NWRI
TN 95-04

NATIONAL WATER RESEARCH INSTITUTE

INSTITUT NATIONAL de RECHERCHE sur les EAUX

CCIW
OCT 26 1995
LIBRARY

Ecosystem Interlaboratory QA Program, Study FP67 for a Variety of Trace Metals and Mercury in Water (July & August 1995)

H. Alkema

Aquatic Ecosystem Protection Branch
National Water Research Institute
867 Lakeshore Rd, Burlington, ON
Canada L7R 4A6

TD
226
N89
no.
AEPB-
TN-95-04

Environnement Canada Conservation et Protection
Environment Canada Conservation and Protection

LE PLAN VERT DU CANADA
CANADA'S GREEN PLAN

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

13 October 1995

To: Participants & Managers in the:
NWRI Ecosystem Interlaboratory QA Program

Re: Final Report for NWRI Study FP67 - Trace Metals & Mercury Portion

Dear Participant,

The Institute is pleased to distribute this final report to the FP/GLAP participant laboratories. This report includes results for a unique series of 10 samples which were analyzed in January and February of this year. The evaluation of results includes an evaluation for systematic bias as well as for precision (flagged results). 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 the evaluations please refer to the attached Appendix A: Glossary of Terms, or to the Research & Applications Branch QA Manual.

We would like to thank all participants for their cooperation and prompt responses. In return it is the aim of the quality assurance group to give prompt evaluations and reports and effective remedial assistance.

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.

In the data summary tables you will find the tabulation of the degree of bias. It has been difficult to quantify and detemine 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.

Should you have any questions or comments regarding this study, please contact me - phone 905-336-4929 or fax 336-4989.

Yours truly,

Harry A.

H. Alkema
QA Chemist, Ecosystem QA Pgm

Attachment: Individual Laboratory Appraisal

AQUATIC ECOSYSTEM PROTECTION BRANCH

FINAL REPORT

REPORT NO. AEPB-TN-95-04

ECOSYSTEM INTERLABORATORY QUALITY ASSURANCE PROGRAM

STUDY FP67

for July and August 1995

An Interlaboratory Quality Assurance Study

for a Variety of Trace Metals and Mercury in Water *

by

H. Alkema

Environmental Standards & Statistics
Aquatic Ecosystem Protection Branch
National Water Research Institute
Burlington, Ontario

October 1995

* the companion study for Major Ions & Nutrients and Total P is Report AEPB-TN-95-03

Table of Contents

1. Table 1 — List of Participating Laboratories

2. Table 2 — Comparison of Laboratory Performance in Study FP67

   a) Trace Metals
   b) Mercury

3. Table 3 — Sample Design

   a) Trace Metals
   b) Mercury

4 Table 4 — Summary of Interlab Medians

   a) Trace Metals
   b) Mercury

6. Appendix A — Glossary of Terms
   Quantifying Bias in QA Studies

7. Appendix B — Data & Evaluation Summary

   a) Trace Metals
   b) Mercury

Table 1

ENVIRONMENT CANADA
National Water Research Institute

Ecosystem Interlaboratory Quality Assurance Program
PARTICIPATION LIST - Study FP/GLAP 67 (July & Aug '95)

AGRA E&E
AECL Research, Pinawa, MB
Alberta Environmental Centre
ASL Analytical Service Lab Ltd.
Can Test Ltd.
Chemical & Geological Laboratories Inc.
City of Calgary
Edmonton Public Works
Elemental Research Inc.
Environment Canada - Atlantic Region
Environment Canada - Centre St. Laurent
Environment Canada - NLET
Environment Canada - Pacific Environmental Science Centre
Environment Canada - WQB, Western & Northern Region
Environment Canada - WQB, Prairie & Northern Region
Environment Canada - River Road, Ottawa
Environment Manitoba
Environment New Brunswick
Envirotest Labs
ERRI, Penn State University
Falconbridge, Kidd Creek Division
Forestry Canada - Sault Ste Marie
Freshwater Institute, Winnipeg, MB
Grace Analytical Lab, Inc., IL
Health Canada, EHC, Ottawa, ON
Health Canada, OHS, Ottawa, ON
Illinois State Water Survey, Champaign
Indian & Northern Affairs Canada
Laboratoire de Santé Publique du Québec
Ministère de l'Environnement du Québec - Laval
Ministère de l'Environnement du Québec - Ste. Foy
Ministère des Ressources Naturelles - Ste. Foy
NWQL, USGS, Arvada, CO
Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph
Ontario Ministry of Environment and Energy - Dorset
Ontario Ministry of Environment and Energy - Etobicoke
Ontario Ministry of Environment and Energy - Kingston
Ontario Ministry of Environment and Energy - London
Ontario Ministry of Environment and Energy - Thunder Bay
PEI Environmental Resources
Regional Municipality of Durham, Pickering, ON
Saskatchewan Health
Saskatchewan Research Council
Sawyer Environmental Laboratory - University of Maine
USGS - WI, Madison
Université du Québec, INRS - Eau, Ste. Foy
University of Alberta, Dept. Of Biological Sciences, Edmonton
Zenon Environmental Labs Inc., BC

Table 2a COMPARISON OF LABORATORY PERFORMANCE (STUDY 0067)

Major Ions & Nutrients

	BIAS			FLAGS			
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF % BIAS AND % FLAGS SCORE
F098	8	0	0.00	40	0	0.00	0.00
F002	15	0	0.00	146	3	2.05	2.05
F068	8	0	0.00	73	2	2.74	2.74
F007	12	0	0.00	119	8	6.72	6.72
F001	18	1	5.56	179	5	2.79	8.35
F032	18	1	5.56	177	8	4.52	10.08
F004	7	0	0.00	65	7	10.77	10.77
F013	12	0	0.00	110	13	11.82	11.82
F095	19	1	5.26	178	12	6.74	12.00
F008	19	1	5.26	174	12	6.90	12.16
F080	14	1	7.14	124	8	6.45	13.59
F050	5	0	0.00	47	7	14.89	14.89
F033	16	2	12.50	149	5	3.36	15.86
F037	10	0	0.00	100	17	17.00	17.00
F003	19	2	10.53	187	13	6.95	17.48
F046	20	2	10.00	176	14	7.95	17.95
F014	16	1	6.25	135	17	12.59	18.84
F009	9	1	11.11	89	8	8.99	20.10
F019	11	0	0.00	101	23	22.77	22.77
F049	9	1	11.11	85	10	11.76	22.88
F031	14	2	14.29	131	12	9.16	23.45
F010	18	2	11.11	171	23	13.45	24.56
F094	20	1	5.00	186	37	19.89	24.89
F038	20	2	10.00	179	30	16.76	26.76
F042	16	3	18.75	152	14	9.21	27.96
F020	16	2	12.50	146	24	16.44	28.94
F036	14	3	21.43	136	11	8.09	29.52
F015	17	3	17.65	165	26	15.76	33.40
F048	14	3	21.43	140	19	13.57	35.00
F061	14	2	14.29	127	27	21.26	35.55
F069	16	3	18.75	150	26	17.33	36.08
F006	15	3	20.00	140	25	17.86	37.86
F074	15	2	13.33	150	38	25.33	38.67
F011	15	4	26.67	144	20	13.89	40.56
F026	15	4	26.67	150	26	17.33	44.00
F030	17	4	23.53	149	31	20.81	44.33
F096	15	5	33.33	150	38	25.33	58.67
F092	15	5	33.33	150	49	32.67	66.00
F034	14	4	28.57	133	50	37.59	66.17
F071	11	3	27.27	109	46	42.20	69.47
F093	7	4	57.14	67	34	50.75	107.89

THE FOLLOWING PARAMETERS WERE USED IN THE ANALYSIS:

Cond	pH	B	DOC	ALK	DIC
NO3 /2	NH3	TKN	F	HARD	Na
Mg	Si	SO4	Cl	K	Ca
Colour	Tot N				

THE FOLLOWING PARAMETER WAS EXCLUDED: Turb

Table 2b COMPARISON OF LABORATORY PERFORMANCE (STUDY 0067)

Mercury

	BIAS			FLAGS			
LAB CODE	NO. OF PARAMETERS ANALYZED	NO. OF PARAMETERS BIASED	PERCENTAGE OF PARAMETERS BIASED (%)	NO. OF RESULTS RANKED	NO. OF FLAGS ASSIGNED	PERCENTAGE OF RESULTS FLAGGED (%)	SUM OF % BIAS AND % FLAGS SCORE
F002	1	0	0.00	10	0	0.00	0.00
F003	1	0	0.00	10	0	0.00	0.00
F011	1	0	0.00	10	0	0.00	0.00
F015	1	0	0.00	9	0	0.00	0.00
F032	1	0	0.00	10	0	0.00	0.00
F033	1	0	0.00	10	0	0.00	0.00
F095	1	0	0.00	7	0	0.00	0.00
F035	1	0	0.00	10	1	10.00	10.00
F001	1	0	0.00	9	1	11.11	11.11
F038	1	0	0.00	9	1	11.11	11.11
F020	1	0	0.00	8	1	12.50	12.50
F037	1	0	0.00	10	2	20.00	20.00
F046	1	0	0.00	9	2	22.22	22.22
F051	1	0	0.00	10	5	50.00	50.00
F010	1	0	0.00	7	4	57.14	57.14
F030	1	0	0.00	5	5	100.00	100.00
F006	1	1	100.00	10	3	30.00	130.00
F007	1	1	100.00	9	6	66.67	166.67
F080	1	1	100.00	8	8	100.00	200.00

Table 3a

SUMMARY OF STUDY TO STUDY PERFORMANCE

Trace Metals

LAB CODE	%BIAS AND %FLAGS ON STUDIES 0062	0063	0064	0065	0066	0067*	MEDIAN SCORE	COMMENTS
F001	10.6	1.5	4.8	19.0	5.0	5.5	5.2	SATISFACTORY, WELL DONE
F002	20.0	5.3	0.0	1.1	-	6.9	5.3	SATISFACTORY, WELL DONE
F003	1.2	7.1	0.0	10.0	5.3	2.6	3.9	SATISFACTORY, WELL DONE
F005	-	-	6.7	16.5	-	-	11.6	SATISFACTORY
F008	28.2	15.6	7.3	25.1	6.7	8.5	12.0	SATISFACTORY
F009	-	79.3	82.4	34.4	38.5	20.0	38.5	MODERATE
F010	25.4	12.1	19.2	18.1	31.7	40.8	22.3	SATISFACTORY
F011	5.2	38.7	6.7	28.6	16.4	11.0	13.7	SATISFACTORY
F013	14.3	31.1	25.0	33.7	4.5	0.0	19.6	SATISFACTORY
F014	63.2	28.7	48.0	35.9	37.5	21.0	36.7	MODERATE
F015	6.9	8.9	11.9	4.5	5.8	11.8	7.9	SATISFACTORY, WELL DONE
F016	38.2	17.4	65.8	58.1	129.4	-	58.1	MODERATE
F019	-	-	-	-	54.0	30.1	42.0	MODERATE
F020	9.4	50.3	48.2	25.4	46.1	33.8	39.9	MODERATE
F023	-	31.0	-	-	-	-	-	-
F024	55.0	28.0	23.0	15.1	14.8	9.4	19.0	SATISFACTORY
F025	31.8	14.0	42.3	36.3	32.2	-	32.2	MODERATE
F026	25.5	70.8	16.0	35.0	-	54.0	35.0	MODERATE
F030	26.0	34.5	38.7	-	35.4	85.7	35.4	MODERATE
F031	-	51.4	33.8	34.1	34.6	49.7	34.6	MODERATE
F032	131.3	0.0	-	57.5	0.0	.7	.7	SATISFACTORY, WELL DONE
F033	11.7	57.7	82.5	11.1	38.8	.7	25.3	MODERATE
F035	-	88.2	39.9	53.3	31.0	8.4	39.9	MODERATE
F036	-	64.3	36.9	-	-	95.7	64.3	POOR
F037	95.0	62.5	50.2	64.1	-	29.0	62.5	POOR
F038	10.3	39.1	10.6	55.6	19.6	8.6	15.1	SATISFACTORY
F039	27.7	-	-	-	-	-	-	-
F040	38.0	-	-	-	-	-	-	-
F042	0.0	0.0	50.0	-	10.0	100.0	10.0	SATISFACTORY, WELL DONE
F043	42.9	41.0	-	-	53.7	-	42.9	MODERATE
F044	12.9	14.0	-	-	-	-	13.5	SATISFACTORY
F045	33.3	-	-	-	-	-	-	-
F046	21.0	26.4	2.1	27.3	14.2	26.4	23.7	SATISFACTORY
F047	59.2	38.6	-	-	-	23.0	38.6	MODERATE
F048	-	60.6	21.1	23.0	37.5	3.8	23.0	SATISFACTORY
F050	-	-	-	81.7	-	-	-	-
F051	-	-	-	17.8	19.6	2.5	17.8	SATISFACTORY
F052	-	-	-	48.0	-	-	-	-
F055	62.1	103.0	-	117.3	-	-	103.0	POOR
F059	-	-	-	56.7	49.9	-	53.3	MODERATE
F060	-	44.4	71.8	-	-	-	58.1	MODERATE
F061	-	-	-	-	98.9	85.9	92.4	POOR
F062	-	65.3	-	59.8	-	-	62.5	POOR
F063	-	-	95.3	-	-	-	-	-
F064	-	-	122.7	-	-	-	-	-
F065	-	-	100.9	-	-	-	-	-
F066	-	-	74.4	7.0	-	-	40.7	MODERATE
F067	-	-	41.6	-	-	-	-	-
F068	-	-	95.8	52.4	26.3	35.3	43.8	MODERATE
F069	-	-	16.6	6.9	20.7	16.2	16.4	SATISFACTORY
F071	-	-	-	-	59.0	131.4	95.2	POOR
F072	-	-	-	37.0	-	-	-	-
F075	-	-	24.9	-	-	-	-	-
F076	-	-	.6	-	.5	-	.5	SATISFACTORY, WELL DONE
F077	-	-	64.0	-	-	-	-	-
F078	-	-	-	49.7	-	-	-	-
F080	-	-	-	37.3	23.9	2.6	23.9	SATISFACTORY
F081	-	-	-	20.5	-	-	-	-
F082	-	-	-	13.5	-	5.5	9.5	SATISFACTORY, WELL DONE
F083	-	-	-	45.0	-	-	-	-
F089	-	-	-	-	57.2	-	-	-
F091	-	-	-	-	62.8	-	-	-
F093	-	-	-	-	-	22.3	-	-
F094	-	-	-	-	-	59.6	-	-
F095	-	-	-	-	-	5.7	-	-
F097	-	-	-	-	-	0.0	0.0	SATISFACTORY, WELL DONE
F098	-	-	-	-	-	0.0	0.0	SATISFACTORY, WELL DONE
F099	-	-	-	-	-	55.0	-	-
INTERLAB MEDIAN	26.0	34.5	36.9	34.1	31.0	16.2		

* The data tables include a modified bias assessment (biases <5% not included)

STUDY DATES: 0062(11-JAN-93), 0063(05-JUL-93), 0064(07-JAN-94), 0065(07-JUL-94), 0066(03-JAN-95), 0067(05-JUL-95)

Table 3b

SUMMARY OF STUDY TO STUDY PERFORMANCE

Mercury

LAB CODE	%BIAS AND %FLAGS ON STUDIES 0063	0065	0067*	MEDIAN SCORE	COMMENTS
F001	33.3	0.0	11.1	11.1	SATISFACTORY
F002	0.0	111.1	0.0	0.0	SATISFACTORY, WELL DONE
F003	0.0	0.0	0.0	0.0	SATISFACTORY, WELL DONE
F005	-	0.0	-	-	-
F006	-	0.0	130.0	65.0	POOR
F007	-	-	166.7	-	-
F008	0.0	-	-	-	-
F010	0.0	70.0	57.1	57.1	MODERATE
F011	20.0	30.0	0.0	20.0	SATISFACTORY
F015	-	0.0	0.0	0.0	SATISFACTORY, WELL DONE
F016	150.0	-	-	-	-
F020	44.4	0.0	12.5	12.5	SATISFACTORY
F023	80.0	-	-	-	-
F024	44.4	-	-	-	-
F025	-	114.3	-	-	-
F030	-	-	100.0	-	-
F032	0.0	-	0.0	0.0	SATISFACTORY, WELL DONE
F033	0.0	11.1	0.0	0.0	SATISFACTORY, WELL DONE
F035	0.0	0.0	10.0	0.0	SATISFACTORY, WELL DONE
F036	130.0	140.0	-	135.0	POOR
F037	0.0	50.0	20.0	20.0	SATISFACTORY
F038	0.0	50.0	11.1	11.1	SATISFACTORY
F044	10.0	-	-	-	-
F046	0.0	100.0	22.2	22.2	SATISFACTORY
F047	150.0	-	-	-	-
F050	-	10.0	-	-	-
F051	-	-	50.0	-	-
F052	-	200.0	-	-	-
F055	100.0	-	-	-	-
F059	14.3	-	-	-	-
F062	200.0	0.0	-	100.0	POOR
F066	-	40.0	-	-	-
F069	-	0.0	-	-	-
F072	-	50.0	-	-	-
F078	-	200.0	-	-	-
F080	-	66.7	200.0	133.3	POOR
F086	-	180.0	-	-	-
F095	-	-	0.0	-	-
INTERLAB MEDIAN	14.3	40.0	11.1		

* The data tables include a modified bias assessment (biases <10% not included)

STUDY DATES: 0063(12-JUL-93), 0065(07-JUL-94), 0067(05-JUL-95)

