.00	4.52	26.00
F063	<1.	0.00	2.5	28.00	2.8	27.00	4.5	24.50
F068	0.148	2.00	2.150	9.00	2.089	4.00	3.883	7.00
F073	0.443	21.00	2.52	29.00	3.375 H	32.00	4.86	29.00
F074	0.29	12.00	2.56	30.00	2.35	10.00	4.88	30.00
F093	0.31	15.00	1.56 L	1.00	2.28	7.00	3.48 L	2.00
F094	0.7	22.00	2.2	13.00	2.7	23.50	3.9	8.00
F095	0.3	13.50	1.9	3.50	2.0	3.00	3.8	6.00
F113	0.324	17.00	60.871 EH	33.00	20.078 EH	33.00	102.956 EH	34.00
F133	0.35	18.00	2.32	20.50	2.56	16.00	4.09	14.00
F135	2.5 EH	27.00	2.3	18.00	2.3	9.00	5.4 VH	33.00
F139	0.28	11.00	2.40	25.00	2.79	26.00	4.67	27.00
F141	<0.1	0.00	2.2	13.00	2.6	19.50	3.5 L	3.00
F143	0.269	9.00	2.32	20.50	2.57	17.50	4.45	21.00
F144	<5.	0.00	<5.	0.00	<5.	0.00	5. H	31.50
F145	0.278	10.00	2.15	9.00	2.5	15.00	3.97	9.00
F147	0.30	13.50	2.15	9.00	2.37	11.00	3.77	5.00
MEDIAN	0.3000		2.3000		2.5700		4.2200	
1CRIT	0.5000		0.5780		0.5942		0.6932	
N	25		31		31		32	
MEAN	0.3846		2.3091		2.5443		4.2846	
3STDEV	0.6108		1.0664		0.9655		1.3443	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	236.00	23.600	10					IC
F003	190.50	19.050	10	H				Color, Hg Thio
F006	40.50	6.750	6	EL VLVL EL	BIASED LOW*	4.54	-3.5309	AgNO3 Titn
F007	215.50	21.550	10					
F009	73.00	7.300	10	L	BIASED LOW	-6.99	0.1916	Dionex
F010	193.50	21.500	9	H H				Titration-conduct.
F011	159.00	15.900	10					
F014	223.00	22.300	10					
F015	209.00	20.900	10	EH				IC Anions
F025	189.00	21.000	9					IC
F026	169.00	16.900	10	EH				DIONEX I.C.
F031	187.00	18.700	10	EL EH				IC
F032	137.00	13.700	10					Colourimetry
F036	156.50	15.650	10					Ion Chromatography
F037	151.00	15.100	10	VLH ELVL				I.C. WATERS
F038	86.50	9.611	9	L				IC
F042	204.00	20.400	10	H				IC
F046	138.50	15.389	9					IC
F048	229.50	22.950	10					IC
F063	228.00	25.333	9	VH				IC
F068	103.50	10.350	10					IC, Dionex
F073	313.00	31.300	10	VHEHEHVHEHEH H	BIASED HIGH	37.75	-1.1287	Dionex DX500
F074	158.00	15.800	10	EH L				IC
F093	86.50	8.650	10	L L L L				Dionex IC
F094	123.00	12.300	10					Colorimetry
F095	129.00	12.900	10					IC
F113	212.00	21.200	10	VLELEH EHEHEH				IC Dionex
F133	115.00	11.500	10					I.C.
F135	260.00	26.000	10	VH H H EH VH				APHA 4500 Cl-B
F139	279.00	27.900	10	VH H VHVH	BIASED HIGH	7.19	0.4119	I.C.
F141	92.00	10.222	9	L L				IC
F143	225.00	22.500	10					IC
F144	228.50	32.643	7	EH VHVHEHEH H	BIASED HIGH*	4.24	2.7171	APHA 4500-Cl B
F145	81.00	8.100	10	L L L L	BIASED LOW	-8.81	0.1861	IC
F147	53.50	5.350	10	VLELL L VL	BIASED LOW	-14.91	0.1752	IC

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

OVERALL AVERAGE
RANK IS 17.433

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F147	53.50	5.350	10	VLELLLVL	BIASED LOW	-14.91	0.1752	IC
F006	40.50	6.750	6	ELVLVLEL	BIASED LOW*	4.54	-3.5309	AgNO3 Titn
F009	73.00	7.300	10	L	BIASED LOW	-6.99	0.1916	Dionex
F145	81.00	8.100	10	LLLL	BIASED LOW	-8.81	0.1861	IC
F093	86.50	8.650	10	LLLL				Dionex IC
F038	86.50	9.611	9	L				IC
F141	92.00	10.222	9	LL				IC
F068	103.50	10.350	10					IC, Dionex
F133	115.00	11.500	10					I.C.
F094	123.00	12.300	10					Colorimetry
F095	129.00	12.900	10					IC
F032	137.00	13.700	10					Colourimetry
F037	151.00	15.100	10	VLHELVL				I.C. WATERS
F046	138.50	15.389	9					IC
F036	156.50	15.650	10					Ion Chromatography
F074	158.00	15.800	10	EHL				IC
F011	159.00	15.900	10					
F026	169.00	16.900	10	EH				DIONEX I.C.
F031	187.00	18.700	10	ELEH				IC
F003	190.50	19.050	10	H				Color, Hg Thio
F042	204.00	20.400	10	H				IC
F015	209.00	20.900	10	EH				IC Anions
F025	189.00	21.000	9					IC
F113	212.00	21.200	10	VLELEHEHEHEH				IC Dionex
F010	193.50	21.500	9	HH				Titration-conduct.
F007	215.50	21.550	10					
F014	223.00	22.300	10					
F143	225.00	22.500	10					IC
F048	229.50	22.950	10					IC
F002	236.00	23.600	10					IC
F063	228.00	25.333	9	VH				IC
F135	260.00	26.000	10	VHHHEHVH				APHA 4500 Cl-B
F139	279.00	27.900	10	VHHVHVH	BIASED HIGH	7.19	0.4119	I.C.
F073	313.00	31.300	10	VHEHEHVHEHEHH	BIASED HIGH	37.75	-1.1287	Dionex DX500
F144	228.50	32.643	7	EHVHVHEHEHH	BIASED HIGH*	4.24	2.7171	APHA 4500-Cl B