Table 4a

Sample Design - FP 67 - July/Aug '95

Trace Metals

Sample No.	Sample Name	Type (DA/Low)	Cu Conc'n (Expected)
1	TM-Humber	Low	0.001
2	TM-51 / 20	Low	0.003
3	TM-21 / 2	Low	0.005
4	TM-22 / 2	Low	0.008
5	TM-25 / 1.5	Low	0.018
6	TMDA-54 / 25	DA*	0.018
7	TM-93 / 4	DA	0.022
8	TMDA-53 / 2.5	DA	0.077
9	TMDA-54 / 3.5	DA	0.127
10	TMDA-54 / 1.8	DA	0.241

* Direct Aspiration

Table 4b

Sample Design - Study FP 67 - July/Aug '95

Mercury (in ppb)

Sample No.	Sample Name	Design Value (ppb)
1	HG-26	0.017
2	HG-27	0.062
3	HG-28	0.17
4	HG-29	0.27
5	HG-30	0.40
6	HG-21	0.035
7	HG-22	0.13
8	HG-23	0.23
9	HG-24	0.37
10	HG-25	0.49

Table 5a

SUMMARY of Interlaboratory MEDIAN VALUES for Trace Metals - STUDY FP67

PARAMETER		SAMPLE NUMBER						
		TM-HUMBER SAMPLE 1	TMDA-51-20 SAMPLE 2	TM-21-2 SAMPLE 3	TM-22-2 SAMPLE 4	TM-25-1.5 SAMPLE 5	TMDA-54-25 SAMPLE 6	TM-93-4 SAMPLE 7
Aluminum	MG/L	.0043	.0041	.0225	.0380	.0360	.0220	.2390
Vanadium	mg/L	.0006	.0040	.0035	.0070	.0100	.0130	.2175
Chromium	mg/L	.0005	.0030	.0050	.0082	.0023	.0180	.0240
Manganese	MG/L	.0012	.0018	.0040	.0070	.0120	.0091	.0230
Iron	MG/L	.0050	.0070	.0058	.0170	.0073	.0120	.1155
Cobalt	mg/L	.0003	.0036	.0030	.0060	.0083	.0154	.0660
Nickel	mg/L	.0014	.0040	.0050	.0090	.0069	.0155	.1115
Copper	mg/L	.0012	.0031	.0050	.0081	.0180	.0173	.0230
Zinc	mg/L	.0020	.0049	.0063	.0107	.0051	.0220	.0259
Arsenic	ug/L	.9000	.8000	.6000	.7000	.7550	1.0500	2.8380
Selenium	ug/L	.4000	.7000	1.0000	1.0000	1.1000	2.0000	3.0000
Strontium	mg/L	.1690	.0060	.1230	.2280	.1540	.0420	.1150
Molybdenum	mg/L	.0012	.0046	.0052	.0082	.0056	.0190	.2190
Silver	ug/L	-	.8420	.7000	.8600	1.5200	1.9000	.7250
Cadmium	mg/L	0.0000	.0018	.0040	.0070	.0050	.0074	.0230
Antimony	ug/L	.3000	.6350	.2500	.3650	5.0000	1.5000	.2200
Barium	MG/L	.0210	.0040	.0140	.0299	.0417	.0120	.2230
Lead	mg/L	.0003	.0030	.0040	.0070	.0150	.0220	.1100
Bismuth	ug/L	-	.3200	.8500	.8250	6.7000	1.5100	.8700
Uranium	ug/L	.4000	1.6000	.1000	.1050	.0800	2.6950	.1950
Lithium	ug/L	3.0000	.8500	1.2000	1.4000	4.4000	1.8000	1.1000
Berylium	ug/L	-	1.1400	.3100	.4050	4.7000	1.5000	.6500

PARAMETER		TMDA-53-2.5 SAMPLE 8	TMDA-54-3.5 SAMPLE 9	TMDA-54-1.8 SAMPLE 10
Aluminum	MG/L	.0932	.1400	.2700
Vanadium	mg/L	.1715	.0960	.1800
Chromium	mg/L	.1440	.1280	.2430
Manganese	MG/L	.0570	.0652	.1237
Iron	MG/L	.1280	.0815	.1526
Cobalt	mg/L	.0679	.1120	.2150
Nickel	mg/L	.1330	.1090	.2060
Copper	mg/L	.0770	.1290	.2420
Zinc	mg/L	.0690	.1580	.2990
Arsenic	ug/L	17.300	6.6110	12.805
Selenium	ug/L	12.200	11.950	20.350
Strontium	mg/L	.1590	.1830	.3460
Molybdenum	mg/L	.0800	.1350	.2600
Silver	ug/L	7.8000	10.550	20.600
Cadmium	mg/L	.1050	.0500	.0950
Antimony	ug/L	10.250	10.400	20.200
Barium	MG/L	.1350	.0792	.1510
Lead	mg/L	.0855	.1592	.3020
Bismuth	ug/L	11.000	6.1000	13.600
Uranium	ug/L	9.2350	19.000	35.000
Lithium	ug/L	14.150	10.000	18.250
Berylium	ug/L	5.0000	10.400	19.500

Table 5b

SUMMARY of Interlaboratory MEDIAN VALUES for Mercury - STUDY FP67

PARAMETER		SAMPLE NUMBER						
		HG-26 SAMPLE 1	HG-27 SAMPLE 2	HG-28 SAMPLE 3	HG-29 SAMPLE 4	HG-30 SAMPLE 5	HG-21 SAMPLE 6	HG-22 SAMPLE 7
Mercury	µg Hg/L	.0200	.0650	.1800	.3000	.4300	.0460	.1395

PARAMETER		SAMPLE NUMBER		
		HG-23 SAMPLE 8	HG-24 SAMPLE 9	HG-25 SAMPLE 10
Mercury	µg Hg/L	.2500	.4000	.5100

Appendix A

Glossary of Terms

GLOSSARY OF TERMS

Used for the Evaluation of Interlaboratory Results

Satisfactory: Fully acceptable, "good results".

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

Out of Control: An analysis for parameter is considered "out of control" when it performs satisfactorily but produces an extreme result.

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 % 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".

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.

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.

LLBAE: Lower Limit for Use of Basic Acceptable Error

BAE: Basic Acceptable Error

CEI: Concentration Error Increment

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

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 Fed-Prov QA Program, for moderate ranges, this has been achieved with the 10% Deviation Rule. To be consistent in the QA studies, Performance Ratings using the (Youden) flagging evaluation should generally remain the same; eg. Very Good for less than 5% of data flagged. We are pleased that these evaluations rate laboratories objectively and provide an appropriate diagnostic tool.

Flagged Result: A result is flagged high ("H") when its value is greater than the median (target value) plus the acceptable difference. A result greater than 1.5 times the acceptable difference is flagged very high ("VH"). Similarly, a result lower than the median by the acceptable difference is flagged low ("L"). A still lower result is flagged very low ("VL"). Extremely different values are those that deviate more than twice the acceptable difference from the median. These results are flagged - "EL" or "EH".

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

References:
1. ASTM, 1983, Volume 11.01, Water 1, Section II, pg 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.

August 1995

Quantifying Bias in QA Studies

August '95

Introduction

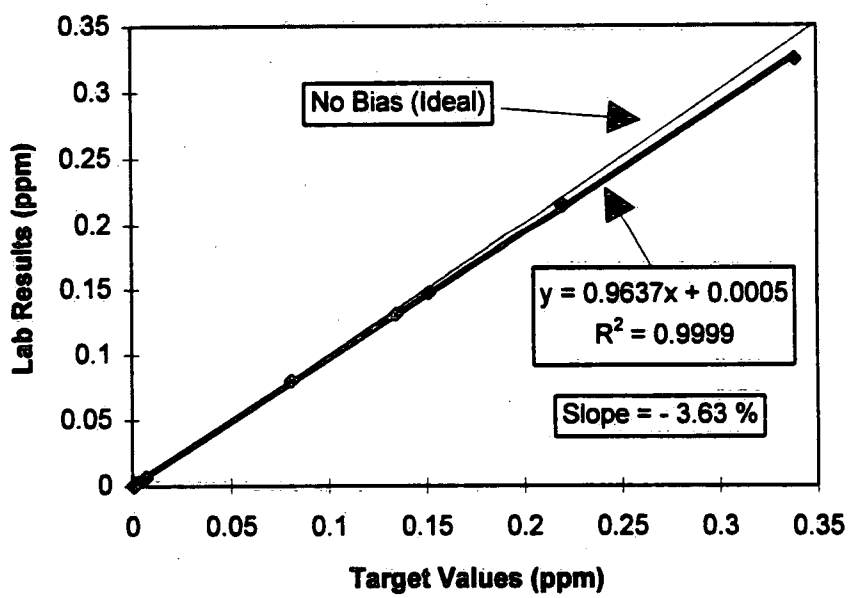
Systematic bias as part of the QA data assessment is a major element in quantifying data quality. It is important in qualifying the accuracy of data in a general sense, when the entire set of analysis data may be affected by factors such as calibration, instrument setup, chemical reagent efficiency and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

Degree of Bias

In the NWRI QA studies with 10 sample series, systematic bias[1] is assessed non-parametrically by the procedure of Youden. Up until now, the degree of bias has not been calculated for the QA reports. The degree of bias may be parametrically quantified by two parameters taken from the parameter performance chart, as in figure 1. When bias is indicated by the procedure of Youden, the slope and intercept, give the degree of bias. A complication arises from the high precision of methodologies and instrumentation like ICPMS. A very high precision of analysis may lead to an assessment of very low bias, e.g. 2 or 3%.

Figure 1 **Parameter Performance**

Vanadium - Interlab Study FP65 Lab F005



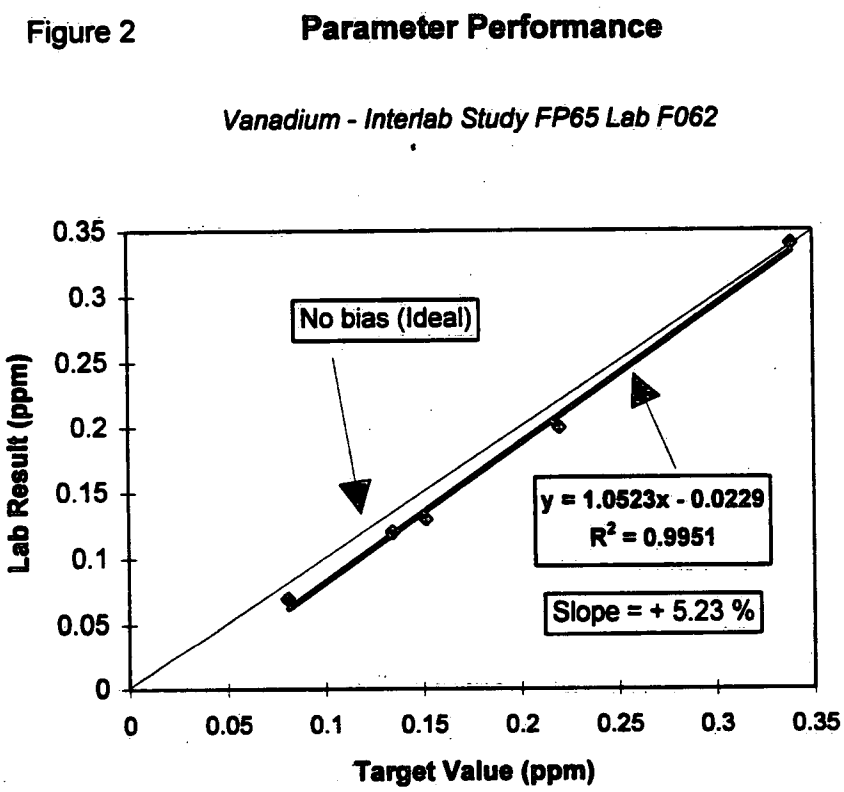
[1] Systematic bias is often identified with the comparison of data to a certified standard.

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



In this parameter performance graph, we have a worst case situation. The Youden bias for Vanadium in Study FP65 for Lab F062 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 indicated.

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.

Bias Critical Values

Major Ions & Nutrients	%	Trace Metals	%
Conductance	2.5	Aluminum	5
Colour	25	Vanadium	5
Turbidity	50	Chromium	5
Boron	10	Manganese	5
pH	10	Iron	5
DOC	7.5	Cobalt	5
DIC	7.5	Nickel	5
Total Alkalinity	3	Copper	5
Nitrate + Nitrite	5	Zinc	5
Ammonia	7.5	Strontium	5
Total Nitrogen	10	Molybdenum	5
TKN	10	Cadmium	5
Fluoride	5	Barium	5
Total Hardness	5	Lead	5
Sodium	5	Arsenic	10
Magnesium	5	Selenium	10
Silicates	5	Silver	10
Sulfate	5	Antimony	10
Chloride	5	Bismuth	25
Potassium	5	Lithium	10
Calcium	5	Berylium	10
		Uranium	10
Total Phosphorus	5		
		Mercury	10

Appendix B

Laboratory Results

1) Trace Metals
2) Mercury

PARAMETER: 13091 Aluminum MG/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0075 BASIC ACCEPTABLE ERROR= .0075 CONCENTRATION ERROR INCREMENT= .1250

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0025	8.00	.0050	13.00	.024	22.00	.039	22.50	.039	27.00	.024	23.00
F002	<.01	0.00	<.01	0.00	.022	15.00	.036	15.00	.036	17.00	.020	10.00
F003	.010	13.50	.008	17.00	.029	29.00	.045	30.00	.043	29.50	.024	23.00
F008	<.01	0.00	<.01	0.00	.023	18.00	.038	18.00	.037	21.00	.022	16.50
F010	.012 H	15.00	.012 H	18.00	.022	15.00	.041	28.00	.043	29.50	.024	23.00
F011	.0014	2.50	.0031	5.00	.0205	11.00	.034	12.00	.033	11.00	.0193	9.00
F014	.013 H	16.50	.002	3.50	.031	31.00	.025 L	2.50	.035	14.50	.022	16.50
F015	.002	5.00	<.002	0.00	.019	5.00	.032	10.00	.031	9.00	.018	7.00
F019	<.02	0.00	.02 EH	19.00	.03	30.00	.04	25.50	.05 H	31.00	.03	28.00
F020	<.02	0.00	<.02	0.00	<.02	0.00	.028	5.00	.024 L	2.00	<.02	0.00
F024	.002	5.00	.004	8.00	.025	25.50	.040	25.50	.039	27.00	.026	25.50
F026	.0037	10.00	.0062	16.00	.0248	24.00	.0387	21.00	.0373	24.00	.0218	13.00
F030	.07 EH	19.00	<.01	0.00	.015	3.00	.03	7.50	.03	6.50	.01 L	3.50
F031	.01	13.50	<.01	0.00	.02	8.00	.03	7.50	.07 EH	33.00	.06 EH	31.00
F032	<.012	0.00	<.012	0.00	.024	22.00	.038	18.00	.037	21.00	.022	16.50
F033	<.005	0.00	<.005	0.00	.023	18.00	.037	16.00	.036	17.00	.022	16.50
F035	<.01	0.00	<.01	0.00	.02	8.00	.03	7.50	.03	6.50	.03	28.00
F036	.002	5.00	.002	3.50	.007 VL	1.00	.025 L	2.50	.029	4.00	.007 VL	1.00
F037	.0014	2.50	.0016	2.00	.0103 L	2.00	.0242 L	1.00	.0175 VL	1.00	.0094 L	2.00
F038	.005	11.00	.006	15.00	.028	27.50	.04	25.50	.037	21.00	.021	11.50
F042	.001	1.00	.001	1.00	.020	8.00	.035	14.00	.034	12.50	.019	8.00
F046	.003	9.00	.005	13.00	.025	25.50	.040	25.50	.038	25.00	.023	21.00
F047	.013 H	16.50	.004	8.00	.028	27.50	.026 L	4.00	.028	3.00	.015	5.00
F051	<.0002	0.00	<.0002	0.00	.017	4.00	.0321	11.00	.0313	10.00	.0160	6.00
F061	.3 EH	20.00	<.1	0.00	<.1	0.00	<.1	0.00	<.1	0.00	<.1	0.00
F069	<.01	0.00	<.01	0.00	.021	12.00	.048	31.00	.036	17.00	.026	25.50
F071	.017 VH	18.00	.005	13.00	.040 VH	32.00	.066 EH	33.00	.060 EH	32.00	.035 H	30.00
F080	<.014	0.00	<.014	0.00	.022	15.00	.043	29.00	.039	27.00	.021	11.50
F082	.0055	12.00	.0035	6.00	.023	18.00	.039	22.50	.037	21.00	.022	16.50
F094	<.01	0.00	<.01	0.00	.02	8.00	.03	7.50	.03	6.50	.01 L	3.50
F095	<.001	0.00	.004	8.00	.024	22.00	.038	18.00	.037	21.00	.022	16.50
F097		0.00	.0046	11.00	.0234	20.00	.0384	20.00	.035	14.50	.0224	20.00
F098	.0022	7.00	.0041	10.00	.0212	13.00	.0343	13.00	.0340	12.50		0.00
F95b	<.01	0.00	<.01	0.00	.02	8.00	.05 H	32.00	.03	6.50	.03	28.00
MEDIAN CONC.	.0043		.0041		.0225		.0380		.0360		.0220	

PARAMETER: 13091 Aluminum MG/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.241	21.00	.096	22.00	.143	21.50	.261	13.50
F002	.250	28.00	.092	14.50	.141	20.00	.280	24.00
F003	.235	16.00	.087	10.50	.135	12.50	.261	13.50
F008	.244	23.50	.095	19.00	.144	24.00	.269	16.00
F010	.250	28.00	.116 H	32.00	.159	31.00	.292	30.00
F011	.2080	4.00	.0848	9.00	.0103 EL	1.00	.019 EL	1.00
F014	.239	17.00	.094	18.00	.151	30.00	.278	22.00
F015	.23	12.50	.08	5.50	.14	18.00	.26	11.00
F019	.25	28.00	.11	28.50	.15	27.50	.27	17.50
F020	.217	6.00	.077	3.00	.125	5.50	.246	5.00
F024	.25	28.00	.10	25.50	.15	27.50	.29	29.00
F026	.2176	7.00	.0932	17.00	.1373	14.00	.2596	9.00
F030	.19 L	1.00	.08	5.50	.125	5.50	.23	3.50
F031	.23	12.50	.11	28.50	.16	32.00	.28	24.00
F032	.244	23.50	.093	16.00	.144	24.00	.272	19.00
F033	.240	19.00	.092	14.50	.140	18.00	.260	11.00
F035	.24	19.00	.1	25.50	.15	27.50	.28	24.00
F036	.22	9.00	.117 H	33.00	.135	12.50	.275	20.00
F037	.252	31.00	.080	5.50	.129	7.00	.287	28.00
F038	.24	19.00	.074 L	2.00	.15	27.50	.3	31.00
F042	.232	15.00	.090	13.00	.131	9.50	.253	6.00
F046	.231	14.00	.096	22.00	.138	15.50	.254	7.00
F047	.245	25.00	.080	5.50	.118	3.00	.286	27.00
F051	.2252	11.00	.0880	12.00	.1335	11.00	.2549	8.00
F061	.2 L	2.50	.1	25.50	.1 VL	2.00	.2 VL	2.00
F069	.282 H	32.00	.115 H	31.00	.176 H	33.00	.285	26.00
F071	.309 VH	33.00	.114 H	30.00	.131	9.50	.350 VH	33.00
F080	.243	22.00	.096	22.00	.143	21.50	.276	21.00
F082	.210	5.00	.082	8.00	.130	8.00	.320 H	32.00
F094	.20 L	2.50	.07 L	1.00	.12	4.00	.23	3.50
F095	.219	8.00	.087	10.50	.138	15.50	.260	11.00
F097	.225	10.00	.0951	20.00	.144	24.00	.265	15.00
F098		0.00		0.00		0.00		0.00
F95b	.25	28.00	.10	25.50	.14	18.00	.27	17.50
MEDIAN CONC.	.2390		.0932		.1400		.2700	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	193.50	19.350	10					ICPMS
F002	143.50	17.938	8					AAS, 10X
F003	194.50	19.450	10					ICP 5X
F008	156.00	19.500	8					GFAAS
F010	249.50	24.950	10	H H H	BIASED HIGH	5.74	.0052	ICP
F011	65.50	6.550	10	ELEL	BIASED LOW	-65.44	.0133	ICPMS
F014	171.50	17.150	10	H L				
F015	83.00	9.222	9					GFAAS-ICP
F019	235.00	26.111	9	EH H	BIASED HIGH*	-2.03	.0114	ICP
F020	26.50	4.417	6	L	BIASED LOW	-5.33	-.0093	ICP
F024	226.50	22.650	10					ICP-AES
F026	155.00	15.500	10					ICP
F030	55.00	6.111	9	EH L L	BIASED LOW	-23.23	.0129	ICP
F031	190.00	21.111	9	EHEH				GFAAS
F032	160.00	20.000	8					ICP 20X
F033	130.00	16.250	8					ICP dig
F035	146.00	18.250	8					ICP-AES
F036	91.50	9.150	10	VLL VL H				COLORIMETRIC
F037	82.00	8.200	10	L L VLL				GFAAS
F038	191.00	19.100	10	L				GFAAS
F042	88.00	8.800	10					GFAAS
F046	177.50	17.750	10					ICPMS
F047	124.50	12.450	10	H L				ICP-MS
F051	73.00	9.125	8					ICPMS
F061	52.00	10.400	5	EH L VLVL				ICP
F069	207.50	25.938	8	H H H	BIASED HIGH	11.56	.0036	DCP
F071	263.50	26.350	10	VH VHEHEHH VHH VH	BIASED HIGH	22.26	.0064	GFAAS
F080	169.00	21.125	8					ICP, dig
F082	149.00	14.900	10	H				ICPMS
F094	36.50	4.563	8	L L L	BIASED LOW	-13.98	-.0038	ICP
F095	130.50	14.500	9					ICP Ultrason
F097	154.50	17.167	9					ICPMS
F098	55.50	11.100	5					NOTFOUND
F95b	163.50	20.438	8	H				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 15.967

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F020	26.50	4.417	6	L	BIASED LOW	-5.33	-.0093	ICP
F094	36.50	4.563	8	LLL	BIASED LOW	-13.98	-.0038	ICP
F030	55.00	6.111	9	EHLL	BIASED LOW	-23.23	.0129	ICP
F011	65.50	6.550	10	ELEL	BIASED LOW	-65.44	.0133	ICPMS
F037	82.00	8.200	10	LLVLL				GFAAS
F042	88.00	8.800	10					GFAAS
F051	73.00	9.125	8					ICPMS
F036	91.50	9.150	10	VLLVLH				COLORIMETRIC
F015	83.00	9.222	9					GFAAS-ICP
F061	52.00	10.400	5	EHLVLVL				ICP
F098	55.50	11.100	5					NOTFOUND
F047	124.50	12.450	10	HL				ICP-MS
F095	130.50	14.500	9					ICP Ultrason
F082	149.00	14.900	10	H				ICPMS
F026	155.00	15.500	10					ICP
F033	130.00	16.250	8					ICP dig
F014	171.50	17.150	10	HL				
F097	154.50	17.167	9					ICPMS
F046	177.50	17.750	10					ICPMS
F002	143.50	17.938	8					AAS, 10X
F035	146.00	18.250	8					ICP-AES
F038	191.00	19.100	10	L				GFAAS
F001	193.50	19.350	10					ICPMS
F003	194.50	19.450	10					ICP 5X
F008	156.00	19.500	8					GFAAS
F032	160.00	20.000	8					ICP 20X
F95b	163.50	20.438	8	H				ICP
F031	190.00	21.111	9	EHEH				GFAAS
F080	169.00	21.125	8					ICP, dig
F024	226.50	22.650	10					ICP-AES
F010	249.50	24.950	10	HHH	BIASED HIGH	5.74	.0052	ICP
F069	207.50	25.938	8	HHH	BIASED HIGH	11.56	.0036	DCP
F019	235.00	26.111	9	EHH	BIASED HIGH*	-2.03	.0114	ICP
F071	263.50	26.350	10	VHVHEHEHHVHHVH	BIASED HIGH	22.26	.0064	GFAAS

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

OVERALL AVERAGE
RANK IS 15.967

Aluminum

PARAMETER: 23091 Vanadium mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0003	2.50	.0041	14.50	.0037	11.00	.0071	18.00	.011	21.00	.014	20.00
F003	.0002	1.00	.0040	10.00	.0034	7.00	.0066	6.50	.0096	8.00	.014	20.00
F008	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.01	14.00	.01	2.00
F010	.001	7.50	.005	17.00	.006 H	16.50	.009	20.00	.013 H	23.00	.017 H	24.00
F011	.0004	4.00	.0040	10.00	.0034	7.00	.0066	6.50	.010	14.00	.0133	17.00
F015	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.01	14.00	.01	2.00
F019	.003 H	9.00	<.002	0.00	.006 H	16.50	.012 VH	21.00	.015 VH	24.00	.016	23.00
F020	<.003	0.00	<.003	0.00	<.003	0.00	.007	14.00	.009	4.50	.013	11.00
F024	<.001	0.00	.003	1.50	.002	1.00	.005	1.00	.008	1.50	.012	5.50
F030	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.01	14.00	.01	2.00
F032	<.003	0.00	.004	10.00	.003	3.50	.007	14.00	.010	14.00	.013	11.00
F033	<.005	0.00	.0038	5.00	.0035	9.00	.0068	9.00	.0097	9.00	.013	11.00
F035	<.002	0.00	.004	10.00	<.002	0.00	.007	14.00	.009	4.50	.013	11.00
F038	<.030	0.00	<.030	0.00	<.030	0.00	<.030	0.00	<.030	0.00	<.030	0.00
F046		0.00	.005	17.00	.004	14.50	.007	14.00	.010	14.00	.013	11.00
F047	.001	7.50	.003	1.50	.004	14.50	.006	3.00	.009	4.50	.012	5.50
F051	.0003	2.50	.0033	3.00	.0030	3.50	.0060	3.00	.0093	7.00	.0130	11.00
F061	<.005	0.00	<.005	0.00	<.005	0.00	<.005	0.00	<.005 VL	0.00	<.005 EL	0.00
F069	<.006	0.00	<.006	0.00	<.006	0.00	.007	14.00	.008	1.50	.011	4.00
F080	<.0014	0.00	.0040	10.00	.0038	13.00	.0066	6.50	.0102	19.00	.0133	17.00
F082	.0005	5.00	.0039	6.00	.0034	7.00	.0066	6.50	.010	14.00	.013	11.00
F093	.004 VH	10.00	.004	10.00	.010 EH	18.00	.007	14.00	.012	22.00	.014	20.00
F094	<.001	0.00	.004	10.00	.003	3.50	.006	3.00	.009	4.50	.013	11.00
F095	.0006	6.00	.0037	4.00	.0036	10.00	.0069	10.00	.010	14.00	.0133	17.00
F097		0.00	.0041	14.50	.0038	12.00	.0072	19.00	.0108	20.00	.0141	22.00
F95b	<.002	0.00	.005	17.00	.003	3.50	.007	14.00	.010	14.00	.013	11.00
MEDIAN CONC.	.0006		.0040		.0035		.0070		.0100		.0130	

PARAMETER: 23091 Vanadium mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.226	24.00	.178	20.50	.099	17.50	.189	22.50
F003	.225	22.00	.176	18.00	.097	15.50	.185	20.00
F008	.22	18.00	.18	24.00	.1	20.00	.19	24.50
F010	.222	20.00	.182	26.00	.103	24.00	.191	26.00
F011	.210	8.00	.167	6.00	.124 EH	25.00	.173	5.00
F015	.22	18.00	.18	24.00	.10	20.00	.18	12.50
F019	.217	12.50	.168	7.50	.096	13.50	.179	9.00
F020	.216	11.00	.169	9.50	.0935	7.00	.176	7.00
F024	.22	18.00	.18	24.00	.094	8.50	.18	12.50
F030	.019 EL	1.00	.155	2.00	.09	3.50	.16 L	1.50
F032	.218	14.50	.168	7.50	.095	10.50	.180	12.50
F033	.210	8.00	.170	11.00	.095	10.50	.180	12.50
F035	.208	5.50	.169	9.50	.094	8.50	.18	12.50
F038	.226	24.00	.179	22.00	.101	22.00	.19	24.50
F046	.226	24.00	.178	20.50	.099	17.50	.189	22.50
F047	.208	5.50	.161	4.00	.102	23.00	.183	18.00
F051	.2133	10.00	.1726	15.00	.0931	6.00	.1756	6.00
F061	.203	3.00	.13 EL	1.00	.063 EL	1.00	.160 L	1.50
F069	.218	14.50	.171	12.50	.089	2.00	.177	8.00
F080	.217	12.50	.172	14.00	.0970	15.50	.183	18.00
F082	.210	8.00	.160	3.00	.091	5.00	.170	3.50
F093	.245 H	26.00	.174	16.50	.142 EH	26.00	.186	21.00
F094	.200	2.00	.162	5.00	.090	3.50	.170	3.50
F095	.204	4.00	.171	12.50	.0954	12.00	.180	12.50
F097	.223	21.00	.177	19.00	.1	20.00	.183	18.00
F95b	.219	16.00	.174	16.50	.096	13.50	.182	16.00
MEDIAN CONC.	.2175		.1715		.0960		.1800	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	171.50	17.150	10					ICPMS
F003	128.00	12.800	10					ICP 5X
F008	102.50	17.083	6					GFAAS, AAS
F010	204.00	20.400	10	H H H	BIASED HIGH*	3.34	.0022	ICP
F011	102.50	10.250	10	EH				ICPMS
F015	90.50	15.083	6					ICP
F019	136.00	15.111	9	H H VHVH				ICP
F020	64.00	9.143	7					ICP
F024	73.50	8.167	9					ICP-AES
F030	24.00	4.000	6	EL L	BIASED LOW	-56.00	.0235	ICP
F032	97.50	10.833	9					ICP 20X
F033	85.00	9.444	9					ICP
F035	75.50	9.438	8					ICP-AES
F038	92.50	23.125	4		INSUFFICIENT DATA			ICP Scan
F046	155.00	17.222	9					ICP
F047	87.00	8.700	10					ICP-MS
F051	67.00	6.700	10					ICPMS
F061	6.50	1.625	4	VLEL ELELL	INSUFFICIENT DATA			ICP
F069	56.50	8.071	7					ICP
F080	125.50	13.944	9					ICP
F082	69.00	6.900	10					ICPMS
F093	183.50	18.350	10	VH EH H EH	BIASED HIGH	7.64	.0041	ICP
F094	46.00	5.111	9		BIASED LOW	-6.70	.0002	ICP
F095	102.00	10.200	10					ICP
F097	165.50	18.389	9					ICPMS
F95b	121.50	13.500	9					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 12.018

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	6.50	1.625	4	VLELELELL	INSUFFICIENT DATA			ICP
F030	24.00	4.000	6	ELL	BIASED LOW	-56.00	.0235	ICP
F094	46.00	5.111	9		BIASED LOW	-6.70	.0002	ICP
F051	67.00	6.700	10					ICPMS
F082	69.00	6.900	10					ICPMS
F069	56.50	8.071	7					ICP
F024	73.50	8.167	9					ICP-AES
F047	87.00	8.700	10					ICP-MS
F020	64.00	9.143	7					ICP
F035	75.50	9.438	8					ICP-AES
F033	85.00	9.444	9					ICP
F095	102.00	10.200	10					ICP
F011	102.50	10.250	10	EH				ICPMS
F032	97.50	10.833	9					ICP 20X
F003	128.00	12.800	10					ICP 5X
F95b	121.50	13.500	9					ICP
F080	125.50	13.944	9					ICP
F015	90.50	15.083	6					ICP
F019	136.00	15.111	9	HHVHVH				ICP
F008	102.50	17.083	6					GFAAS, AAS
F001	171.50	17.150	10					ICPMS
F046	155.00	17.222	9					ICP
F093	183.50	18.350	10	VHEHHEH	BIASED HIGH	7.64	.0041	ICP
F097	165.50	18.389	9					ICPMS
F010	204.00	20.400	10	HHH	BIASED HIGH*	3.34	.0022	ICP
F038	92.50	23.125	4		INSUFFICIENT DATA			ICP Scan

* 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 12.018

Vanadium

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;24091

PARAMETER: 24091 Chromium mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0007	10.50	.0030	17.50	.0050	19.50	.0082	15.50	.0024	16.50	.017	8.50
F002	.0005	6.50	.0029	8.50	.0055	26.00	.0090	26.50	.0023	14.00	.0214	30.00
F003	.0003	2.00	.0029	8.50	.0045	6.00	.0080	9.50	.0027	21.00	.019	22.50
F008	<.002	0.00	.003	17.50	.005	19.50	.008	9.50	.002	7.00	.018	16.00
F009	<.001	0.00	.003	17.50	.006	27.50	.010	31.00	.003	24.00	.017	8.50
F010	.002	14.50	.004	28.50	.005	19.50	.011 H	32.00	.005 H	28.00	.020	27.50
F011	.0010	12.00	.0031	25.50	.0048	11.00	.0081	13.00	.0023	14.00	.0178	12.00
F013	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00
F014	.0005	6.50	.003	17.50	.0047	7.50	.0079	7.00	.0029	22.00	.022 H	31.50
F015	<.0005	0.00	.0029	8.50	.0048	11.00	.0082	15.50	.0022	11.50	.022 H	31.50
F019	<.004	0.00	.004	28.50	.009 VH	29.00	.009	26.50	.004	26.50	.020	27.50
F020	<.002	0.00	.003	17.50	.005	19.50	.0081	13.00	<.002	0.00	.018	16.00
F024	<.001	0.00	.003	17.50	.005	19.50	.009	26.50	.003	24.00	.020	27.50
F030	<.008	0.00	<.008	0.00	<.008	0.00	<.008	0.00	<.008	0.00	.015	3.00
F031	.0003	2.00	.0028	4.50	.0038	3.00	.0075	5.00	.002	7.00	.019	22.50
F032	<.002	0.00	.003	17.50	.005	19.50	.008	9.50	.002	7.00	.017	8.50
F033	<.002	0.00	.0030	17.50	.0048	11.00	.0083	17.50	.0021	10.00	.018	16.00
F035	<.002	0.00	<.002	0.00	.003	1.00	.007	2.00	<.002	0.00	.017	8.50
F037	.0005	6.50	.0027	3.00	.0048	11.00	.0086	20.50	.0019	4.00	.0190	22.50
F038	<.001	0.00	.003	17.50	.006	27.50	.009	26.50	.003	24.00	.019	22.50
F046	.0005	6.50	.003	17.50	.005	19.50	.009	26.50	.002	7.00	.018	16.00
F047	.0023	16.00	.0024	2.00	.0042	4.00	.0071	3.50	.0017	3.00	.0146	2.00
F048	.0005	6.50	.0033	27.00	.0047	7.50	.0080	9.50	.0022	11.50	.0195	25.00
F051	<.001	0.00	.0017	1.00	.0036	2.00	.0071	3.50	.0015	2.00	.0166	6.00
F061	<.005	0.00	<.005	0.00	<.005	0.00	<.005 L	0.00	<.005	0.00	<.005 EL	0.00
F069	<.001	0.00	.003	17.50	.005	19.50	.009	26.50	.002	7.00	.020	27.50
F080	<.0014	0.00	.0031	25.50	.0050	19.50	.0083	17.50	.0025	19.50	.0187	19.00
F082	.0017	13.00	.0030	17.50	.0048	11.00	.0081	13.00	.0024	16.50	.016	4.50
F093	.004 VH	17.00	.003	17.50	.011 EH	30.00	.009	26.50	.001	1.00	.016	4.50
F094	<.005	0.00	<.005	0.00	<.005	0.00	.006	1.00	<.005	0.00	.014 L	1.00
F095	.0007	10.50	.0028	4.50	.0051	25.00	.0086	20.50	.0025	19.50	.0179	13.00
F097		0.00		0.00		0.00	.0088	22.00		0.00	.0189	20.00
F098	.0003	2.00	.0029	8.50	.0049	14.00	.0084	19.00	.0023	14.00		0.00
F099	.0005	6.50	.0028	6.00	.0045	5.00	.0077	6.00	.0024	18.00	.0176	11.00
F95b	.002	14.50	.003	17.50	.005	19.50	.009	26.50	.004	26.50	.018	16.00
MEDIAN CONC.	.0005		.0030		.0050		.0082		.0023		.0180	