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

OVERALL AVERAGE
RANK IS 17.433

Chloride

PARAMETER: 20091 Calcium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 0.2000 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	28.6	11.00	43.8	17.00	96.0	27.00	59.0	20.50	26.9	8.00	37.6	12.00
F003	28.6	11.00	44.2	22.00	93.8	18.50	60.9	28.00	27.8	17.00	38.2	22.50
F006	29.	18.50	43.	8.00	92.	10.00	58.	9.00	28.	21.00	38.	19.50
F007	28.9	15.50	43.3	11.00	93.8	18.50	58.6	15.50	27.5	12.00	37.6	12.00
F009	27.0 L	4.00	43.1	9.50	93.	14.00	58.	9.00	26.1 L	5.50	37.	7.50
F010	29.5	24.50	43.6	13.50	93.	14.00	57.	7.00	28.	21.00	38.	19.50
F011	28.3	7.50	45.6	28.50	94.1	22.00	53. VL	3.00	27.3	9.00	37.	7.50
F014	28.6	11.00	43.7	15.50	94.0	20.50	58.2	11.00	27.5	12.00	37.7	15.00
F015	30.1	28.00	45.6	28.50	97.7	32.00	60.7	26.00	28.5	25.50	39.4	27.00
F019	29.8	26.00	43.9	18.50	92.4	11.00	58.7	17.00	27.7	15.50	37.7	15.00
F025	30.7 H	32.00	45.4	27.00	95.7	26.00	59.6	25.00	29.2	30.50	40.2 H	31.00
F026	26.090 VL	3.00	38.84 VL	2.00	82.525 VL	2.00	52.27 VL	2.00	24.15 VL	2.00	32.915 VL	2.00
F031	27.2 L	5.00	40.9 L	3.00	84.4 VL	3.50	55.1 L	5.00	26.3 L	7.00	36.1	5.00
F032	30.	27.00	42.1	5.00	92.7	12.00	58.6	15.50	28.2	23.50	39.1	26.00
F036	28.8	14.00	44.7	25.00	94.7	23.50	58.9	19.00	27.6	14.00	37.4	10.00
F037	32.13 VH	33.00	48.12 VH	34.00	103.9 VH	34.00	66.25 EH	34.00	30.31 VH	32.00	41.11 VH	32.00
F038	29.2	21.50	43.6	13.50	91.1	8.00	58.8	18.00	28.	21.00	37.9	18.00
F042	25.0 VL	2.00	41.7	4.00	84.4 VL	3.50	54.5 L	4.00	24.8 VL	3.00	33.8 VL	3.00
F046	29.2	21.50	44.1	20.50	93.0	14.00	59.5	24.00	28.2	23.50	38.6	24.00
F048	28.97	17.00	43.43	12.00	91.5	9.00	58.5	13.00	27.5	12.00	37.7	15.00
F063	33.1 EH	34.00	47.8 VH	33.00	96.1	28.50	61.5	30.00	31.3 VH	34.00	42.2 VH	34.00
F074	27.60	6.00	42.20	6.00	89.00	6.00	55.40 L	6.00	26.10 L	5.50	35.90	4.00
F093	30.4	29.50	46.3 H	30.50	97.5	31.00	61.7	31.00	29.1	29.00	39.6	29.00
F094	29.1	20.00	44.1	20.50	94.7	23.50	59.1	22.50	27.7	15.50	37.8	17.00
F095	29.3	23.00	43.9	18.50	93.5	16.00	58.5	13.00	27.9	18.50	38.2	22.50
F113	29.	18.50	45.1	26.00	93.7	17.00	59.1	22.50	27.9	18.50	37.6	12.00
F133	28.3	7.50	43.1	9.50	91.0	7.00	59.0	20.50	28.7	27.00	38.1	21.00
F135	28.4	9.00	42.6	7.00	88.7 L	5.00	58.5	13.00	25.8 L	4.00	37.0	7.50
F139	23.82 EL	1.00	35.76 EL	1.00	76.5 EL	1.00	48.34 EL	1.00	22.82 EL	1.00	30.59 EL	1.00
F141	30.5	31.00	46.3 H	30.50	97.0	30.00	61.3	29.00	29.0	28.00	39.5	28.00
F143	29.5	24.50	44.6	23.50	96.1	28.50	60.8	27.00	28.5	25.50	38.9	25.00
F144	28.7	13.00	43.7	15.50	94.	20.50	58.	9.00	27.4	10.00	37.	7.50
F145	28.9	15.50	44.6	23.50	95.	25.00	63.7 VH	33.00	31. VH	33.00	41.4 VH	33.00
F147	30.4	29.50	46.4 H	32.00	99.0 H	33.00	61.9 H	32.00	29.2	30.50	40.0 H	30.00
MEDIAN	28.9850		43.8500		93.7500		58.7500		27.8500		37.8500	
1CRIT	1.5993		2.3425		4.8375		3.0875		1.5425		2.0425	
N	32		32		32		32		32		32	
MEAN	28.9309		43.9147		92.9727		58.6366		27.7456		37.9383	
3STDEV	4.0343		5.1536		11.2277		7.3877		4.1640		5.1923	

PARAMETER: 20091 Calcium mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	27.2	9.50	56.2	10.00	57.5	17.00	54.4	22.00
F003	27.3	11.50	57.5	17.00	57.5	17.00	53.6	15.00
F006	30. H	32.00	59.	24.00	60.	32.00	55.	24.50
F007	27.5	14.00	57.7	20.00	57.5	17.00	54.1	19.00
F009	26.7	6.00	57.	12.50	55.	6.00	53.	12.00
F010	27.9	21.00	57.	12.50	58.	21.50	55.	24.50
F011	26.8	7.00	59.5	26.00	58.1	24.00	53.4	14.00
F014	27.0	8.00	56.0	7.50	55.2	7.00	52.1	9.00
F015	28.1	25.00	59.8	28.00	58.5	26.00	54.1	19.00
F019	27.7	17.50	57.6	18.50	57.2	14.00	52.5	10.00
F025	30.4 VH	33.00	61.1 H	32.00	59.3	29.50	55.1	26.00
F026	23.59 VL	2.00	49.425 EL	2.00	49.185 EL	2.00	45.855 VL	3.00
F031	26.3	5.00	54.1 L	5.00	54.2 L	5.00	50.5 L	6.00
F032	28.	23.50	56.	7.50	55.9	8.00	50.6 L	7.00
F036	27.3	11.50	56.8	11.00	56.9	11.50	53.7	16.00
F037	29.3 H	30.00	62.8 VH	34.00	60.41	33.00	59.11 VH	34.00
F038	27.6	15.50	57.6	18.50	57.9	20.00	52.8	11.00
F042	24.3 VL	3.00	51.1 VL	3.00	50.7 VL	3.00	50.1 L	5.00
F046	27.9	21.00	57.8	21.00	57.8	19.00	53.8	17.00
F048	27.7	17.50	57.3	16.00	58.09	23.00	54.11	21.00
F063	31.7 VH	34.00	62.4 VH	33.00	59.3	29.50	55.3	28.00
F074	25.30 VL	4.00	53.70 L	4.00	53.80 L	4.00	49.50 VL	4.00
F093	28.2	26.00	60.0	29.50	58.9	27.00	55.2	27.00
F094	27.4	13.00	57.1	14.00	57.	13.00	53.3	13.00
F095	27.6	15.50	57.2	15.00	57.3	15.00	54.1	19.00
F113	27.8	19.00	58.1	22.00	56.9	11.50	55.5	30.00
F133	27.9	21.00	59.1	25.00	56.8	9.50	56.5	32.00
F135	28.0	23.50	56.0	7.50	56.8	9.50	41.3 EL	1.00
F139	22.35 EL	1.00	47.15 EL	1.00	46.63 EL	1.00	43.08 EL	2.00
F141	28.6	29.00	60.4	31.00	59.8	31.00	55.4	29.00
F143	28.4	27.00	58.5	23.00	58.4	25.00	54.6	23.00
F144	27.2	9.50	56.	7.50	58.	21.50	52.	8.00
F145	29.7 H	31.00	60.	29.50	61. H	34.00	57.3 H	33.00
F147	28.5	28.00	59.6	27.00	59.2	28.00	56.2	31.00
MEDIAN	27.7000		57.5500		57.5000		53.9500	
1CRIT	1.5350		3.0275		3.0250		2.8475	
N	32		32		32		32	
MEAN	27.5997		57.3945		57.0964		53.1795	
3STDEV	4.1392		7.8959		7.2235		8.7116	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	154.00	15.400	10					Flame AA
F003	179.50	17.950	10					ICP
F006	198.50	19.850	10	H				ICP
F007	154.50	15.450	10					
F009	86.00	8.600	10	L L				ICP-MS
F010	179.00	17.900	10					ICP-OES
F011	148.50	14.850	10	VL				
F014	116.50	11.650	10					ICP
F015	265.00	26.500	10					ICP
F019	163.00	16.300	10					ICAP
F025	292.00	29.200	10	H H VHH	BIASED HIGH*	-0.09	1.9409	ICP
F026	22.00	2.200	10	VLVLVLVLVLVLVLELELVL	BIASED LOW	-12.24	-0.3174	Flame AAS
F031	49.50	4.950	10	L L VLL L L L L	BIASED LOW	-10.83	2.0209	ICP, Extble
F032	155.00	15.500	10	L				AAS
F036	155.50	15.550	10					AAS
F037	330.00	33.000	10	VHVHVHEHVHVHH VH VH	BIASED HIGH	11.44	-1.0086	ICP-MS
F038	165.00	16.500	10					ICP-OES
F042	33.50	3.350	10	VL VLL VLVLVLVLVLL	BIASED LOW	-8.86	-0.4106	Flame AA, nitrous
F046	205.50	20.550	10					ICAP
F048	155.50	15.550	10					IC
F063	318.00	31.800	10	EHVH VHVHVHVH	BIASED HIGH*	-2.86	4.6929	FAA
F074	49.50	4.950	10	L L VLL L VL	BIASED LOW	-5.17	-0.4039	AAS
F093	289.50	28.950	10	H	BIASED HIGH*	3.83	0.0490	ICP
F094	172.00	17.200	10					ICP
F095	176.00	17.600	10					IC
F113	197.00	19.700	10					FAAS PE-5100
F133	180.00	18.000	10					ICP-MS
F135	87.00	8.700	10	L L EL				APHA 3500-Ca-D
F139	11.00	1.100	10	ELELELELELELELELELEL	BIASED LOW	-18.36	-0.1162	ICP-OES
F141	296.50	29.650	10	H	BIASED HIGH*	3.26	0.4184	ICO-OES
F143	252.00	25.200	10					ICP
F144	122.00	12.200	10					APHA 3500-Ca B
F145	290.50	29.050	10	VHVHVHH H H	BIASED HIGH*	0.70	2.1437	ICP-AES
F147	301.00	30.100	10	H H H H	BIASED HIGH	5.45	-0.3939	ICP

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

OVERALL AVERAGE
RANK IS 17.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	11.00	1.100	10	ELELELELELELELELELEL	BIASED LOW	-18.36	-0.1162	ICP-OES
F026	22.00	2.200	10	VLVLVLVLVLVLVLELELVL	BIASED LOW	-12.24	-0.3174	Flame AAS
F042	33.50	3.350	10	VLVLLVLVLVLVLVLL	BIASED LOW	-8.86	-0.4106	Flame AA, nitrous
F031	49.50	4.950	10	LLVLLLLLL	BIASED LOW	-10.83	2.0209	ICP, Extble
F074	49.50	4.950	10	LLVLLLVL	BIASED LOW	-5.17	-0.4039	AAS
F009	86.00	8.600	10	LL				ICP-MS
F135	87.00	8.700	10	LLEL				APHA 3500-Ca-D
F014	116.50	11.650	10					ICP
F144	122.00	12.200	10					APHA 3500-Ca B
F011	148.50	14.850	10	VL				
F002	154.00	15.400	10					Flame AA
F007	154.50	15.450	10					
F032	155.00	15.500	10	L				AAS
F036	155.50	15.550	10					AAS
F048	155.50	15.550	10					IC
F019	163.00	16.300	10					ICAP
F038	165.00	16.500	10					ICP-OES
F094	172.00	17.200	10					ICP
F095	176.00	17.600	10					IC
F010	179.00	17.900	10					ICP-OES
F003	179.50	17.950	10					ICP
F133	180.00	18.000	10					ICP-MS
F113	197.00	19.700	10					FAAS PE-5100
F006	198.50	19.850	10	H				ICP
F046	205.50	20.550	10					ICAP
F143	252.00	25.200	10					ICP
F015	265.00	26.500	10					ICP
F093	289.50	28.950	10	H	BIASED HIGH*	3.83	0.0490	ICP
F145	290.50	29.050	10	VHVHVHHHH	BIASED HIGH*	0.70	2.1437	ICP-AES
F025	292.00	29.200	10	HHVHH	BIASED HIGH*	-0.09	1.9409	ICP
F141	296.50	29.650	10	H	BIASED HIGH*	3.26	0.4184	ICO-OES
F147	301.00	30.100	10	HHHH	BIASED HIGH	5.45	-0.3939	ICP
F063	318.00	31.800	10	EHVHVHVHVHVH	BIASED HIGH*	-2.86	4.6929	FAA
F037	330.00	33.000	10	VHVHVHEHVHVHHVHVH	BIASED HIGH	11.44	-1.0086	ICP-MS

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

OVERALL AVERAGE
RANK IS 17.500

Calcium

PARAMETER: 12091 Magnesium mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.5000 BASIC ACCEPTABLE ERROR= 0.2000 CONCENTRATION ERROR INCREMENT= 0.0500