PARAMETER: 24091 Chromium mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.023	10.50	.142	14.50	.126	12.00	.238	9.50
F002	.0347 EH	32.00	.1654 H	33.00	.1454 H	33.00	.2585	29.00
F003	.024	20.00	.145	20.50	.127	15.50	.243	16.50
F008	.021	3.50	.095 EL	2.00	.144 H	32.00	.269	33.00
F009	.024	20.00	.14	11.00	.125	8.50	.24	12.00
F010	.028	30.00	.156	32.00	.138	31.00	.258	28.00
F011	.0227	8.00	.139	9.00	.124	6.50	.230	6.00
F013	<.05	0.00	.145	20.50	.128	17.50	.244	18.50
F014	.027	29.00	.154	31.00	.136	30.00	.251	26.00
F015	.021	3.50	.141	13.00	.13	21.50	.25	25.00
F019	.023	10.50	.061 EL	1.00	.069 EL	1.00	.130 EL	1.00
F020	.0238	15.00	.142	14.50	.126	12.00	.238	9.50
F024	.025	26.50	.15	27.00	.13	21.50	.26	31.00
F030	.020	1.50	.122 L	3.50	.107 L	2.00	.204 L	2.00
F031	.025	26.50	.15	27.00	.13	21.50	.26	31.00
F032	.024	20.00	.135	8.00	.125	8.50	.234	7.00
F033	.023	10.50	.140	11.00	.130	21.50	.240	12.00
F035	.024	20.00	.144	17.50	.126	12.00	.243	16.50
F037	.0260	28.00	.1502	29.50	.1331	29.00	.2454	20.00
F038	.029 H	31.00	.147	24.00	.131	26.50	.249	24.00
F046	.024	20.00	.144	17.50	.128	17.50	.252	27.00
F047	.0212	5.00	.133	7.00	.127	15.50	.244	18.50
F048	.0235	14.00		0.00		0.00		0.00
F051	.0240	20.00	.1502	29.50	.1306	25.00	.2489	23.00
F061	<.005 EL	0.00	.122 L	3.50	.109 L	3.00	.220	4.00
F069	.024	20.00	.144	17.50	.130	21.50	.260	31.00
F080	.0231	13.00	.146	22.50	.131	26.50	.24	12.00
F082	.024	20.00	.130	6.00	.120	5.00	.220	4.00
F093	.023	10.50	.150	27.00	.124	6.50	.247	22.00
F094	.020	1.50	.128	5.00	.114	4.00	.220	4.00
F095	.0219	6.00	.140	11.00	.126	12.00	.237	8.00
F097	.0244	25.00	.146	22.50	.13	21.50	.241	14.00
F098		0.00		0.00		0.00		0.00
F099	.0223	7.00	.1472	25.00	.1318	28.00	.2459	21.00
F95b	.024	20.00	.144	17.50	.126	12.00	.242	15.00
MEDIAN CONC.	.0240		.1440		.1280		.2430	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	134.50	13.450	10					ICPMS
F002	238.50	23.850	10	EHH H				GFAAS
F003	142.00	14.200	10					ICP 5X
F008	140.00	15.556	9	ELH				GFAAS
F009	160.00	17.778	9					
F010	271.00	27.100	10	H H	BIASED HIGH	6.07	.0016	ICP
F011	117.00	11.700	10					ICPMS
F013	56.50	18.833	3		INSUFFICIENT DATA			ICP
F014	208.00	20.800	10	H				
F015	141.00	15.667	9	H				GFAAS-ICP
F019	151.50	16.833	9	VH ELELEL				ICP
F020	117.00	14.625	8					ICP
F024	221.00	24.556	9					ICP-AES
F030	12.00	2.400	5	L L L	BIASED LOW	-15.90	-.0001	ICP
F031	150.00	15.000	10					GFAAS
F032	105.50	11.722	9					ICP 20X
F033	127.00	14.111	9					ICP
F035	77.50	11.071	7					ICP-AES
F037	174.00	17.400	10					GFAAS
F038	223.50	24.833	9	H	BIASED HIGH*	1.85	.0011	GFAAS T
F046	175.00	17.500	10					ICPMS
F047	76.50	7.650	10		BIASED LOW*	-.85	-.0014	ICP-MS
F048	101.00	14.429	7					GFAAS
F051	112.00	12.444	9					ICPMS
F061	10.50	3.500	3	L ELELL L	INSUFFICIENT DATA			ICP
F069	188.00	20.889	9					GFAAS
F080	175.00	19.444	9					ICP
F082	110.50	11.050	10					ICPMS
F093	162.50	16.250	10	VH EH				ICP
F094	16.50	2.750	6	L	BIASED LOW	-8.92	-.0021	ICP
F095	130.00	13.000	10					ICP
F097	125.00	20.833	6					ICPMS
F098	57.50	11.500	5					NOTFOUND
F099	133.50	13.350	10					AAS-FURACE
F95b	185.00	18.500	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 15.806

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F030	12.00	2.400	5	LLL	BIASED LOW	-15.90	-.0001	ICP
F094	16.50	2.750	6	L	BIASED LOW	-8.92	-.0021	ICP
F061	10.50	3.500	3	LELELLL	INSUFFICIENT DATA			ICP
F047	76.50	7.650	10		BIASED LOW*	-.85	-.0014	ICP-MS
F082	110.50	11.050	10					ICPMS
F035	77.50	11.071	7					ICP-AES
F098	57.50	11.500	5					NOTFOUND
F011	117.00	11.700	10					ICPMS
F032	105.50	11.722	9					ICP 20X
F051	112.00	12.444	9					ICPMS
F095	130.00	13.000	10					ICP
F099	133.50	13.350	10					AAS-FURACE
F001	134.50	13.450	10					ICPMS
F033	127.00	14.111	9					ICP
F003	142.00	14.200	10					ICP 5X
F048	101.00	14.429	7					GFAAS
F020	117.00	14.625	8					ICP
F031	150.00	15.000	10					GFAAS
F008	140.00	15.556	9	ELH				GFAAS
F015	141.00	15.667	9	H				GFAAS-ICP
F093	162.50	16.250	10	VHEH				ICP
F019	151.50	16.833	9	VHELELEL				ICP
F037	174.00	17.400	10					GFAAS
F046	175.00	17.500	10					ICPMS
F009	160.00	17.778	9					
F95b	185.00	18.500	10					ICP
F013	56.50	18.833	3		INSUFFICIENT DATA			ICP
F080	175.00	19.444	9					ICP
F014	208.00	20.800	10	H				
F097	125.00	20.833	6					ICPMS
F069	188.00	20.889	9					GFAAS
F002	238.50	23.850	10	EHHH				GFAAS
F024	221.00	24.556	9					ICP-AES
F038	223.50	24.833	9	H	BIASED HIGH*	1.85	.0011	GFAAS T
F010	271.00	27.100	10	HH	BIASED HIGH	6.07	.0016	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 15.806

PARAMETER: 25091 Manganese MG/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0015 BASIC ACCEPTABLE ERROR= .0015 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0012	13.00	.0018	11.50	.0041	17.00	.0073	22.50	.012	15.50	.0091	17.00
F002	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.013	27.50	.012 H	31.00
F003	.0011	9.50	.0018	11.50	.0040	10.50	.0069	6.50	.0115	8.00	.0095	23.00
F008	<.005	0.00	<.005	0.00	<.005	0.00	.007	13.00	.012	15.50	.009	12.50
F010	.002	19.50	.002	17.50	.005	23.00	.008	26.50	.013	27.50	.010	27.00
F011	.0011	9.50	.0017	8.00	.0039	3.00	.0070	13.00	.012	15.50	.0092	19.00
F013	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00
F014	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	0.0T EL	1.00
F015	<.001	0.00	<.001	0.00	.004	10.50	.007	13.00	.014	31.00	.010	27.00
F019	.003 H	21.00	.002	17.50	.005	23.00	.008	26.50	.011	4.50	.011	30.00
F020	<.002	0.00	<.002	0.00	.004	10.50	.0072	20.00	.0122	22.00	.0092	19.00
F024	.001	4.00	.002	17.50	.005	23.00	.008	26.50	.013	27.50	.010	27.00
F026	.0038 VH	22.00	.0016	3.50	.0042	18.00	.0063	3.00	.0117	9.00	.0072	2.00
F030	.007 EH	23.50	.002	17.50	.004	10.50	.007	13.00	.011	4.50	.009	12.50
F031	.0015	17.50	.0016	3.50	.0044	20.00	.0081	29.00	.012	15.50	.008	4.00
F032	.001	4.00	.002	17.50	.004	10.50	.007	13.00	.012	15.50	.009	12.50
F033	.0011	9.50	.0017	8.00	.0039	3.00	.0070	13.00	.012	15.50	.009	12.50
F035	.0012	13.00	.0016	3.50	.004	10.50	.0073	22.50	.0126	24.00	.0094	22.00
F036	.001	4.00	.003	22.00	.005	23.00	.008	26.50	.013	27.50	.010	27.00
F038	<.005	0.00	<.005	0.00	<.005	0.00	.007	13.00	.013	27.50	.01	27.00
F046	.001	4.00	.002	17.50	.004	10.50	.007	13.00	.012	15.50	.009	12.50
F047	.001	4.00	.0015	1.00	.0040	10.50	.0064	4.00	.0118	10.00	.0090	12.50
F048	.0015	17.50	.0017	8.00	.0040	10.50	.0068	5.00	.0114	7.00	.0086	7.00
F051	.0010	4.00	<.001	0.00	.0029	1.00	.0059	1.00	.0109	2.00	.0086	7.00
F061	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00
F069	<.001	0.00	<.001	0.00	<.001 VL	0.00	.006	2.00	.011	4.50	.009	12.50
F071	.007 EH	23.50	.009 EH	23.00	.011 EH	26.00	.017 EH	30.00	.005 EL	1.00	.025 EH	32.00
F080	.0013	16.00	.0017	8.00	.040 EH	27.00	.0072	20.00	.0121	21.00	.0093	21.00
F082	.0012	13.00	.0017	8.00	.0039	3.00	.0069	6.50	.012	15.50	.0086	7.00
F093	.002	19.50	.002	17.50	.005	23.00	.007	13.00	.013	27.50	.008	4.00
F094	.001	4.00	.002	17.50	.004	10.50	.007	13.00	.011	4.50	.008	4.00
F095	.0011	9.50	.0016	3.50	.0040	10.50	.0072	20.00	.0120	15.50	.0092	19.00
F097	.0013	15.00	.0018	13.00	.0043	19.00	.0076	24.00	.0125	23.00	.0098	24.00
F95b	<.002	0.00	<.002	0.00	.004	10.50	.007	13.00	.012	15.50	.009	12.50
MEDIAN CONC.	.0012		.0018		.0040		.0070		.0120		.0091	

PARAMETER: 25091 Manganese MG/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.024	22.50	.057	17.00	.065	16.00	.126	22.50
F002	.028 H	30.50	.060	27.50	.068	28.50	.128	27.50
F003	.0237	20.00	.0571	18.50	.0653	19.00	.123	16.00
F008	.022	10.50	.058	22.00	.066	22.00	.125	19.50
F010	.028 H	30.50	.060	27.50	.068	28.50	.127	25.50
F011	.0223	14.00	.0553	8.00	.0631	12.00	.117	7.00
F013	.026	28.50	.060	27.50	.068	28.50	.128	27.50
F014	.021	3.50	.049 L	3.00	.053 VL	2.00	.122	14.00
F015	.025	26.50	.060	27.50	.068	28.50	.127	25.50
F019	.024	22.50	.061	31.00	.069	31.00	.130	30.00
F020	.0235	19.00	.0561	13.50	.064	13.50	.121	12.00
F024	.025	26.50	.060	27.50	.070	32.00	.13	30.00
F026	.0218	7.00	.0510	4.00	.0595	4.00	.1117	4.00
F030	.020	2.00	.048 L	2.00	.056 L	3.00	.107 L	2.00
F031	.015 EL	1.00	.10 EH	34.00	.06	6.00	.12	9.50
F032	.026	28.50	.056	10.50	.067	26.00	.126	22.50
F033	.022	10.50	.056	10.50	.063	10.50	.120	9.50
F035	.0229	16.00	.0584	24.00	.0651	17.00	.13	30.00
F036	.032 EH	32.00	.066 H	32.00	.073	33.00	.142 H	34.00
F038	.024	22.50	.058	22.00	.066	22.00	.126	22.50
F046	.024	22.50	.058	22.00	.066	22.00	.126	22.50
F047	.0219	8.00	.0562	15.00	.0669	25.00	.136	32.00
F048	.0212	6.00	.0538	7.00	.0613	8.00	.1140	6.00
F051	.0222	13.00	.0571	18.50	.0646	15.00	.1233	17.00
F061	<.01 EL	0.00	.03 EL	1.00	.04 EL	1.00	.10 VL	1.00
F069	.022	10.50	.056	10.50	.062	9.00	.120	9.50
F071	.035 EH	33.00	.075 EH	33.00	.079 VH	34.00	.138 H	33.00
F080	.0228	15.00	.0561	13.50	.0654	20.00	.122	14.00
F082	.023	17.50	.052	5.50	.060	6.00	.110	3.00
F093	.022	10.50	.060	27.50	.064	13.50	.125	19.50
F094	.021	3.50	.052	5.50	.060	6.00	.113	5.00
F095	.0211	5.00	.0565	16.00	.0652	18.00	.122	14.00
F097	.0243	25.00	.0579	20.00	.0664	24.00	.124	18.00
F95b	.023	17.50	.056	10.50	.063	10.50	.120	9.50
MEDIAN CONC.	.0230		.0570		.0652		.1237	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	174.50	17.450	10					ICPMS
F002	172.50	28.750	6	H H	BIASED HIGH*	1.29	.0026	AAS
F003	142.50	14.250	10					ICP 5X
F008	115.00	16.429	7					ICP
F010	253.00	25.300	10	H	BIASED HIGH*	2.33	.0012	ICP
F011	109.00	10.900	10					ICPMS
F013	112.00	28.000	4		INSUFFICIENT DATA			ICP
F014	23.50	4.700	5	EL L VL	BIASED LOW*	3.09	-.0083	
F015	189.50	23.688	8					ICP
F019	237.00	23.700	10	H				ICP
F020	129.50	16.188	8					ICP
F024	241.50	24.150	10					ICP-AES
F026	76.50	7.650	10	VH	BIASED LOW	-10.28	.0006	ICP
F030	90.50	9.050	10	EH L L L				ICP
F031	140.00	14.000	10	ELEH				GFAAS
F032	160.50	16.050	10					ICP 20X
F033	102.50	10.250	10					ICP
F035	182.50	18.250	10					ICP-AES
F036	261.00	26.100	10	EHH H	BIASED HIGH	14.18	.0006	COLORIMETRIC
F038	156.50	22.357	7					ICP Scan
F046	162.00	16.200	10					ICPMS
F047	122.00	12.200	10					ICP-MS
F048	82.00	8.200	10					GFAAS
F051	78.50	8.722	9					ICPMS
F061	3.00	1.000	3	ELELELVL	INSUFFICIENT DATA			ICP
F069	58.50	8.357	7	VL				ICP
F071	268.50	26.850	10	EHEHEHEHELEHEHEHVHH	BIASED HIGH	8.38	.0072	GFAAS
F080	175.50	17.550	10	EH				ICP
F082	85.00	8.500	10					ICPMS
F093	175.50	17.550	10					ICP
F094	73.50	7.350	10		BIASED LOW	-8.70	.0002	ICP
F095	131.00	13.100	10					ICP
F097	205.00	20.500	10					ICPMS
F95b	99.50	12.438	8					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 15.858

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	3.00	1.000	3	ELELELVL	INSUFFICIENT DATA			ICP
F014	23.50	4.700	5	ELLVL	BIASED LOW*	3.09	-.0083	
F094	73.50	7.350	10		BIASED LOW	-8.70	.0002	ICP
F026	76.50	7.650	10	VH	BIASED LOW	-10.28	.0006	ICP
F048	82.00	8.200	10					GFAAS
F069	58.50	8.357	7	VL				ICP
F082	85.00	8.500	10					ICPMS
F051	78.50	8.722	9					ICPMS
F030	90.50	9.050	10	EHLLL				ICP
F033	102.50	10.250	10					ICP
F011	109.00	10.900	10					ICPMS
F047	122.00	12.200	10					ICP-MS
F95b	99.50	12.438	8					ICP
F095	131.00	13.100	10					ICP
F031	140.00	14.000	10	ELEH				GFAAS
F003	142.50	14.250	10					ICP 5X
F032	160.50	16.050	10					ICP 20X
F020	129.50	16.188	8					ICP
F046	162.00	16.200	10					ICPMS
F008	115.00	16.429	7					ICP
F001	174.50	17.450	10					ICPMS
F080	175.50	17.550	10	EH				ICP
F093	175.50	17.550	10					ICP
F035	182.50	18.250	10					ICP-AES
F097	205.00	20.500	10					ICPMS
F038	156.50	22.357	7					ICP Scan
F015	189.50	23.688	8					ICP
F019	237.00	23.700	10	H				ICP
F024	241.50	24.150	10					ICP-AES
F010	253.00	25.300	10	H	BIASED HIGH*	2.33	.0012	ICP
F036	261.00	26.100	10	EHHH	BIASED HIGH	14.18	.0006	COLORIMETRIC
F071	268.50	26.850	10	EHEHEHEHELEHEHEHVHH	BIASED HIGH	8.38	.0072	GFAAS
F013	112.00	28.000	4		INSUFFICIENT DATA			ICP
F002	172.50	28.750	6	HH	BIASED HIGH*	1.29	.0026	AAS