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	7.76	16.00	10.66	17.00	24.3	16.00	32.9	14.00	7.86	13.00	8.55	17.00
F003	7.63	12.00	10.5	11.50	25.2	26.50	34.6	24.00	7.74	11.00	8.48	11.00
F006	8.	26.00	11.	28.50	25.	25.00	35.	27.50	8.	23.50	9.	29.50
F007	7.73	14.50	10.9	26.00	24.8	24.00	34.	23.00	7.89	16.50	8.68	23.00
F009	7.20 L	4.50	10.5	11.50	24.2	13.50	32.5	9.00	7.26 L	3.00	8.25	9.00
F010	7.92	23.00	10.72	23.00	24.2	13.50	33.4	18.00	8.03	26.00	8.65	22.00
F011	7.81	20.50	10.7	20.50	24.5	20.00	35.6 H	30.00	7.93	20.50	8.54	16.00
F014	7.64	13.00	10.6	14.50	24.5	20.00	32.9	14.00	7.82	12.00	8.50	13.00
F015	8.3	31.00	11.1	31.00	25.3	28.00	34.8	25.00	8.3	30.00	9.1	31.00
F019	8.01	28.00	10.7	20.50	24.3	16.00	32.4	8.00	7.87	14.50	8.50	13.00
F025	8.9 VH	33.00	11.7 H	33.00	26.1 H	32.00	34.9	26.00	8.8 VH	32.00	9.8 VH	33.00
F026	7.488	8.00	10.260	6.00	23.66	9.00	31.775	5.00	7.532	7.00	8.095	6.00
F031	7.1 L	2.00	9.6 VL	3.50	21.5 VL	2.00	30.6 L	3.00	7.3 L	4.50	7.9 L	2.00
F032	7.8	18.50	10.6	14.50	24.1	11.50	32.3	7.00	7.92	19.00	8.56	18.00
F036	7.78	17.00	10.5	11.50	24.6	22.50	33.5	20.00	7.87	14.50	8.51	15.00
F037	7.211 L	6.00	10.74	24.00	23.28	4.00	35.86 H	32.00	7.498	6.00	8.028	5.00
F038	8.	26.00	10.7	20.50	24.3	16.00	33.7	22.00	8.	23.50	8.7	24.00
F042	7.3	7.00	10.3	7.50	23.5	6.50	31.2 L	4.00	7.3 L	4.50	8.0	3.50
F046	7.17 L	3.00	9.95 L	5.00	23.5	6.50	33.1	16.00	7.55	8.00	8.14	7.00
F048	7.83	22.00	10.68	18.00	24.4	18.00	33.2	17.00	7.89	16.50	8.62	21.00
F063	9.9 EH	34.00	12.5 EH	34.00	26.8 VH	33.00	36.9 VH	34.00	9.3 EH	33.00	10.5 EH	34.00
F074	7.50	9.00	10.40	9.00	23.30	5.00	32.00	6.00	7.60	9.00	8.20	8.00
F093	7.81	20.50	10.9	26.00	24.6	22.50	33.5	20.00	7.93	20.50	8.60	20.00
F094	8.	26.00	11.1	31.00	25.7	29.00	35.	27.50	8.1	27.00	8.9	28.00
F095	7.8	18.50	10.7	20.50	24.5	20.00	32.7	10.00	7.9	18.00	8.5	13.00
F113	7.54	10.00	10.3	7.50	24.1	11.50	32.9	14.00	7.7	10.00	8.29	10.00
F133	7.56	11.00	10.65	16.00	23.55	8.00	32.80	11.50	7.98	22.00	8.83	25.50
F135	8.5 H	32.00	8.9 EL	2.00	25.9 H	30.00	33.5	20.00	8.6 H	31.00	9.0	29.50
F139	6.35 EL	1.00	8.69 EL	1.00	20.2 EL	1.00	27.38 EL	1.00	6.49 EL	1.00	6.95 EL	1.00
F141	8.19	30.00	11.1	31.00	26.0 H	31.00	35.1	29.00	8.21	29.00	8.85	27.00
F143	7.73	14.50	10.5	11.50	23.9	10.00	32.8	11.50	8.01	25.00	8.59	19.00
F144	7.2 L	4.50	9.6 VL	3.50	22.5 L	3.00	30. VL	2.00	7.2 L	2.00	8.	3.50
F145	7.94	24.00	10.9	26.00	25.2	26.50	36.3 VH	33.00	9.31 EH	34.00	9.74 VH	32.00
F147	8.03	29.00	11.00	28.50	27.70 EH	34.00	35.80 H	31.00	8.13	28.00	8.83	25.50
MEDIAN	7.7900		10.6700		24.3500		33.3000		7.8950		8.5550	
1CRIT	0.5645		0.7085		1.3925		1.8400		0.5698		0.6028	
N	32		32		32		32		32		32	
MEAN	7.7618		10.5769		24.4153		33.4573		7.9069		8.5917	
3STDEV	1.1728		1.5285		3.1723		4.5326		1.2849		1.3021	

PARAMETER: 12091 Magnesium mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	7.96	12.00	18.8	13.00	44.2	12.50	32.4	10.00
F003	7.87	9.50	19.3	22.50	45.9	25.00	33.3	22.50
F006	9. VH	32.00	20.	30.00	49. VH	32.50	33.	19.00
F007	8.15	21.00	19.3	22.50	45.3	19.00	33.5	24.00
F009	7.8	7.50	18.3	7.50	43.	6.50	33.	19.00
F010	8.30	26.00	19.48	26.00	45.5	20.50	33.3	22.50
F011	7.97	13.00	19.	17.00	47.	27.00	33.8	25.50
F014	8.00	15.00	18.8	13.00	44.1	11.00	32.3	9.00
F015	8.5	29.50	20.2 H	31.00	47.5 H	29.00	33.8	25.50
F019	8.07	18.00	19.0	17.00	43.6	10.00	31.6	7.00
F025	10.0 EH	34.00	21.7 EH	34.00	49.2 VH	34.00	35.2 H	30.00
F026	7.648	5.00	18.025	6.00	41.855 L	4.00	31.535	6.00
F031	7.5	4.00	17.6 L	3.00	42.5 L	5.00	30.2 VL	3.00
F032	8.02	17.00	18.6	10.50	44.2	12.50	32.2	8.00
F036	8.	15.00	19.1	19.00	43.4	9.00	32.9	16.50
F037	8.163	22.00	16.64 VL	2.00	45.07	18.00	38.07 EH	34.00
F038	8.3	26.00	19.6	27.00	45.7	23.00	33.	19.00
F042	7.4 L	2.50	17.9	5.00	41.6 L	3.00	30.7 L	4.00
F046	7.67	6.00	18.6	10.50	45.8	24.00	32.9	16.50
F048	8.23	23.50	19.38	25.00	45.6	22.00	33.19	21.00
F063	9.9 EH	33.00	20.7 VH	33.00	48.8 VH	31.00	36.3 VH	32.00
F074	7.80	7.50	18.30	7.50	43.00	6.50	31.00 L	5.00
F093	8.00	15.00	19.3	22.50	44.9	16.50	32.7	14.00
F094	8.3	26.00	19.9	29.00	46.8	26.00	34.5	27.00
F095	8.1	20.00	19.0	17.00	44.7	15.00	32.8	15.00
F113	7.87	9.50	18.8	13.00	44.9	16.50	32.5	11.00
F133	8.08	19.00	18.95	15.00	43.05	8.00	32.55	12.00
F135	8.5	29.50	18.4	9.00	44.5	14.00	34.7	28.00
F139	6.62 EL	1.00	15.91 EL	1.00	37.06 EL	1.00	26.63 EL	1.00
F141	8.46	28.00	19.7	28.00	47.3	28.00	34.8 H	29.00
F143	7.90	11.00	19.2	20.00	45.5	20.50	32.6	13.00
F144	7.4 L	2.50	17.8 L	4.00	39. VL	2.00	30.1 VL	2.00
F145	8.86 H	31.00	20.3 H	32.00	49. VH	32.50	36.6 VH	33.00
F147	8.23	23.50	19.30	22.50	47.90 H	30.00	35.8 VH	31.00
MEDIAN	8.0450		19.0000		44.9850		32.9500	
1CRIT	0.5773		1.1250		2.4243		1.8225	
N	32		32		32		32	
MEAN	8.1235		18.9773		45.0055		33.0867	
3STDEV	1.4377		2.5076		6.6868		4.6935	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	140.50	14.050	10					Flame AA
F003	175.50	17.550	10					ICP
F006	273.50	27.350	10	VH VH	BIASED HIGH	6.34	-0.3067	ICP
F007	213.50	21.350	10					
F009	91.00	9.100	10	L L				ICP-MS
F010	220.50	22.050	10					ICP-OES
F011	210.00	21.000	10	H				
F014	134.50	13.450	10					ICP
F015	291.00	29.100	10	H H	BIASED HIGH*	4.39	0.0687	ICP
F019	152.00	15.200	10					ICAP
F025	321.00	32.100	10	VHH H VHVHEHEHVHH	BIASED HIGH	5.69	0.7528	ICP
F026	62.00	6.200	10	L	BIASED LOW	-6.04	0.2259	Flame AAS
F031	32.00	3.200	10	L VLVLL L L L L VL	BIASED LOW	-6.62	-0.2666	ICP, Extble
F032	136.50	13.650	10					AAS
F036	160.00	16.000	10					AAS
F037	153.00	15.300	10	L H VL EH				ICP-MS
F038	227.00	22.700	10					ICPOES
F042	47.50	4.750	10	L L L L L	BIASED LOW	-7.09	0.1661	Flame AA, nitrous
F046	102.50	10.250	10	L L				ICAP
F048	204.00	20.400	10					IC
F063	331.00	33.100	10	EHEHVHVHEHEHEHVHVHVH	BIASED HIGH	5.91	1.2389	FAA
F074	72.50	7.250	10	L	BIASED LOW*	-4.95	0.1344	AAS
F093	197.50	19.750	10					ICP
F094	276.50	27.650	10		BIASED HIGH*	4.81	-0.0741	ICP
F095	167.00	16.700	10					IC
F113	113.00	11.300	10					FAAS, PE-5100
F133	148.00	14.800	10					ICP-MS
F135	225.00	22.500	10	H ELH H				
F139	10.00	1.000	10	ELELELELELELELELELEL	BIASED LOW	-17.86	0.0021	ICP-OES
F141	290.00	29.000	10	H H	BIASED HIGH	5.70	-0.1080	ICO-OES
F143	156.00	15.600	10					ICP
F144	29.00	2.900	10	L VLL VLL L L VLVL	BIASED LOW	-12.29	0.5536	APHA 3500-Mg B
F145	304.00	30.400	10	VHEHVHH H VHVH	BIASED HIGH	9.09	-0.1352	ICP-AES
F147	283.00	28.300	10	EHH H VH	BIASED HIGH	8.89	-0.4390	ICP

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

OVERALL AVERAGE
RANK IS 17.500

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F139	10.00	1.000	10	ELELELELELELELELELEL	BIASED LOW	-17.86	0.0021	ICP-OES
F144	29.00	2.900	10	LVLLVLLLLVLVL	BIASED LOW	-12.29	0.5536	APHA 3500-Mg B
F031	32.00	3.200	10	LVLVLLLLLLVL	BIASED LOW	-6.62	-0.2666	ICP, Extble
F042	47.50	4.750	10	LLLLL	BIASED LOW	-7.09	0.1661	Flame AA, nitrous
F026	62.00	6.200	10	L	BIASED LOW	-6.04	0.2259	Flame AAS
F074	72.50	7.250	10	L	BIASED LOW*	-4.95	0.1344	AAS
F009	91.00	9.100	10	LL				ICP-MS
F046	102.50	10.250	10	LL				ICAP
F113	113.00	11.300	10					FAAS, PE-5100
F014	134.50	13.450	10					ICP
F032	136.50	13.650	10					AAS
F002	140.50	14.050	10					Flame AA
F133	148.00	14.800	10					ICP-MS
F019	152.00	15.200	10					ICAP
F037	153.00	15.300	10	LHVLEH				ICP-MS
F143	156.00	15.600	10					ICP
F036	160.00	16.000	10					AAS
F095	167.00	16.700	10					IC
F003	175.50	17.550	10					ICP
F093	197.50	19.750	10					ICP
F048	204.00	20.400	10					IC
F011	210.00	21.000	10	H				
F007	213.50	21.350	10					
F010	220.50	22.050	10					ICP-OES
F135	225.00	22.500	10	HELHH				
F038	227.00	22.700	10					ICPOES
F006	273.50	27.350	10	VHVH	BIASED HIGH	6.34	-0.3067	ICP
F094	276.50	27.650	10		BIASED HIGH*	4.81	-0.0741	ICP
F147	283.00	28.300	10	EHHHVH	BIASED HIGH	8.89	-0.4390	ICP
F141	290.00	29.000	10	HH	BIASED HIGH	5.70	-0.1080	ICO-OES
F015	291.00	29.100	10	HH	BIASED HIGH*	4.39	0.0687	ICP
F145	304.00	30.400	10	VHEHVHHHVHVH	BIASED HIGH	9.09	-0.1352	ICP-AES
F025	321.00	32.100	10	VHHHVHVHEHEHVHH	BIASED HIGH	5.69	0.7528	ICP
F063	331.00	33.100	10	EHEHVHVHEHEHEHVHVHVH	BIASED HIGH	5.91	1.2389	FAA

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

OVERALL AVERAGE
RANK IS 17.500

Magnesium

PARAMETER: 10692 Total Hardness mg/L

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Interlab QA for Major Ions

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 1.0000 CONCENTRATION ERROR INCREMENT= 0.0400