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

OVERALL AVERAGE
RANK IS 15.858

PARAMETER: 26091 Iron MG/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0050 BASIC ACCEPTABLE ERROR= .0050 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0055	15.00	.0095	21.00	.0061	15.00	.017	16.00	.008	14.50	.011	8.50
F002	.005	11.00	.0075	16.00	.0055	10.00	.018	20.50	.0073	11.00	.0115	10.50
F003	.0041	8.00	.0073	14.00	.0053	8.00	.0180	20.50	.0106	18.00	.012	15.00
F008	<.01	0.00	<.01	0.00	<.01	0.00	.02	24.00	<.01	0.00	.01	5.50
F010	.004	6.50	.006	5.50	.006	12.50	.018	20.50	.008	14.50	.012	15.00
F011	.003	3.00	.007	11.50	.005	4.50	.016	11.50	.006	6.00	.012	15.00
F013	<.1	0.00	<.1	0.00	<.01	0.00	<.1	0.00	<.1	0.00	<.1	0.00
F014	<.01	0.00	<.01	0.00	<.01	0.00	.017	16.00	<.01	0.00	.011	8.50
F015	<.005	0.00	.006	5.50	<.005	0.00	.010 L	5.00	<.005	0.00	<.005 L	0.00
F019	.004	6.50	.008	17.00	.007	17.00	.039 EH	26.00	.006	6.00	.013	21.50
F020	<.003	0.00	<.003	0.00	<.003	0.00	.004 EL	3.00	<.003	0.00	<.003 VL	0.00
F024	.005	11.00	.007	11.50	.006	12.50	.018	20.50	.007	10.00	.013	21.50
F026	.0075	19.00	.0067	8.00	.0047	2.00	.0141	9.00	.0057	4.00	.0103	7.00
F030	.693 EH	22.00	.013 H	23.00	.019 EH	20.00	.023	25.00	.012	19.00	.016	25.00
F031	.007	18.00	.007	11.50	.017 EH	19.00	.041 EH	28.00	.024 EH	21.00	.030 EH	26.00
F032	.0050	11.00	.0074	15.00	.0054	9.00	.017	16.00	.0079	12.50	.012	15.00
F033	.006	16.00	.009	20.00	.005	4.50	.016	11.50	.0079	12.50	.012	15.00
F035	.005	11.00	.006	5.50	.005	4.50	.017	16.00	.013 H	20.00	.012	15.00
F036	.002	1.00	.002	1.00	.004	1.00	.014	8.00	.002 L	2.00	.006 L	3.00
F038	<.030	0.00	<.030	0.00	<.030	0.00	<.030	0.00	<.030	0.00	<.030	0.00
F046	<.03	0.00	<.03	0.00	<.03	0.00	<.03	0.00	<.03	0.00	.014	23.50
F047	.050 EH	21.00	.040 EH	24.00	<.01	0.00	.04 EH	27.00	<.01	0.00	<.01	0.00
F048	.0065	17.00	.0088	19.00	.0068	16.00	.0018 EL	1.00	.0081	16.00	.0128	20.00
F051	<.001	0.00	<.001 L	0.00	<.001	0.00	.0076 VL	4.00	<.001 L	0.00	.0053 L	2.00
F061	<.01	0.00	<.01	0.00	<.01	0.00	<.01 L	0.00	<.01	0.00	<.01	0.00
F069	.005	11.00	.010	22.00	<.003	0.00	.013	6.50	.004	3.00	.010	5.50
F071	.014 VH	20.00	.007	11.50	.009	18.00	.002 EL	2.00	.001 L	1.00	.014	23.50
F080	.0054	14.00	.0085	18.00	.0060	12.50	.0184	23.00	.0068	8.50	.0127	19.00
F093	.003	3.00	.005	2.50	.005	4.50	.017	16.00	.006	6.00	.003 VL	1.00
F094	<.005	0.00	.005	2.50	<.005	0.00	.013	6.50	<.005	0.00	.009	4.00
F095	.0037	5.00	.0069	9.00	.0051	7.00	.0162	13.00	.0068	8.50	.0115	10.50
F95b	.003	3.00	.006	5.50	.006	12.50	.015	10.00	.009	17.00	.012	15.00
MEDIAN CONC.	.0050		.0070		.0058		.0170		.0073		.0120	

PARAMETER: 26091 Iron MG/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.115	16.00	.127	16.00	.079	10.00	.153	17.50
F002	.120	23.00	.130	19.50	.082	18.50	.154	19.50
F003	.112	10.50	.123	11.50	.078	8.00	.148	8.00
F008	.12	23.00	.13	19.50	.08	13.00	.16	27.50
F010	.116	17.00	.131	23.00	.085	24.50	.159	24.50
F011	.118	19.00	.156 VH	31.00	.083	21.50	.152	13.50
F013	.120	23.00	.136	27.00	.085	24.50	.158	23.00
F014	.126	29.00	.131	23.00	.086	27.50	.160	27.50
F015	.112	10.50	.120	7.00	.082	18.50	.145	5.50
F019	.121	27.00	.133	26.00	.086	27.50	.160	27.50
F020	.111	9.00	.106 L	3.00	.0692	2.00	.138	3.00
F024	.12	23.00	.14	28.50	.090	30.00	.16	27.50
F026	.1069	6.00	.1119	5.00	.0765	5.00	.1422	4.00
F030	.113	12.00	.118	6.00	.080	13.00	.145	5.50
F031	.245 EH	32.00	.16 VH	32.00	.36 EH	32.00	.21 EH	32.00
F032	.121	27.00	.123	11.50	.082	18.50	.154	19.50
F033	.110	8.00	.130	19.50	.082	18.50	.150	10.50
F035	.109	7.00	.121	8.50	.08	13.00	.152	13.50
F036	.120	23.00	.125	14.00	.080	13.00	.152	13.50
F038	.121	27.00	.131	23.00	.084	23.00	.159	24.50
F046	.13	30.00	.14	28.50	.087	29.00	.17	30.00
F047	.10	3.00	.11 L	4.00	.07	3.00	.15	10.50
F048	.1143	15.00	.1321	25.00	.083	21.50	.1522	16.00
F051	.1186	20.00	.1267	15.00	.0773	7.00	.1570	22.00
F061	.09 VL	1.00	.10 VL	1.00	.06 VL	1.00	.13 L	1.00
F069	.114	13.50	.122	10.00	.080	13.00	.149	9.00
F071	.131	31.00	.148 H	30.00	.108 EH	31.00	.176 H	31.00
F080	.114	13.50	.129	17.00	.0851	26.00	.156	21.00
F093	.105	4.50	.130	19.50	.077	6.00	.153	17.50
F094	.099 L	2.00	.105 L	2.00	.071	4.00	.132 L	2.00
F095	.105	4.50	.121	8.50	.0787	9.00	.147	7.00
F95b	.117	18.00	.124	13.00	.081	16.00	.152	13.50
MEDIAN CONC.	.1155		.1280		.0815		.1526	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	149.50	14.950	10					ICP5x
F002	159.50	15.950	10					AAS, 10X
F003	121.50	12.150	10					ICP 5X
F008	112.50	18.750	6					ICP
F010	163.50	16.350	10					ICP
F011	136.50	13.650	10	VH				AAS
F013	97.50	24.375	4		INSUFFICIENT DATA			ICP
F014	131.50	21.917	6					
F015	52.00	8.667	6	L L				ICP
F019	202.00	20.200	10	EH				ICP
F020	20.00	4.000	5	EL VL L	BIASED LOW*	-1.99	-.0113	ICP
F024	196.00	19.600	10					ICP-AES
F026	69.00	6.900	10		BIASED LOW	-8.52	.0000	ICP
F030	170.50	17.050	10	EHH EH				ICP
F031	251.50	25.150	10	EHEHEHEHEHVHEHEH	BIASED HIGH	65.85	.0219	GFAAS
F032	155.00	15.500	10					ICP 20X
F033	136.00	13.600	10					ICP
F035	114.00	11.400	10	H				ICP-AES
F036	79.50	7.950	10	L L				COLORIMETRIC
F038	97.50	24.375	4		INSUFFICIENT DATA			ICP Scan
F046	141.00	28.200	5		BIASED HIGH	11.01	-.0005	ICP
F047	92.50	13.214	7	EHEH EH L				ICP-MS
F048	166.50	16.650	10	EL				GFAAS
F051	70.00	11.667	6	L VLL L				ICPMS
F061	4.00	1.000	4	L VLVLVLL	INSUFFICIENT DATA			ICP
F069	93.50	10.389	9					ICP
F071	199.00	19.900	10	VH ELL H EHH				GFAAS
F080	172.50	17.250	10					ICP
F093	80.50	8.050	10	VL				ICP
F094	23.00	3.286	7	L L L	BIASED LOW	-13.93	-.0012	ICP
F095	82.00	8.200	10					ICP
F95b	123.50	12.350	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 14.361

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	4.00	1.000	4	LVLVLVLL	INSUFFICIENT DATA			ICP
F094	23.00	3.286	7	LLL	BIASED LOW	-13.93	-.0012	ICP
F020	20.00	4.000	5	ELVLL	BIASED LOW*	-1.99	-.0113	ICP
F026	69.00	6.900	10		BIASED LOW	-8.52	.0000	ICP
F036	79.50	7.950	10	LL				COLORIMETRIC
F093	80.50	8.050	10	VL				ICP
F095	82.00	8.200	10					ICP
F015	52.00	8.667	6	LL				ICP
F069	93.50	10.389	9					ICP
F035	114.00	11.400	10	H				ICP-AES
F051	70.00	11.667	6	LVLLL				ICPMS
F003	121.50	12.150	10					ICP 5X
F95b	123.50	12.350	10					ICP
F047	92.50	13.214	7	EHEHEHL				ICP-MS
F033	136.00	13.600	10					ICP
F011	136.50	13.650	10	VH				AAS
F001	149.50	14.950	10					ICP5x
F032	155.00	15.500	10					ICP 20X
F002	159.50	15.950	10					AAS, 10X
F010	163.50	16.350	10					ICP
F048	166.50	16.650	10	EL				GFAAS
F030	170.50	17.050	10	EHHEH				ICP
F080	172.50	17.250	10					ICP
F008	112.50	18.750	6					ICP
F024	196.00	19.600	10					ICP-AES
F071	199.00	19.900	10	VHELLHEHH				GFAAS
F019	202.00	20.200	10	EH				ICP
F014	131.50	21.917	6					
F038	97.50	24.375	4		INSUFFICIENT DATA			ICP Scan
F013	97.50	24.375	4		INSUFFICIENT DATA			ICP
F031	251.50	25.150	10	EHEHEHEHEHVHEHEH	BIASED HIGH	65.85	.0219	GFAAS
F046	141.00	28.200	5		BIASED HIGH	11.01	-.0005	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 14.361

PARAMETER: 27091 Cobalt mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<.0001	0.00	.0037	13.00	.0029	8.50	.0061	22.50	.0085	14.50	.015	8.50
F003	.0001	3.00	.0036	11.00	.0026	6.00	.0054	7.00	.0076	5.00	.016	18.00
F008	<.002	0.00	.004	17.50	.003	14.00	.006	16.50	.009	20.00	.016	18.00
F010	<.001	0.00	.005	21.50	.004	20.50	.008	25.00	.011 H	25.00	.019 H	26.00
F011	<.0001	0.00	.0036	11.00	.0028	7.00	.0056	9.00	.0082	12.00	.0151	11.00
F015	<.005	0.00	<.005	0.00	<.005	0.00	.006	16.50	.009	20.00	.017	24.00
F019	<.003	0.00	.006 H	23.00	<.003	0.00	.003 L	1.00	.006	1.00	.017	24.00
F020	.003 H	6.00	<.003	0.00	<.003	0.00	.005	3.50	.0089	16.00	.0152	12.00
F024	<.001	0.00	.003	4.00	.003	14.00	.006	16.50	.009	20.00	.016	18.00
F026	-.0007	1.00	.0027	2.00	.0020	3.00	.0050	3.50	.0069	2.00	.0140	4.00
F030	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.01 VL	1.00
F032	<.001	0.00	.003	4.00	.003	14.00	.006	16.50	.008	9.00	.015	8.50
F033	<.005	0.00	.0036	11.00	.0029	8.50	.0059	11.00	.0083	13.00	.016	18.00
F035	<.001	0.00	.004	17.50	.001	1.00	.005	3.50	.008	9.00	.016	18.00
F038	<.001	0.00	.004	17.50	.003	14.00	.006	16.50	.009	20.00	.015	8.50
F046	<.001	0.00	.004	17.50	.003	14.00	.006	16.50	.008	9.00	.016	18.00
F047	.0003	4.00	.0033	7.00	.0029	10.00	.0056	8.00	.0074	4.00	.0137	2.00
F051	<.0001	0.00	.0032	6.00	.0024	5.00	.0053	6.00	.0079	6.00	.0148	6.00
F061	<.005	0.00	<.005	0.00	<.005	0.00	<.005	0.00	<.005 L	0.00	<.005 EL	0.00
F069	<.001	0.00	.004	17.50	.004	20.50	.006	16.50	.009	20.00	.017	24.00
F071	0.000	2.00	.002	1.00	.002	3.00	.005	3.50	.008	9.00	.016	18.00
F080	<.0014	0.00	.0035	8.50	.0031	18.50	.0058	10.00	.0092	24.00	.0153	13.00
F093	.004 VH	7.00	.004	17.50	.010 EH	22.00	.006	16.50	.008	9.00	.015	8.50
F094	<.002	0.00	.003	4.00	.003	14.00	.006	16.50	.009	20.00	.014	4.00
F095	.0009	5.00	.0035	8.50	.0031	18.50	.0061	22.50	.0085	14.50	.0156	14.00
F097		0.00	.0038	14.00	.0030	14.00	.0063	24.00	.009	20.00	.0164	22.00
F95b	<.002	0.00	.005	21.50	.002	3.00	.006	16.50	.007	3.00	.014	4.00
MEDIAN CONC.	.0003		.0036		.0030		.0060		.0083		.0154	

PARAMETER: 27091 Cobalt mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.066	16.00	.068	15.50	.113	15.00	.218	15.50
F003	.066	16.00	.066	9.00	.111	12.00	.209	7.00
F008	.07	25.00	.07	20.50	.12	25.50	.23	25.50
F010	.066	16.00	.074	27.00	.118	21.00	.223	22.00
F011	.0616	7.00	.0646	6.00	.110	9.50	.201	5.00
F015	.068	23.00	.073	26.00	.120	25.50	.219	17.50
F019	.067	20.50	.071	23.00	.119	22.50	.226	23.50
F020	.0668	19.00	.0671	12.00	.1135	16.00	.215	13.50
F024	.069	24.00	.070	20.50	.12	25.50	.22	20.00
F026	.0593	2.00	.0604	3.00	.1060	5.00	.1979	3.00
F030	.06	3.50	.06	2.00	.10	2.00	.19 L	1.00
F032	.063	9.00	.063	4.50	.109	7.00	.206	6.00
F033	.065	12.50	.068	15.50	.110	9.50	.210	10.00
F035	.062	8.00	.065	7.00	.115	18.00	.218	15.50
F038	.072	27.00	.072	24.50	.119	22.50	.226	23.50
F046	.066	16.00	.067	11.00	.11	9.50	.22	20.00
F047	.0603	5.00	.0679	14.00	.108	6.00	.215	13.50
F051	.0635	10.00	.0673	13.00	.1114	13.00	.2099	8.00
F061	.044 EL	1.00	.036 EL	1.00	.097 L	1.00	.192	2.00
F069	.071	26.00	.070	20.50	.120	25.50	.235	27.00
F071	.065	12.50	.069	18.00	.104	3.00	.230	25.50
F080	.0636	11.00	.0658	8.00	.112	14.00	.210	10.00
F093	.067	20.50	.072	24.50	.110	9.50	.220	20.00
F094	.060	3.50	.063	4.50	.105	4.00	.199	4.00
F095	.0613	6.00	.0669	10.00	.114	17.00	.210	10.00
F097	.0674	22.00	.0687	17.00	.117	20.00	.213	12.00
F95b	.066	16.00	.070	20.50	.116	19.00	.219	17.50
MEDIAN CONC.	.0660		.0679		.1120		.2150	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	129.00	14.333	9					ICPMS
F003	94.00	9.400	10					ICP 5X
F008	182.50	20.278	9		BIASED HIGH	7.00	-.0005	GFAAS, AAS
F010	204.00	22.667	9	H H	BIASED HIGH*	2.96	.0018	ICP
F011	77.50	8.611	9					ICPMS
F015	152.50	21.786	7		BIASED HIGH*	2.28	.0015	ICP
F019	138.50	17.313	8	H L				ICP
F020	98.00	12.250	8	H				ICP
F024	162.50	18.056	9					ICP-AES
F026	28.50	2.850	10		BIASED LOW	-7.28	-.0008	ICP
F030	9.50	1.900	5	VL L	BIASED LOW	-10.48	-.0013	ICP
F032	78.50	8.722	9					ICP 20X
F033	109.00	12.111	9					ICP
F035	97.50	10.833	9					ICP-AES
F038	174.00	19.333	9					GFAAS T
F046	131.50	14.611	9					ICPMS
F047	73.50	7.350	10					ICP-MS
F051	73.00	8.111	9					ICPMS
F061	5.00	1.250	4	L ELELELL	INSUFFICIENT DATA			ICP
F069	197.50	21.944	9		BIASED HIGH	8.77	-.0005	GFAAS
F071	95.50	9.550	10					GFAAS
F080	117.00	13.000	9					ICP
F093	155.00	15.500	10	VH EH				ICP
F094	74.50	8.278	9					ICP
F095	126.00	12.600	10					ICP
F097	165.00	18.333	9					ICPMS
F95b	121.00	13.444	9					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 13.008