SAMPLE	1 = HURON-03		2 = HH-90		3 = GRAND-94		4 = PEMB-97		5 = RICH-95		6 = HUMB-95	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	103.	5.00	154.	9.50	338.	12.00	295.	16.00	101.	3.50	130.	6.50
F006	105.	9.50	153.	6.50	333.	6.00	289.	11.00	103.	10.50	132.	12.00
F011	103.	5.00	158.	14.00	336.	9.00	279.	1.50	101.	3.50	128.	1.50
F014	102.9	3.00	152.8	5.00	335.6	8.00	280.8	3.00	100.9	2.00	129.1	4.00
F015	112. H	21.00	164. H	19.00	352.	18.50	308. VH	19.00	112. VH	20.00	141. VH	20.00
F025	110.	19.50	160.	15.00	350.	17.00	290.	12.50	110. H	19.00	140. H	19.00
F031	106.	12.00	172. EH	21.00	352.	18.50	290.	12.50	102.	6.00	129.	3.00
F032	107.	14.00	149.	1.00	331.	4.50	279.	1.50	103.	10.50	133.	14.00
F037	109.92	18.00	164.38 H	20.00	355.3 H	20.00	313.1 VH	21.00	106.56	18.00	135.71	17.00
F038	106.	12.00	153.	6.50	328.	2.00	286.	8.00	103.	10.50	131.	9.00
F046	103.	5.00	152.	4.00	331.	4.50	288.	10.00	102.	6.00	131.	9.00
F048	104.94	8.00	153.97	8.00	336.40	10.00	282.92	7.00	102.92	8.00	129.96	5.00
F093	108.1	15.00	160.5	16.00	344.8	15.00	292.0	14.50	105.3	14.00	134.3	15.00
F094	106.	12.00	156.	12.00	342.	14.00	292.	14.50	103.	10.50	131.	9.00
F095	105.	9.50	154.	9.50	334.	7.00	281.	4.00	102.	6.00	130.	6.50
F133	101.7	1.00	151.6	3.00	324.1	1.00	282.4	6.00	104.4	13.00	131.5	11.00
F135	109.6	17.00	154.9	11.00	337.9	11.00	287.0	9.00	105.5	15.00	132.6	13.00
F141	110.	19.50	161.	17.00	349.	16.00	297.	17.00	106.	16.00	135.	16.00
F144	102.	2.00	151.	2.00	329.	3.00	282.	5.00	100.	1.00	128.	1.50
F145	104.8	7.00	156.2	13.00	340.8	13.00	308.1 VH	20.00	115.7 EH	21.00	143.4 EH	21.00
F147	108.9	16.00	161.2	18.00	361.3 VH	21.00	301.9 H	18.00	106.4	17.00	136.2	18.00
MEDIAN	106.0000		154.9000		337.9000		289.0000		103.0000		131.5000	
1CRIT	5.2000		7.1560		14.4760		12.5200		5.0800		6.2200	
N	19		19		19		18		19		18	
MEAN	106.0611		156.3974		339.7789		290.7289		104.2095		132.9095	
3STDEV	7.8839		12.4182		24.8039		24.8322		8.8215		10.2449	

PARAMETER: 10692 Total Hardness mg/L

SAMPLE	7 = WHITE-97		8 = SWAN-98		9 = FISHER-98		10 = FRENCH-98	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F003	101.	5.00	223.	7.50	332.	7.50	271.	9.00
F006	112. VH	20.00	230.	17.00	352. H	19.00	273.	12.50
F011	99.7	1.00	227.	14.00	339.	15.00	272.	10.00
F014	100.4	4.00	217.2	3.00	319.4 L	2.00	263.1	3.00
F015	111. VH	19.00	243. EH	21.00	362. VH	21.00	292. VH	19.00
F025	120. EH	21.00	240. VH	20.00	350. H	18.00	280.	16.00
F031	100.	2.50	220.	5.00	335.	11.50	275.	14.50
F032	103.	11.00	216.	1.50	322.	4.00	259. L	1.00
F037	106.8	17.00	225.3	12.00	336.44	13.00	304.37 EH	21.00
F038	103.	11.00	225.	10.50	333.	10.00	268.	5.00
F046	102.	6.50	223.	7.50	337.	14.00	273.	12.50
F048	102.11	8.00	219.56	4.00	327.72	6.00	270.41	8.00
F093	103.4	13.00	229.3	16.00	332.0	7.50	272.5	11.00
F094	103.	11.00	225.	10.50	335.	11.50	275.	14.50
F095	102.	6.50	221.	6.00	327.	5.00	270.	7.00
F133	102.9	9.00	225.6	13.00	319.1 L	1.00	267.6	4.00
F135	106.0	15.50	224.6	9.00	332.7	9.00	269.2	6.00
F141	106.	15.50	232.	18.00	344.	16.00	282.	17.00
F144	100.	2.50	216.	1.50	321.	3.00	263.	2.00
F145	110.6 H	18.00	233.2	19.00	353.4 H	20.00	293.3 VH	20.00
F147	105.1	14.00	228.3	15.00	345.1	17.00	288.0 H	18.00
MEDIAN	103.0000		225.0000		335.0000		272.5000	
1CRIT	5.0800		9.9600		14.3600		11.8600	
N	19		18		19		19	
MEAN	104.2268		226.0589		335.4610		274.6374	
3STDEV	10.7224		16.1163		29.2536		25.5014	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F003	81.50	8.150	10					Calculated
F006	124.00	12.400	10	VH H				Calcn
F011	74.50	7.450	10					
F014	37.00	3.700	10	L	BIASED LOW*	-3.18	0.9737	Calcn
F015	197.50	19.750	10	H H VHVHVHVHEHVHVH	BIASED HIGH	5.95	1.6698	ICP
F025	177.00	17.700	10	H H EHVHH	BIASED HIGH*	0.77	7.6427	Calculation
F031	106.50	10.650	10	EH				Titration
F032	63.00	6.300	10	L				AAS
F037	177.00	17.700	10	H H VH EH	BIASED HIGH	5.50	-1.3104	CALCULATION
F038	84.50	8.450	10					Calculation
F046	79.00	7.900	10					Calcn
F048	72.00	7.200	10					
F093	137.00	13.700	10					Calculation
F094	119.50	11.950	10					Calculation
F095	67.00	6.700	10					Calculation
F133	62.00	6.200	10	L				TITRIMETRIC
F135	115.50	11.550	10					APHA 2340-C
F141	168.00	16.800	10		BIASED HIGH*	2.91	0.4283	ICO-OES
F144	23.50	2.350	10		BIASED LOW*	-3.41	0.4335	APHA 2340C
F145	172.00	17.200	10	VHEHEHH H VH	BIASED HIGH*	3.50	2.9659	Calcn
F147	172.00	17.200	10	VHH H	BIASED HIGH	5.93	-3.7376	Calcn, ICP

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

OVERALL AVERAGE
RANK IS 11.000

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F144	23.50	2.350	10		BIASED LOW*	-3.41	0.4335	APHA 2340C
F014	37.00	3.700	10	L	BIASED LOW*	-3.18	0.9737	Calcn
F133	62.00	6.200	10	L				TITRIMETRIC
F032	63.00	6.300	10	L				AAS
F095	67.00	6.700	10					Calculation
F048	72.00	7.200	10					
F011	74.50	7.450	10					
F046	79.00	7.900	10					Calcn
F003	81.50	8.150	10					Calculated
F038	84.50	8.450	10					Calculation
F031	106.50	10.650	10	EH				Titration
F135	115.50	11.550	10					APHA 2340-C
F094	119.50	11.950	10					Calculation
F006	124.00	12.400	10	VHH				Calcn
F093	137.00	13.700	10					Calculation
F141	168.00	16.800	10		BIASED HIGH*	2.91	0.4283	ICO-OES
F145	172.00	17.200	10	VHEHEHHHVH	BIASED HIGH*	3.50	2.9659	Calcn
F147	172.00	17.200	10	VHHH	BIASED HIGH	5.93	-3.7376	Calcn, ICP
F037	177.00	17.700	10	HHVHEH	BIASED HIGH	5.50	-1.3104	CALCULATION
F025	177.00	17.700	10	HHEHVHH	BIASED HIGH*	0.77	7.6427	Calculation
F015	197.50	19.750	10	HHVHVHVHVHEHVHVH	BIASED HIGH	5.95	1.6698	ICP

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

OVERALL AVERAGE
RANK IS 11.000

PARAMETER: 15092 Total Phosphorus mg/L P

NATIONAL WATER RESEARCH INSTITUTE
ENVIRONMENT CANADA
BURLINGTON ONTARIO

NWRI Ecosystem Interlab QA for Total P

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 0.0040 BASIC ACCEPTABLE ERROR= 0.0040 CONCENTRATION ERROR INCREMENT= 0.1000

SAMPLE	1 = PHOS-731		2 = AUX-98		3 = PHOS-732		4 = LONG-01		5 = MIRAM-97p		6 = PHOS-734	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.001	4.00	0.003	8.00	0.059	14.50	0.007	13.00	0.039	20.50	0.138	12.00
F003	<0.0002	0.00	0.0011	1.50	0.0571	12.00	0.0074	14.00	0.0355	14.00	0.1412	20.00
F004	0.002T	5.50	0.002T	3.50	0.060	18.00	0.006	9.50	0.037	16.00	0.143	22.00
F006	<0.02	0.00	<0.02	0.00	0.04 VL	1.00	<0.02	0.00	0.02 EL	1.00	0.14	17.00
F007	<0.004	0.00	<0.004	0.00	0.053	7.00	0.005	5.50	0.035	10.50	0.13	5.00
F009	<0.03	0.00	0.03 VH	15.00	0.07 H	26.00	<0.03	0.00	0.05 EH	28.00	0.16 H	28.00
F010	<0.010	0.00	<0.010	0.00	0.055	9.00	<0.010	0.00	0.030	4.50	0.140	17.00
F014	<0.005	0.00	<0.005	0.00	0.058	13.00	<0.005	0.00	0.034	7.00	0.14	17.00
F015	<0.002	0.00	<0.002	0.00	0.061	22.00	0.005	5.50	0.038	18.00	0.144	23.00
F025	<0.003	0.00	<0.003	0.00	0.045 L	3.00	0.005	5.50	0.034	7.00	0.113 VL	1.00
F026	0.0005	1.50	0.0030	6.00	0.0561	11.00	0.008	15.50	0.0353	13.00	0.1338	8.00
F032	0.002W	0.00	0.004T	10.50	0.062	23.00	0.006T	9.50	0.038	18.00	0.148	25.00
F036	0.0006T	3.00	0.002	3.50	0.0678	25.00	0.0064	11.00	0.0396	22.00	0.174 EH	29.00
F038	0.003	7.00	0.004	10.50	0.06	18.00	0.009	17.00	0.041	25.00	0.135	9.00
F042	0.0039	8.00	0.0157 VH	13.00	0.0701 H	27.00	0.0124 H	20.00	0.0413	26.00	0.136	10.50
F048	<0.002	0.00	0.0025	5.00	0.0607	21.00	0.066 EH	23.00	0.0366	15.00	0.1555	27.00
F060	<0.05	0.00	<0.05	0.00	0.08 EH	29.00	<0.05	0.00	<0.05	0.00	0.12 L	2.00
F069	<0.001	0.00	<0.001	0.00	0.048 L	5.00	0.004	2.00	0.030	4.50	0.121 L	3.00
F072	<0.004	0.00	<0.004	0.00	0.060	18.00	0.010	18.00	0.040	23.50	0.140	17.00
F074	0.002	5.50	0.003	8.00	0.060	18.00	0.008	15.50	0.039	20.50	0.139	13.50
F094	<0.002	0.00	<0.002	0.00	0.044 VL	2.00	0.003	1.00	0.025 VL	2.00	0.122 L	4.00
F095	0.005	9.50	0.007	12.00	0.056	10.00	0.011 H	19.00	0.038	18.00	0.136	10.50
F113	0.0005	1.50	0.0011	1.50	0.0458 L	4.00	0.0067	12.00	0.0268 L	3.00	0.139	13.50
F133	0.005	9.50	0.003	8.00	0.059	14.50	0.005	5.50	0.035	10.50	0.146	24.00
F139	0.012 VH	14.00	0.0468 EH	16.00	0.0728 H	28.00	0.0236 EH	22.00	0.0427	27.00	0.1506	26.00
F140	0.007 H	11.50	<0.005	0.00	0.053	7.00	0.005	5.50	0.035	10.50	0.132	6.50
F141	<0.01	0.00	<0.01	0.00	0.06	18.00	<0.01	0.00	0.04	23.50	0.14	17.00
F145	0.011 VH	13.00	0.019 VH	14.00	0.063	24.00	0.02 VH	21.00	0.034	7.00	0.142	21.00
F146	0.007 H	11.50	<0.005	0.00	0.053	7.00	0.005	5.50	0.035	10.50	0.132	6.50
MEDIAN OR *TARGET CONC.	*0.0020		0.0030		0.0590		0.0067		0.0360		0.1400	
1CRIT	0.0040		0.0040		0.0095		0.0043		0.0072		0.0176	
N	11		13		27		21		26		27	
MEAN	0.0043		0.0076		0.0581		0.0084		0.0360		0.1387	
3STDEV	0.0089		0.0249		0.0215		0.0147		0.0127		0.0274	