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	5.00	1.250	4	LELELELL	INSUFFICIENT DATA			ICP
F030	9.50	1.900	5	VLL	BIASED LOW	-10.48	-.0013	ICP
F026	28.50	2.850	10		BIASED LOW	-7.28	-.0008	ICP
F047	73.50	7.350	10					ICP-MS
F051	73.00	8.111	9					ICPMS
F094	74.50	8.278	9					ICP
F011	77.50	8.611	9					ICPMS
F032	78.50	8.722	9					ICP 20X
F003	94.00	9.400	10					ICP 5X
F071	95.50	9.550	10					GFAAS
F035	97.50	10.833	9					ICP-AES
F033	109.00	12.111	9					ICP
F020	98.00	12.250	8	H				ICP
F095	126.00	12.600	10					ICP
F080	117.00	13.000	9					ICP
F95b	121.00	13.444	9					ICP
F001	129.00	14.333	9					ICPMS
F046	131.50	14.611	9					ICPMS
F093	155.00	15.500	10	VHEH				ICP
F019	138.50	17.313	8	HL				ICP
F024	162.50	18.056	9					ICP-AES
F097	165.00	18.333	9					ICPMS
F038	174.00	19.333	9					GFAAS T
F008	182.50	20.278	9		BIASED HIGH	7.00	-.0005	GFAAS, AAS
F015	152.50	21.786	7		BIASED HIGH*	2.28	.0015	ICP
F069	197.50	21.944	9		BIASED HIGH	8.77	-.0005	GFAAS
F010	204.00	22.667	9	HH	BIASED HIGH*	2.96	.0018	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 13.008

Cobalt

PARAMETER: 28091 Nickel mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0006	2.00	.0041	18.00	.0049	10.50	.0088	13.00	.0067	13.00	.015	10.50
F002	<.002	0.00	.0040	12.50	.0051	16.50	.0085	10.00	.0075	20.00	.0155	15.50
F003	.0008	3.00	.0039	6.50	.0044	4.50	.0078	3.00	.0060	5.00	.016	20.50
F008	<.005	0.00	<.005	0.00	<.005	0.00	.008	5.50	.006	5.00	.014	6.00
F010	.001	5.00	.008 VH	21.50	.009 VH	20.50	.013 H	25.00	.011 VH	25.00	.019 H	27.00
F011	.0015	11.00	.0040	12.50	.0048	8.50	.0083	7.50	.0065	11.00	.0149	7.00
F013	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00
F014	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00
F015	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00
F019	<.005	0.00	.013 EH	23.00	.009 VH	20.50	.011	23.00	.007	17.00	.011 L	2.00
F020	<.008	0.00	<.008	0.00	<.008	0.00	.0136 VH	26.00	.010 H	23.50	.0185	26.00
F024	<.001	0.00	.004	12.50	.005	13.50	.009	16.50	.007	17.00	.016	20.50
F026	.0098 EH	14.00	.0054	20.00	.0068	19.00	.0107	21.00	.0088	22.00	.0157	17.00
F030	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.01 VL	1.00
F032	<.001	0.00	.004	12.50	.005	13.50	.009	16.50	.007	17.00	.015	10.50
F033	<.001	0.00	.0039	6.50	.0046	6.50	.0084	9.00	.0064	8.50	.015	10.50
F035	<.002	0.00	.004	12.50	.002 L	1.00	.011	23.00	.007	17.00	.016	20.50
F038	.001	5.00	.004	12.50	.004	2.50	.009	16.50	.006	5.00	.015	10.50
F046	.001	5.00	.004	12.50	.005	13.50	.009	16.50	.007	17.00	.016	20.50
F047	.0016	12.00	.0033	2.00	.0046	6.50	.0076	2.00	.0057	3.00	.0135	5.00
F048	.0013	7.00	.0046	19.00	.0048	8.50	.0086	11.00	.0064	8.50	.0150	10.50
F051	.0014	8.50	.0034	3.00	.0044	4.50	.0079	4.00	.0063	7.00	.0155	15.50
F061	<.005	0.00	<.005	0.00	<.005	0.00	<.005 L	0.00	.028 EH	26.00	.026 EH	28.00
F069	<.001	0.00	.004	12.50	.005	13.50	.009	16.50	.008	21.00	.017	24.00
F071	.032 EH	15.00	.033 EH	24.00	.028 EH	23.00	.029 EH	27.00	.041 EH	27.00	.043 EH	29.00
F080	<.0071	0.00	<.0071	0.00	<.0071	0.00	.0080	5.50	<.0071	0.00	.0168	23.00
F082	.0014	8.50	.0040	12.50	.0049	10.50	.0083	7.50	.0065	11.00	.015	10.50
F093	.003	13.00	.004	12.50	.010 EH	22.00	.009	16.50	.005	1.50	.013	3.50
F094	<.002	0.00	.002	1.00	.004	2.50	.006 L	1.00	.005	1.50	.013	3.50
F095	.0005	1.00	.0038	4.00	.0051	16.50	.0087	12.00	.0065	11.00	.0154	14.00
F097	.0015	10.00	.0038	5.00	.0051	18.00	.0091	20.00	.0069	14.00	.0158	18.00
F95b	<.005	0.00	.008 VH	21.50	<.005	0.00	.011	23.00	.010 H	23.50	.018	25.00
MEDIAN CONC.	.0014		.0040		.0050		.0090		.0069		.0155	

PARAMETER: 28091 Nickel mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.112	18.00	.133	16.50	.107	12.00	.204	13.00
F002	.122	31.00	.136	22.00	.110	21.00	.208	19.50
F003	.111	16.00	.131	14.50	.106	9.50	.198	8.00
F008	.11	12.50	.13	10.50	.12	30.50	.2	10.50
F010	.116	23.00	.142	31.00	.113	26.00	.209	21.50
F011	.105	6.00	.127	6.00	.104	5.00	.193	5.00
F013	.118	26.00	.140	26.50	.113	26.00	.209	21.50
F014	.112	18.00	.140	26.50	.105	6.50	.205	14.00
F015	.12	28.50	.13	10.50	.11	21.00	.22	29.50
F019	.117	24.50	.140	26.50	.110	21.00	.214	27.00
F020	.117	24.50	.135	19.00	.109	16.50	.206	15.50
F024	.12	28.50	.14	26.50	.11	21.00	.21	23.50
F026	.1069	7.00	.1233	4.00	.1051	8.00	.1934	6.00
F030	.10	2.00	.115 L	2.00	.09 L	2.00	.18 L	2.00
F032	.109	9.00	.126	5.00	.106	9.50	.198	8.00
F033	.110	12.50	.130	10.50	.110	21.00	.200	10.50
F035	.11	12.50	.135	19.00	.115	28.00	.213	26.00
F038	.109	9.00	.135	19.00	.113	26.00	.206	15.50
F046	.12	28.50	.14	26.50	.11	21.00	.21	23.50
F047	.101	3.00	.128	7.00	.109	16.50	.207	17.50
F048	.1152	22.00	.1310	14.50	.1076	14.00		0.00
F051	.1104	15.00	.1353	21.00	.1089	15.00	.2032	12.00
F061	.102	4.50	.071 EL	1.00	.043 EL	1.00	.148 EL	1.00
F069	.120	28.50	.140	26.50	.120	30.50	.220	29.50
F071	.162 EH	32.00	.188 EH	32.00	.144 EH	32.00	.271 EH	31.00
F080	.109	9.00	.133	16.50	.110	21.00	.208	19.50
F082	.110	12.50	.130	10.50	.100	4.00	.190	4.00
F093	.113	20.50	.141	30.00	.105	6.50	.211	25.00
F094	.098 L	1.00	.123	3.00	.099	3.00	.188	3.00
F095	.102	4.50	.130	10.50	.107	12.00	.198	8.00
F097	.113	20.50	.139	23.00	.117	29.00	.215	28.00
F95b	.112	18.00	.130	10.50	.107	12.00	.207	17.50
MEDIAN CONC.	.1115		.1330		.1090		.2060	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	126.50	12.650	10					ICPMS
F002	168.00	18.667	9					AAS, 10X
F003	90.50	9.050	10					ICP 5X
F008	80.50	11.500	7					GFAAS, AAS
F010	225.50	22.550	10	VHVHH VHH	BIASED HIGH*	1.07	.0033	ICP
F011	79.50	7.950	10					ICPMS
F013	100.00	25.000	4		INSUFFICIENT DATA			ICP
F014	65.00	16.250	4		INSUFFICIENT DATA			
F015	89.50	22.375	4		INSUFFICIENT DATA			ICP
F019	184.50	20.500	9	EHVH L				ICP
F020	151.00	21.571	7	VHH				ICP
F024	179.50	19.944	9					ICP-AES
F026	138.00	13.800	10	EH				ICP
F030	9.00	1.800	5	VL L L L	BIASED LOW	-10.72	-.0037	ICP
F032	101.50	11.278	9					ICP 20X
F033	95.50	10.611	9					ICP
F035	159.50	17.722	9	L				ICP-AES
F038	121.50	12.150	10					GFAAS T
F046	184.50	18.450	10					ICPMS
F047	74.50	7.450	10		BIASED LOW*	-.99	-.0014	ICP-MS
F048	115.00	12.778	9					GFAAS
F051	105.50	10.550	10					ICPMS
F061	61.50	10.250	6	L EHEH ELELEL				ICP
F069	202.50	22.500	9					GFAAS
F071	272.00	27.200	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	18.56	.0258	GFAAS
F080	94.50	15.750	6					ICP
F082	91.50	9.150	10					ICPMS
F093	151.00	15.100	10	EH				ICP
F094	19.50	2.167	9	L L	BIASED LOW	-8.02	-.0015	ICP
F095	93.50	9.350	10					ICP
F097	185.50	18.550	10					ICPMS
F95b	151.00	18.875	8	VH H				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 14.585

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F030	9.00	1.800	5	VLLLL	BIASED LOW	-10.72	-.0037	ICP
F094	19.50	2.167	9	LL	BIASED LOW	-8.02	-.0015	ICP
F047	74.50	7.450	10		BIASED LOW*	-.99	-.0014	ICP-MS
F011	79.50	7.950	10					ICPMS
F003	90.50	9.050	10					ICP 5X
F082	91.50	9.150	10					ICPMS
F095	93.50	9.350	10					ICP
F061	61.50	10.250	6	LEHEHELELEL				ICP
F051	105.50	10.550	10					ICPMS
F033	95.50	10.611	9					ICP
F032	101.50	11.278	9					ICP 20X
F008	80.50	11.500	7					GFAAS, AAS
F038	121.50	12.150	10					GFAAS T
F001	126.50	12.650	10					ICPMS
F048	115.00	12.778	9					GFAAS
F026	138.00	13.800	10	EH				ICP
F093	151.00	15.100	10	EH				ICP
F080	94.50	15.750	6					ICP
F014	65.00	16.250	4		INSUFFICIENT DATA			
F035	159.50	17.722	9	L				ICP-AES
F046	184.50	18.450	10					ICPMS
F097	185.50	18.550	10					ICPMS
F002	168.00	18.667	9					AAS, 10X
F95b	151.00	18.875	8	VHH				ICP
F024	179.50	19.944	9					ICP-AES
F019	184.50	20.500	9	EHVHL				ICP
F020	151.00	21.571	7	VHH				ICP
F015	89.50	22.375	4		INSUFFICIENT DATA			ICP
F069	202.50	22.500	9					GFAAS
F010	225.50	22.550	10	VHVHHVHH	BIASED HIGH*	1.07	.0033	ICP
F013	100.00	25.000	4		INSUFFICIENT DATA			ICP
F071	272.00	27.200	10	EHEHEHEHEHEHEHEHEHEH	BIASED HIGH	18.56	.0258	GFAAS

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

OVERALL AVERAGE
RANK IS 14.585

Nickel

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;29091

PARAMETER: 29091 Copper mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0012	14.50	.0033	19.00	.0050	19.00	.0093	30.00	.018	20.50	.017	12.50
F002	.0012	14.50	.0032	16.50	.0051	25.00	.0085	19.00	.018	20.50	.019	26.50
F003	.0014	18.00	.0033	19.00	.0049	12.50	.0086	20.50	.0178	16.00	.016	8.00
F008	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.02	33.50	.02	31.50
F010	.001	8.00	.004	26.00	.006	29.50	.010	31.00	.020	33.50	.019	26.50
F011	.0010	8.00	.0031	15.00	.0046	7.00	.0080	11.00	.0171	14.00	.0177	19.00
F013	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	.019	29.50	.017	12.50
F014	.0005	2.00	.004	26.00	.0037	2.50	.0081	16.00	.018	20.50	.018	21.50
F015	<.005	0.00	<.005	0.00	.006	29.50	.005 L	2.00	.021	36.00	.021 H	33.00
F019	<.002	0.00	.004	26.00	.005	19.00	.012 H	32.00	.018	20.50	.018	21.50
F020	<.001	0.00	.0029	7.00	.0046	7.00	.008	11.00	.0175	15.00	.0172	17.00
F024	<.001	0.00	.001	2.00	.005	19.00	.008	11.00	.018	20.50	.020	31.50
F026	.0071 EH	25.00	.0025	5.00	.0050	19.00	.0080	11.00	.0161	6.50	.0157	6.00
F030	<.006	0.00	<.006	0.00	<.006	0.00	.006	3.00	.015	4.00	.014	3.00
F031	.0010	8.00	.0030	11.00	.0047	10.00	.0070	4.00	.0100 EL	2.00	.0150	4.50
F032	.001	8.00	.003	11.00	.005	19.00	.008	11.00	.017	11.50	.017	12.50
F033	.0014	18.00	.0033	19.00	.0049	12.50	.0082	17.50	.017	11.50	.018	21.50
F035	<.002	0.00	<.002	0.00	.004	4.50	.008	11.00	.017	11.50	.016	8.00
F036	.0015	21.00	.0034	21.00	.0050	19.00	.0082	17.50	.0166	8.00	.0166	10.00
F037	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.020	33.50	.023 VH	34.50
F038	.001	8.00	.003	11.00	.004	4.50	.008	11.00	.019	29.50	.019	26.50
F046	.001	8.00	.003	11.00	.005	19.00	.009	25.00	.018	20.50	.023 VH	34.50
F047	.0019	23.00	.0035	22.00	.0060	29.50	.0090	25.00	.0181	25.00	.0173	18.00
F048	.0012	14.50	.0030	11.00	.0047	10.00	.0086	20.50	.0194	31.00	.0192	29.00
F051	.0007	3.00	.0021	4.00	.0037	2.50	.0071	5.00	.0161	6.50	.0171	15.50
F061	<.005	0.00	<.005	0.00	<.005	0.00	<.005 L	0.00	.006 EL	1.00	.008 EL	1.00
F069	.001	8.00	.003	11.00	.005	19.00	.009	25.00	.020	33.50	.019	26.50
F071	0.000	1.00	0.000 L	1.00	0.000 EL	1.00	.001 EL	1.00	.011 VL	3.00	.012 VL	2.00
F080	.0031	24.00	.0042	28.00	.0060	29.50	.0088	22.00	.0187	27.00	.0185	24.00
F082	.0014	18.00	.0032	16.50	.0047	10.00	.0080	11.00	.017	11.50	.017	12.50
F093	.001	8.00	.002	3.00	.005	19.00	.009	25.00	.018	20.50	.015	4.50
F094	.001	8.00	.003	11.00	.005	19.00	.008	11.00	.016	5.00	.016	8.00
F095	.0016	22.00	.0028	6.00	.0046	7.00	.0077	6.00	.0169	9.00	.0171	15.50
F097	.0015	20.00	.0036	23.00	.0057	27.00	.0091	28.00	.0185	26.00	.0194	30.00
F098	.0012	14.50	.0036	24.00	.0054	26.00	.0092	29.00	.0189	28.00		0.00
F95b	<.002	0.00	.0045	29.00	.005	19.00	.009	25.00	.018	20.50	.018	21.50
MEDIAN CONC.	.0012		.0031		.0050		.0081		.0180		.0173	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	190.50	19.050	10					ICPMS
F002	232.50	23.250	10					AAS, 10X
F003	164.50	16.450	10					ICP 5X
F008	142.00	23.667	6					ICP
F010	255.50	25.550	10					ICP
F011	116.00	11.600	10					ICPMS
F013	143.00	23.833	6					ICP
F014	215.00	21.500	10	H				
F015	220.00	27.500	8	L H	BIASED HIGH	5.28	.0003	ICP
F019	193.50	21.500	9	H				ICP
F020	114.00	12.667	9					ICP
F024	202.50	22.500	9					ICP-AES
F026	95.50	9.550	10	EH L				ICP
F030	25.50	3.643	7	L	BIASED LOW	-9.18	-.0013	ICP
F031	89.00	8.900	10	EL				GFAAS
F032	121.00	12.100	10					ICP 20X
F033	148.00	14.800	10					ICP
F035	73.50	9.188	8					ICP-AES
F036	109.50	10.950	10	L L				GFAAS
F037	182.50	30.417	6	VH H	BIASED HIGH*	.49	.0045	ICP
F038	205.50	20.550	10					GFAAS T
F046	223.00	22.300	10	VH				ICPMS
F047	271.50	27.150	10		BIASED HIGH	9.08	-.0002	ICP-MS
F048	183.00	18.300	10	EH				GFAAS
F051	88.50	8.850	10					ICPMS
F061	7.00	1.167	6	L ELELVLELVLL	BIASED LOW	-9.95	-.0103	ICP
F069	227.50	22.750	10					GFAAS
F071	76.00	7.600	10	L ELELVLVLVL	BIASED LOW	8.27	-.0067	GFAAS
F080	224.50	22.450	10					ICP
F082	120.00	12.000	10					ICPMS
F093	151.00	15.100	10					ICP
F094	84.50	8.450	10					ICP
F095	126.00	12.600	10					ICP
F097	262.50	26.250	10					ICPMS
F098	121.50	24.300	5					NOTFOUND
F95b	194.50	21.611	9					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 17.073

PARAMETER: 29091 Copper mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.023	19.50	.077	19.00	.128	17.00	.243	19.50
F002	.027	33.00	.080	24.00	.132	26.50	.250	27.00
F003	.021	8.50	.077	19.00	.129	18.50	.249	24.50
F008	.02	4.50	.08	24.00	.13	21.50	.25	27.00
F010	.025	30.50	.080	24.00	.131	24.00	.247	22.50
F011	.0214	10.50	.0745	12.00	.125	12.50	.229	7.00
F013	.024	26.00	.080	24.00	.132	26.50	.249	24.50
F014	.028 H	34.00	.084	33.00	.133	30.50	.252	29.00
F015	.024	26.00	.083	32.00	.133	30.50	.256	31.00
F019	.022	13.00	.076	14.00	.132	26.50	.245	21.00
F020	.0228	16.00	.076	14.00	.126	14.00	.236	13.00
F024	.023	19.50	.082	30.50	.14	35.00	.26	33.50
F026	.0179 L	3.00	.0701	6.00	.1202	8.00	.2231	6.00
F030	.020	4.50	.070	4.50	.114 L	2.50	.219	4.00
F031	.0225	15.00	.070	4.50	.13	21.50	.23	8.50
F032	.023	19.50	.072	8.50	.123	10.00	.231	10.00
F033	.023	19.50	.076	14.00	.120	6.00	.230	8.50
F035	.022	13.00	.072	8.50	.12	6.00	.233	11.00
F036	.0205	7.00	.0682	2.00	.114 L	2.50	.212 L	1.50
F037	.025	30.50	.089 H	35.00	.132	26.50	.247	22.50
F038	.024	26.00	.081	28.50	.133	30.50	.254	30.00
F046	.023	19.50	.082	30.50	.13	21.50	.26	33.50
F047	.0240	26.00	.0861	34.00	.139	34.00	.264	35.00
F048	.242 EH	35.00	.0743	11.00	.1210	9.00	.2358	12.00
F051	.0214	10.50	.0765	16.50	.1246	11.00	.2366	14.00
F061	.016 VL	1.50	.051 EL	1.00	.101 VL	1.00	.212 L	1.50
F069	.026	32.00	.080	24.00	.130	21.50	.250	27.00
F071	.016 VL	1.50	.069	3.00	.133	30.50	.258	32.00
F080	.0231	23.00	.0765	16.50	.127	15.50	.238	15.00
F082	.023	19.50	.073	10.00	.120	6.00	.220	5.00
F093	.022	13.00	.081	28.50	.125	12.50	.242	17.00
F094	.021	8.50	.071	7.00	.115	4.00	.216	3.00
F095	.0201	6.00	.0770	19.00	.129	18.50	.242	17.00
F097	.0246	29.00	.0803	27.00	.134	33.00	.243	19.50
F098		0.00		0.00		0.00		0.00
F95b	.024	26.00	.079	21.00	.127	15.50	.242	17.00
MEDIAN CONC.	.0230		.0770		.1290		.2420	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	7.00	1.167	6	LELELVLELVLL	BIASED LOW	-9.95	-.0103	ICP
F030	25.50	3.643	7	L	BIASED LOW	-9.18	-.0013	ICP
F071	76.00	7.600	10	LELELVLVLVL	BIASED LOW	8.27	-.0067	GFAAS
F094	84.50	8.450	10					ICP
F051	88.50	8.850	10					ICPMS
F031	89.00	8.900	10	EL				GFAAS
F035	73.50	9.188	8					ICP-AES
F026	95.50	9.550	10	EHL				ICP
F036	109.50	10.950	10	LL				GFAAS
F011	116.00	11.600	10					ICPMS
F082	120.00	12.000	10					ICPMS
F032	121.00	12.100	10					ICP 20X
F095	126.00	12.600	10					ICP
F020	114.00	12.667	9					ICP
F033	148.00	14.800	10					ICP
F093	151.00	15.100	10					ICP
F003	164.50	16.450	10					ICP 5X
F048	183.00	18.300	10	EH				GFAAS
F001	190.50	19.050	10					ICPMS
F038	205.50	20.550	10					GFAAS T
F019	193.50	21.500	9	H				ICP
F014	215.00	21.500	10	H				
F95b	194.50	21.611	9					ICP
F046	223.00	22.300	10	VH				ICPMS
F080	224.50	22.450	10					ICP
F024	202.50	22.500	9					ICP-AES
F069	227.50	22.750	10					GFAAS
F002	232.50	23.250	10					AAS, 10X
F008	142.00	23.667	6					ICP
F013	143.00	23.833	6					ICP
F098	121.50	24.300	5					NOTFOUND
F010	255.50	25.550	10					ICP
F097	262.50	26.250	10					ICPMS
F047	271.50	27.150	10		BIASED HIGH	9.08	-.0002	ICP-MS
F015	220.00	27.500	8	LH	BIASED HIGH	5.28	.0003	ICP
F037	182.50	30.417	6	VHH	BIASED HIGH*	.49	.0045	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 17.073

Copper

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;30091

PARAMETER: 30091 Zinc mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0030 BASIC ACCEPTABLE ERROR= .0030 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0016	6.00	.0049	14.00	.0067	18.00	.012	29.00	.0057	17.00	.022	16.00
F002	<.01	0.00	<.01	0.00	<.01	0.00	.011	22.00	<.01	0.00	.022	16.00
F003	.0016	6.00	.0043	7.50	.0055	5.00	.0101	16.00	.0048	7.00	.022	16.00
F008	<.01	0.00	<.01	0.00	<.01	0.00	.01	13.00	<.01	0.00	.02	6.00
F010	.002	13.50	.005	18.50	.006	10.50	.011	22.00	.005	11.00	.023	26.00
F011	.0013	3.00	.0043	7.50	.0057	6.00	.0098	9.00	.0051	14.50	.0211	11.00
F013	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	.022	16.00
F014	<.01	0.00	<.01	0.00	.012 VH	31.00	.010	13.00	<.01	0.00	.021	9.50
F015	.002	13.50	.005	18.50	.006	10.50	.011	22.00	.005	11.00	.022	16.00
F019	.006 H	22.00	.009 H	25.00	.007	23.50	.012	29.00	.012 EH	29.00	.030 VH	33.00
F020	<.002	0.00	.0021	2.00	.005	4.00	.0094	8.00	.0046	6.00	.0222	21.00
F024	.002	13.50	.004	5.50	.006	10.50	.011	22.00	.005	11.00	.025	30.00
F026	.0019	9.00	.0044	9.00	.0058	7.00	.0099	10.00	.0045	5.00	.0199	4.00
F030	<.006	0.00	<.006	0.00	.006	10.50	.012	29.00	<.006	0.00	.017 L	2.00
F031	<.01	0.00	<.01	0.00	<.01	0.00	.01	13.00	<.01	0.00	.02	6.00
F032	.0016	6.00	.0046	10.00	.0059	8.00	.010	13.00	.0051	14.50	.022	16.00
F033	.0022	17.00	.0047	11.00	.0061	13.00	.011	22.00	.005	11.00	.022	16.00
F035	<.003	0.00	.005	18.50	.007	23.50	.01	13.00	.006	18.50	.023	26.00
F036	.0008	1.00	.0035	4.00	.0036	2.00	.0053 L	2.00	.0028	1.00	.175 EH	34.00
F037	<.01	0.00	<.01	0.00	.010 H	30.00	.015 H	34.00	.011 VH	27.50	.021	9.50
F038	<.005	0.00	<.005	0.00	.007	23.50	.012	29.00	.007	22.50	.023	26.00
F046	.002	13.50	.005	18.50	.007	23.50	.011	22.00	.005	11.00	.022	16.00
F047	.004	19.50	.007	24.00	.009	28.50	.014	33.00	.008	26.00	.023	26.00
F051	.0016	6.00	.0026	3.00	.0042	3.00	.0088	4.50	.0073	25.00	.0209	8.00
F061	.025 EH	24.00	.021 EH	26.00	.009	28.50	.005 VL	1.00	.011 VH	27.50	.028 H	31.50
F069	.004	19.50	<.003	0.00	.007	23.50	.009	6.50	.004	3.50	.028 H	31.50
F071	.002	13.50	.002	1.00	.003	1.00	.006 L	3.00	.003	2.00	.020	6.00
F080	.0026	18.00	.0054	22.00	.0063	15.50	.0105	17.00	.0049	8.00	.0226	22.00
F082	.0041	21.00	.0049	14.00	.0062	14.00	.0088	4.50	.0065	20.00	.016 L	1.00
F093	.001	2.00	.005	18.50	.007	23.50	.009	6.50	.004	3.50	.018	3.00
F094	.008 VH	23.00	.004	5.50	.007	23.50	.012	29.00	.006	18.50	.022	16.00
F095	.0016	6.00	.0049	14.00	.0063	15.50	.0109	18.00	.0071	24.00	.0228	23.00
F097	.0019	10.00	.0048	12.00	.0065	17.00	.0111	26.00	.0053	16.00	.0231	29.00
F098	.0020	13.50	.0063	23.00	.0069	19.00	.0123	32.00	.0067	21.00		0.00
F95b	<.002	0.00	.005	18.50	.007	23.50	.011	22.00	.007	22.50	.023	26.00
MEDIAN CONC.	.0020		.0049		.0063		.0107		.0051		.0220	

PARAMETER: 30091 Zinc mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.025	12.00	.068	12.50	.159	19.50	.296	13.00
F002	.030	28.00	.069	16.50	.158	17.00	.298	16.50
F003	.026	20.00	.068	12.50	.154	8.00	.297	14.50
F008	.03	28.00	.07	21.50	.16	23.00	.3	20.00
F010	.034 VH	33.00	.072	28.00	.163	31.00	.306	27.00
F011	.0226	5.00	.0643	4.00	.147	6.00	.275	5.00
F013	.027	24.50	.071	26.00	.161	26.50	.294	10.50
F014	.025	12.00	.069	16.50	.157	14.50	.304	25.00
F015	.026	20.00	.070	21.50	.162	28.50	.306	27.00
F019	.032 H	32.00	.075	31.00	.174	34.00	.317	33.00
F020	.0262	23.00	.0686	14.00	.158	17.00	.300	20.00
F024	.026	20.00	.070	21.50	.16	23.00	.30	20.00
F026	.0231	7.00	.0607	3.00	.1445	5.00	.2677	4.00
F030	.023	6.00	.054 VL	2.00	.124 VL	3.00	.241 VL	3.00
F031	.02 L	3.00	.07	21.50	.16	23.00	.31	30.00
F032	.031	30.50	.065	6.00	.156	11.00	.294	10.50
F033	.026	20.00	.069	16.50	.160	23.00	.300	20.00
F035	.025	12.00	.07	21.50	.163	31.00	.31	30.00
F036	.0124 EL	1.00	.214 EH	34.00	.144	4.00	.217 EL	1.00
F037	.029	26.00	.078	32.00	.164	33.00	.302	23.00
F038	.027	24.50	.071	26.00	.161	26.50	.31	30.00
F046	.025	12.00	.070	21.50	.162	28.50	.311	32.00
F047	.036 VH	34.00	.091 EH	33.00	.155	9.00	.295	12.00
F051	.0215	4.00	.0667	8.00	.1565	13.00	.2929	8.00
F061	.031	30.50	.073	29.50	.090 EL	1.00	.230 EL	2.00
F069	.030	28.00	.067	9.00	.156	11.00	.291	7.00
F071	.025	12.00	.065	6.00	.118 EL	2.00	.293	9.00
F080	.0258	17.00	.0676	10.00	.159	19.50	.297	14.50
F082	.018 L	2.00	.045 EL	1.00	.160	23.00	.320	34.00
F093	.025	12.00	.073	29.50	.157	14.50	.303	24.00
F094	.025	12.00	.065	6.00	.148	7.00	.279	6.00
F095	.0239	8.00	.0677	11.00	.156	11.00	.298	16.50
F097	.0253	16.00	.071	26.00	.163	31.00	.306	27.00
F098		0.00		0.00		0.00		0.00
F95b	.026	20.00	.069	16.50	.158	17.00	.300	20.00
MEDIAN CONC.	.0259		.0690		.1580		.2990	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	157.00	15.700	10					ICPMS
F002	116.00	19.333	6					AAS
F003	112.50	11.250	10					ICP 5X
F008	111.50	18.583	6					ICP
F010	220.50	22.050	10	VH				ICP
F011	71.00	7.100	10		BIASED LOW	-7.78	.0000	ICPMS
F013	103.50	20.700	5					ICP
F014	121.50	17.357	7	VH				
F015	188.50	18.850	10					ICP
F019	291.50	29.150	10	H H EHVHH	BIASED HIGH	5.29	.0039	ICP
F020	115.00	12.778	9					ICP
F024	177.00	17.700	10					ICP-AES
F026	63.00	6.300	10		BIASED LOW	-10.17	.0001	ICP
F030	55.50	7.929	7	L VLVLVL				ICP
F031	96.50	16.083	6	L				AAS FLAME
F032	125.50	12.550	10					ICP 20X
F033	169.50	16.950	10					ICP
F035	194.00	21.556	9					ICP-AES
F036	84.00	8.400	10	L EHELEH EL				GFAAS
F037	215.00	26.875	8	H H VH	BIASED HIGH*	.12	.0042	ICP
F038	208.00	26.000	8		BIASED HIGH*	3.08	.0005	ICP Scan
F046	198.50	19.850	10					ICPMS
F047	245.00	24.500	10	VHEH				ICP-MS
F051	82.50	8.250	10					ICPMS
F061	201.50	20.150	10	EHEH VLVHH ELEL				ICP
F069	139.50	15.500	9	H				ICP
F071	55.50	5.550	10	L EL	BIASED LOW	-5.44	-.0033	GFAAS
F080	163.50	16.350	10					ICP
F082	134.50	13.450	10	L L EL				ICPMS
F093	137.00	13.700	10					ICP
F094	146.50	14.650	10	VH				ICP
F095	147.00	14.700	10					ICP
F097	210.00	21.000	10					ICPMS
F098	108.50	21.700	5					NOTFOUND
F95b	186.00	20.667	9					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 16.408

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F071	55.50	5.550	10	LEL	BIASED LOW	-5.44	-.0033	GFAAS
F026	63.00	6.300	10		BIASED LOW	-10.17	.0001	ICP
F011	71.00	7.100	10		BIASED LOW	-7.78	.0000	ICPMS
F030	55.50	7.929	7	LVLVLVL				ICP
F051	82.50	8.250	10					ICPMS
F036	84.00	8.400	10	LEHELEHEL				GFAAS
F003	112.50	11.250	10					ICP 5X
F032	125.50	12.550	10					ICP 20X
F020	115.00	12.778	9					ICP
F082	134.50	13.450	10	LLEL				ICPMS
F093	137.00	13.700	10					ICP
F094	146.50	14.650	10	VH				ICP
F095	147.00	14.700	10					ICP
F069	139.50	15.500	9	H				ICP
F001	157.00	15.700	10					ICPMS
F031	96.50	16.083	6	L				AAS FLAME
F080	163.50	16.350	10					ICP
F033	169.50	16.950	10					ICP
F014	121.50	17.357	7	VH				
F024	177.00	17.700	10					ICP-AES
F008	111.50	18.583	6					ICP
F015	188.50	18.850	10					ICP
F002	116.00	19.333	6					AAS
F046	198.50	19.850	10					ICPMS
F061	201.50	20.150	10	EHEHVLVHHELEL				ICP
F95b	186.00	20.667	9					ICP
F013	103.50	20.700	5					ICP
F097	210.00	21.000	10					ICPMS
F035	194.00	21.556	9					ICP-AES
F098	108.50	21.700	5					NOTFOUND
F010	220.50	22.050	10	VH				ICP
F047	245.00	24.500	10	VHEH				ICP-MS
F038	208.00	26.000	8		BIASED HIGH*	3.08	.0005	ICP Scan
F037	215.00	26.875	8	HHVH	BIASED HIGH*	.12	.0042	ICP
F019	291.50	29.150	10	HHEHVHH	BIASED HIGH	5.29	.0039	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 16.408