PARAMETER: 15092 Total Phosphorus mg/L P

SAMPLE	7 = PHOS-736		8 = PHOS-737		9 = PHOS-738		10 = PHOS-739	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F002	0.223	17.50	0.295	13.00	0.343	13.00	0.399	10.50
F003	0.2291	20.00	0.3065	21.00	0.3605	25.00	0.4142	21.00
F004	0.230	22.00	0.309	22.00	0.359	21.00	0.432	29.00
F006	0.23	22.00	0.31	24.00	0.35	18.50	0.42	23.50
F007	0.22	14.00	0.299	15.00	0.342	12.00	0.408	17.00
F009	0.24	26.50	0.32	26.00	0.36	23.00	0.43	26.50
F010	0.235	25.00	0.310	24.00	0.360	23.00	0.430	26.50
F014	0.22	14.00	0.30	17.00	0.35	18.50	0.40	13.00
F015	0.24	26.50	0.4 EH	29.00	0.4 EH	29.00	0.4	13.00
F025	0.218	10.50	0.270	4.00	0.330	5.00	0.368	3.00
F026	0.217	8.50	0.289	9.50	0.339	7.00	0.391	9.00
F032	0.22	14.00	0.28	6.00	0.34	10.00	0.38	5.00
F036	0.251 H	28.00	0.361 EH	28.00	0.379	28.00	0.42	23.50
F038	0.218	10.50	0.289	9.50	0.339	7.00	0.39	7.50
F042	0.215	7.00	0.295	13.00	0.339	7.00	0.399	10.50
F048	0.2527 H	29.00	0.3277	27.00	0.3733	27.00	0.4315	28.00
F060	0.22	14.00	0.29	11.00	0.34	10.00	0.41	19.50
F069	0.192 L	2.00	0.269	3.00	0.310	3.00	0.361	1.00
F072	0.220	14.00	0.300	17.00	0.340	10.00	0.390	7.50
F074	0.223	17.50	0.295	13.00	0.344	14.00	0.400	13.00
F094	0.197	3.00	0.26 L	2.00	0.306 L	1.00	0.372	4.00
F095	0.227	19.00	0.304	20.00	0.366	26.00	0.415	22.00
F113	0.217	8.50	0.3	17.00	0.354	20.00	0.427	25.00
F133	0.231	24.00	0.303	19.00	0.348	17.00	0.403	15.00
F139	0.1834 L	1.00	0.2482 VL	1.00	0.309	2.00	0.3636	2.00
F140	0.208	5.50	0.285	7.50	0.345	15.50	0.408	17.00
F141	0.23	22.00	0.31	24.00	0.36	23.00	0.41	19.50
F145	0.203	4.00	0.277	5.00	0.326	4.00	0.382	6.00
F146	0.208	5.50	0.285	7.50	0.345	15.50	0.408	17.00
MEDIAN OR *TARGET CONC.	0.2200		0.2990		0.3450		0.4030	
1CRIT	0.0256		0.0335		0.0381		0.0439	
N	27		27		27		27	
MEAN	0.2216		0.2977		0.3463		0.4026	
3STDEV	0.0384		0.0590		0.0480		0.0551	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F002	126.00	12.600	10					AA-II Colormetric
F003	148.50	16.500	9					Autoclave, SnCl2
F004	168.50	16.850	10					
F006	107.00	15.286	7	VL EL				AA
F007	86.00	10.750	8					
F009	199.00	24.875	8	VHH EHH	BIASED HIGH*	1.01	0.0175	
F010	129.00	18.429	7					Colorimetry
F014	99.50	14.214	7					
F015	166.00	20.750	8	EHEH				Colorimetric
F025	39.00	4.875	8	L VL	BIASED LOW	-5.89	-0.0046	Auto Ascorbic AR
F026	89.00	8.900	10					AUTOCLAV, AA
F032	121.00	13.444	9					colourimetry
F036	201.00	20.100	10	EHH EH				
F038	121.00	12.100	10					COLOR - DIGESTION
F042	142.00	14.200	10	VHH H				persulfate digest
F048	202.00	22.444	9	EH H	BIASED HIGH*	3.69	0.0154	Colourimetric
F060	85.50	14.250	6	EH L				Dig. Auto Color
F069	23.50	2.938	8	L L L	BIASED LOW	-9.37	-0.0040	P-ml. segmnt.fl.
F072	125.00	15.625	8					
F074	138.50	13.850	10					UV Dig. - Colour
F094	19.00	2.375	8	VL VLL L L	BIASED LOW	-7.92	-0.0075	Colorimetric
F095	166.00	16.600	10	H				Skalar SFA
F113	106.00	10.600	10	L L				Per., NaOH, FIA
F133	147.00	14.700	10					COLORIMETRIC
F139	139.00	13.900	10	VHEHH EH L VL				ICP-OES
F140	86.50	9.611	9	H				Colourimetric
F141	147.00	21.000	7					Technicon
F145	119.00	11.900	10	VHVH VH				Auto Colour
F146	86.50	9.611	9	H				Colourimetric

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

OVERALL AVERAGE
RANK IS 13.855

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F094	19.00	2.375	8	VLVLLLL	BIASED LOW	-7.92	-0.0075	Colorimetric
F069	23.50	2.938	8	LLL	BIASED LOW	-9.37	-0.0040	P-ml. segmnt.fl.
F025	39.00	4.875	8	LVL	BIASED LOW	-5.89	-0.0046	Auto Ascorbic AR
F026	89.00	8.900	10					AUTOCLAV, AA
F140	86.50	9.611	9	H				Colourimetric
F146	86.50	9.611	9	H				Colourimetric
F113	106.00	10.600	10	LL				Per., NaOH, FIA
F007	86.00	10.750	8					
F145	119.00	11.900	10	VHVHVH				Auto Colour
F038	121.00	12.100	10					COLOR - DIGESTION
F002	126.00	12.600	10					AA-II Colormetric
F032	121.00	13.444	9					colourimetry
F074	138.50	13.850	10					UV Dig. - Colour
F139	139.00	13.900	10	VHEHHEHLVL				ICP-OES
F042	142.00	14.200	10	VHHH				persulfate digest
F014	99.50	14.214	7					
F060	85.50	14.250	6	EHL				Dig. Auto Color
F133	147.00	14.700	10					COLORIMETRIC
F006	107.00	15.286	7	VLEL				AA
F072	125.00	15.625	8					
F003	148.50	16.500	9					
F095	166.00	16.600	10	H				Autoclave, SnCl2
F004	168.50	16.850	10					Skalar SFA
F010	129.00	18.429	7					
F036	201.00	20.100	10	EHHEH				Colorimetry
F015	166.00	20.750	8	EHEH				
F141	147.00	21.000	7					Colorimetric
F048	202.00	22.444	9	EHH	BIASED HIGH*	3.69	0.0154	Technicon
F009	199.00	24.875	8	VHHEHH	BIASED HIGH*	1.01	0.0175	Colourimetric

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

OVERALL AVERAGE
RANK IS 13.855

Total Phosphorus

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