PARAMETER: 38091 Strontium mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0050 BASIC ACCEPTABLE ERROR= .0050 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.169	9.50	.0057	5.00	.121	8.00	.227	8.50	.151	8.00	.041	6.50
F003	.1711	12.00	.0067	16.00	.123	9.50	.230	11.50	.153	9.00	.0435	15.00
F010	.160	4.00	.005	2.00	.116	4.50	.212	4.50	.143	5.00	.038	2.00
F011	.1730	13.50	.0059	6.00	.125	12.00	.226	7.00	.154	11.50	.0416	8.00
F015	.179	16.00	.006	10.00	.130	15.50	.241	19.00	.163	17.00	.043	12.50
F020	.162	5.00	.0056	4.00	.118	6.00	.219	6.00	.148	6.00	.0394	4.00
F024	.18	17.00	.006	10.00	.13	15.50	.24	17.00	.17	19.00	.045	17.00
F030	.153	3.00	.006	10.00	.114	2.00	.211	3.00	.140	3.00	.038	2.00
F032	.163	6.00	.0060	10.00	.123	9.50	.227	8.50	.154	11.50	.041	6.50
F033	.177	15.00	.006	10.00	.120	7.00	.230	11.50	.150	7.00	.042	10.00
F035	.169	9.50	<.007	0.00	.129	14.00	.234	14.00	.154	11.50	.042	10.00
F038	.182	19.00	.011	17.00	.131	17.50	.237	15.00	.164	18.00	.047	18.00
F046	.181	18.00	.006	10.00	.131	17.50	.240	17.00	.162	15.50	.044	16.00
F047	.165	7.00	.0061	15.00	.106 L	1.00	.208	2.00	.131 L	2.00	.0405	5.00
F068	.094 EL	1.00		0.00	.116	4.50	.206	1.00	.129 L	1.00	.048	19.00
F069	.170	11.00	.005	2.00	.124	11.00	.228	10.00	.154	11.50	.043	12.50
F080	.173	13.50	.0061	14.00	.128	13.00	.232	13.00	.157	14.00	.0420	10.00
F094	.150	2.00	.005	2.00	.115	3.00	.212	4.50	.142	4.00	.038	2.00
F095	.167	8.00	.0060	10.00	.132	19.00	.240	17.00	.162	15.50	.0434	14.00
MEDIAN CONC.	.1690		.0060		.1230		.2280		.1540		.0420	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.113	7.00	.154	6.00	.179	6.00	.332	5.00
F003	.118	13.50	.163	12.50	.186	13.00	.354	13.50
F010	.106	3.50	.141	1.00	.164	1.50	.321	3.00
F011	.116	11.50	.157	8.00	.177	5.00	.333	6.00
F015	.119	15.00	.165	15.50	.189	16.00	.358	15.50
F020	.110	5.50	.149	4.00	.171	4.00	.323	4.00
F024	.12	16.00	.17	18.00	.20	19.00	.36	17.00
F030	.105	2.00	.144	2.50	.164	1.50	.317	1.50
F032	.118	13.50	.153	5.00	.181	9.00	.340	8.50
F033	.110	5.50	.160	11.00	.180	7.50	.340	8.50
F035	.114	8.00	.165	15.50	.185	12.00	.358	15.50
F038	.125	18.00	.164	14.00	.188	14.50	.354	13.50
F046	.121	17.00	.167	17.00	.192	17.00	.367	18.00
F047	.106	3.50	.156	7.00	.180	7.50	.339	7.00
F068		0.00	.217 EH	19.00	.199	18.00	.397 H	19.00
F069	.116	11.50	.159	10.00	.183	10.00	.346	10.00
F080	.115	9.50	.158	9.00	.184	11.00	.347	11.00
F094	.103	1.00	.144	2.50	.165	3.00	.317	1.50
F095	.115	9.50	.163	12.50	.188	14.50	.350	12.00
MEDIAN CONC.	.1150		.1590		.1830		.3460	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	69.50	6.950	10					ICPMS
F003	125.50	12.550	10					ICP 5X
F010	31.00	3.100	10		BIASED LOW	-7.19	-.0009	ICP
F011	88.50	8.850	10					ICPMS
F015	152.00	15.200	10		BIASED HIGH*	4.03	.0007	ICP
F020	48.50	4.850	10		BIASED LOW	-6.23	.0015	ICP
F024	165.50	16.550	10		BIASED HIGH*	4.59	.0026	ICP-AES
F030	30.50	3.050	10		BIASED LOW	-8.43	-.0004	ICP
F032	88.00	8.800	10					ICP 20X
F033	93.00	9.300	10					ICP
F035	110.00	12.222	9					ICP-AES
F038	164.50	16.450	10		BIASED HIGH*	.93	.0064	ICP Scan
F046	163.00	16.300	10		BIASED HIGH	6.00	-.0006	ICP
F047	57.00	5.700	10	L L				ICP-MS
F068	82.50	10.313	8	EL L EH H				IC
F069	99.50	9.950	10					ICP
F080	118.00	11.800	10					ICP
F094	25.50	2.550	10		BIASED LOW	-8.12	-.0010	ICP
F095	132.00	13.200	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 9.861

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F094	25.50	2.550	10		BIASED LOW	-8.12	-.0010	ICP
F030	30.50	3.050	10		BIASED LOW	-8.43	-.0004	ICP
F010	31.00	3.100	10		BIASED LOW	-7.19	-.0009	ICP
F020	48.50	4.850	10		BIASED LOW	-6.23	.0015	ICP
F047	57.00	5.700	10	LL				ICP-MS
F001	69.50	6.950	10					ICPMS
F032	88.00	8.800	10					ICP 20X
F011	88.50	8.850	10					ICPMS
F033	93.00	9.300	10					ICP
F069	99.50	9.950	10					ICP
F068	82.50	10.313	8	ELLEHH				IC
F080	118.00	11.800	10					ICP
F035	110.00	12.222	9					ICP-AES
F003	125.50	12.550	10					ICP 5X
F095	132.00	13.200	10					ICP
F015	152.00	15.200	10		BIASED HIGH*	4.03	.0007	ICP
F046	163.00	16.300	10		BIASED HIGH	6.00	-.0006	ICP
F038	164.50	16.450	10		BIASED HIGH*	.93	.0064	ICP Scan
F024	165.50	16.550	10		BIASED HIGH*	4.59	.0026	ICP-AES

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

OVERALL AVERAGE
RANK IS 9.861

PARAMETER: 42091 Molybdenum mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0013	9.00	.0049	13.00	.0055	14.00	.0091	19.00	.0060	14.50	.021	22.00
F003	.0012	7.50	.0046	10.00	.0049	3.00	.0081	10.00	.0054	8.50	.019	11.00
F009	.001	3.50	.005	16.50	.006	18.00	.010	20.00	.007	19.00	.020	18.00
F010	.006 EH	14.00	.005	16.50	.006	18.00	.009	17.00	.006	14.50	.020	18.00
F011	.0014	10.00	.0046	10.00	.0053	12.00	.0086	15.00	.0060	14.50	.0191	15.00
F015	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.02	18.00
F019	<.005	0.00	<.005	0.00	<.005	0.00	<.005 L	0.00	<.005	0.00	.012 VL	1.00
F020	<.004	0.00	.0046	10.00	.005	6.50	.0057	1.00	.004	1.00	.0127 VL	2.00
F024	<.001	0.00	.004	3.50	.005	6.50	.007	3.00	.005	5.50	.020	18.00
F026	.0010	3.50	.0038	1.00	.0053	12.00	.0083	11.00	.0048	2.00	.0164	4.00
F030	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00	<.02	0.00
F032	.001	3.50	.004	3.50	.005	6.50	.008	7.50	.005	5.50	.019	11.00
F033	.0012	7.50	.0043	8.00	.0051	10.00	.0085	13.50	.0056	11.00	.019	11.00
F035	<.002	0.00	.004	3.50	.005	6.50	.008	7.50	.005	5.50	.019	11.00
F038	.001	3.50	.005	16.50	.005	6.50	.008	7.50	.006	14.50	.019	11.00
F046	.002	13.00	.005	16.50	.006	18.00	.009	17.00	.006	14.50	.020	18.00
F047	.0015	11.00	.0047	12.00	.0053	12.00	.0080	5.00	.0055	10.00	.0177	6.00
F051	.0015	12.00	.0040	3.50	.0043	1.00	.0075	4.00	.0049	3.00	.0179	7.00
F061	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	.04 EH	20.00	<.05	0.00
F069	.001	3.50	.005	16.50	.006	18.00	.009	17.00	.006	14.50	.021	22.00
F080	.0061 EH	15.00	.0041	6.50	.0056	15.00	.0084	12.00	.0068	18.00	.0190	11.00
F093	.001	3.50	.005	16.50	.006	18.00	.008	7.50	.005	5.50	.021	22.00
F094	<.005	0.00	<.005	0.00	.005	6.50	.006	2.00	<.005	0.00	.016	3.00
F095	<.0005	0.00	.0041	6.50	.0048	2.00	.0085	13.50	.0054	8.50	.019	11.00
F95b	<.0005	0.00	<.01	0.00	<.005	0.00	<.005 L	0.00	<.005	0.00	.017	5.00
MEDIAN CONC.	.0012		.0046		.0052		.0082		.0056		.0190	

PARAMETER: 42091 Molybdenum mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.228	24.00	.083	20.50	.146	24.00	.274	24.00
F003	.221	20.50	.080	13.00	.137	14.50	.262	15.00
F009	.22	16.50	.083	20.50	.135	12.00	.26	12.00
F010	.221	20.50	.085	24.50	.140	19.00	.261	14.00
F011	.220	16.50	.0801	16.00	.135	12.00	.258	10.00
F015	.22	16.50	.08	13.00	.14	19.00	.26	12.00
F019	.220	16.50	.080	13.00	.134	10.00	.266	18.00
F020	.196	5.00	.0680 L	2.00	.115 L	1.00	.222 L	2.00
F024	.22	16.50	.083	20.50	.14	19.00	.28	25.00
F026	.2075	9.00	.0746	7.00	.1319	8.00	.2493	6.00
F030	.19 L	2.50	.07 L	3.50	.12	2.50	.23 L	3.50
F032	.192 L	4.00	.077	8.00	.135	12.00	.253	8.00
F033	.200	7.00	.080	13.00	.140	19.00	.250	7.00
F035	.217	11.00	.082	17.00	.141	22.00	.271	23.00
F038	.219	12.50	.07 L	3.50	.13	6.00	.263	16.00
F046	.23	25.00	.085	24.50	.14	19.00	.27	21.50
F047	.186 L	1.00	.0721	6.00	.125	4.50	.217 VL	1.00
F051	.2099	10.00	.0779	9.00	.1310	7.00	.2542	9.00
F061	.19 L	2.50	.05 EL	1.00	.12	2.50	.23 L	3.50
F069	.227	23.00	.084	23.00	.151 H	25.00	.270	21.50
F080	.220	16.50	.0821	18.00	.142	23.00	.269	19.50
F093	.224	22.00	.083	20.50	.137	14.50	.265	17.00
F094	.197	6.00	.071	5.00	.125	4.50	.238	5.00
F095	.203	8.00	.0791	10.00	.139	16.00	.260	12.00
F95b	.219	12.50	.080	13.00	.133	9.00	.269	19.50
MEDIAN CONC.	.2190		.0800		.1350		.2600	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	184.00	18.400	10		BIASED HIGH	5.05	.0004	ICPMS
F003	113.00	11.300	10					ICP 5X
F009	156.00	15.600	10					
F010	176.00	17.600	10	EH				ICP
F011	131.00	13.100	10					ICPMS
F015	78.50	15.700	5					ICP
F019	58.50	11.700	5	L VL				ICP
F020	30.50	3.389	9	VL L L L	BIASED LOW	-12.75	-.0011	ICP
F024	117.50	13.056	9					ICP-AES
F026	63.50	6.350	10					ICP
F030	12.00	3.000	4	L L L	INSUFFICIENT DATA			ICP
F032	69.50	6.950	10	L				ICP 20X
F033	107.00	10.700	10					ICP
F035	107.00	11.889	9					ICP-AES
F038	97.50	9.750	10	L				GFAAS T
F046	187.00	18.700	10		BIASED HIGH*	4.08	.0005	ICPMS
F047	68.50	6.850	10	L VL				ICP-MS
F051	65.50	6.550	10					ICPMS
F061	29.50	5.900	5	EH L EL L				ICP
F069	184.00	18.400	10	H	BIASED HIGH*	4.37	.0010	GFAAS
F080	154.50	15.450	10	EH				ICP
F093	147.00	14.700	10					ICP
F094	32.00	4.571	7		BIASED LOW	-8.56	-.0009	ICP
F095	87.50	9.722	9					ICP
F95b	59.00	11.800	5	L				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 11.594

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F030	12.00	3.000	4	LLL	INSUFFICIENT DATA			ICP
F020	30.50	3.389	9	VLLLL	BIASED LOW	-12.75	-.0011	ICP
F094	32.00	4.571	7		BIASED LOW	-8.56	-.0009	ICP
F061	29.50	5.900	5	EHLELL				ICP
F026	63.50	6.350	10					ICP
F051	65.50	6.550	10					ICPMS
F047	68.50	6.850	10	LVL				ICP-MS
F032	69.50	6.950	10	L				ICP 20X
F095	87.50	9.722	9					ICP
F038	97.50	9.750	10	L				GFAAS T
F033	107.00	10.700	10					ICP
F003	113.00	11.300	10					ICP 5X
F019	58.50	11.700	5	LVL				ICP
F95b	59.00	11.800	5	L				ICP
F035	107.00	11.889	9					ICP-AES
F024	117.50	13.056	9					ICP-AES
F011	131.00	13.100	10					ICPMS
F093	147.00	14.700	10					ICP
F080	154.50	15.450	10	EH				ICP
F009	156.00	15.600	10					
F015	78.50	15.700	5					ICP
F010	176.00	17.600	10	EH				ICP
F069	184.00	18.400	10	H	BIASED HIGH*	4.37	.0010	GFAAS
F001	184.00	18.400	10		BIASED HIGH	5.05	.0004	ICPMS
F046	187.00	18.700	10		BIASED HIGH*	4.08	.0005	ICPMS

* 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 11.594

Molybdenum

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;48091

PARAMETER: 48091 Cadmium mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0015 BASIC ACCEPTABLE ERROR= .0015 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0000	5.00	.0017	12.00	.004	15.50	.0071	21.50	.0049	14.00	.0075	20.50
F002	<.001	0.00	.0017	12.00	.0043	26.00	.0073	24.50	.0050	21.50	.0073	15.50
F003	<.0001	0.00	.0017	12.00	.0038	7.00	.0068	9.00	.0045	7.50	.008	29.50
F008	<.001	0.00	.002	26.00	.004	15.50	.008	31.00	.005	21.50	.007	8.00
F009	<.001	0.00	.0017	12.00	.005	31.50	.008	31.00	.006	34.00	.008	29.50
F010	<.0003	0.00	.0017	12.00	.004	15.50	.008	31.00	.006	34.00	.009	35.00
F011	.0001	6.50	.0018	18.50	.0042	23.50	.0072	23.00	.0050	21.50	.0075	20.50
F013	<.005	0.00	.003	33.00	.004	15.50	.008	31.00	.005	21.50	.008	29.50
F014	<.0001	0.00	.002	26.00	.004	15.50	.007	16.50	.005	21.50	.007	8.00
F015	<.005	0.00	<.005	0.00	.006 H	34.00	.009	36.00	.006	34.00	.006	3.00
F019	<.002	0.00	<.002	0.00	.006 H	34.00	.008	31.00	.006	34.00	.007	8.00
F020	<.0001	0.00	.0016	6.00	.0043	26.00	.007	16.50	.0046	9.00	.0074	18.00
F024	<.001	0.00	.002	26.00	.004	15.50	.007	16.50	.005	21.50	.008	29.50
F026	-.0002	1.00	.0017	12.00	.0039	8.50	.0045 L	2.00	.0044	6.00	.0045 L	1.00
F030	<.004	0.00	<.004	0.00	<.004	0.00	.006	4.50	.004	3.00	.005 L	2.00
F031	<.0005	0.00	.0018	18.50	.0025	2.00	.0032 VL	1.00	.0015 VL	1.00	.0070	8.00
F032	<.0003	0.00	.0017	12.00	.004	15.50	.0070	16.50	.0047	11.50	.0072	13.50
F033	<.0002	0.00	.0016	6.00	.0042	23.50	.0073	24.50	.0049	14.00	.0074	18.00
F035	<.0006	0.00	.0015	3.00	.0018 L	1.00	.0071	21.50	.0045	7.50	.0077	25.00
F036	0.0000	3.00	.0015	3.00	.0027	3.00	.0052	3.00	.0032	2.00	.0072	13.50
F037	<.001	0.00	.0020	26.00	.0045	28.00	.0082	35.00	.0056	31.00	.0085	34.00
F038	<.0002	0.00	.0018	18.50	.004	15.50	.0069	11.00	.005	21.50	.0082	33.00
F046	<.001	0.00	.002	26.00	.005	31.50	.008	31.00	.005	21.50	.008	29.50
F047	.0003	8.00	.0020	31.00	.0048	30.00	.0065	7.00	.0051	28.00	.0076	22.00
F048	.0001	6.50	.0022	32.00	.0046	29.00	.0080	31.00	.0054	30.00	.0076	23.50
F051	<.0001	0.00	.0011	1.00	.0034	5.00	.0065	6.00	.0043	5.00	.0073	15.50
F061	<.005	0.00	<.005	0.00	<.005	0.00	<.005	0.00	<.005	0.00	<.005 L	0.00
F069	<.001	0.00	.002	26.00	.004	15.50	.007	16.50	.005	21.50	.007	8.00
F080	<.0014	0.00	.0017	12.00	.0043	26.00	.0069	11.00	.0049	14.00	.0078	26.00
F082	<.001	0.00	.0018	18.50	.0040	15.50	.0070	16.50	.0052	29.00	.0074	18.00
F093	.001	9.00	.002	26.00	.006 H	34.00	.007	16.50	.005	21.50	.007	8.00
F094	<.001	0.00	.002	26.00	.003	4.00	.006	4.50	.005	21.50	.007	8.00
F095	<.0002	0.00	.0015	3.00	.0039	8.50	.0069	11.00	.0047	11.50	.0071	12.00
F097		0.00	.0018	21.00	.0041	22.00	.0073	26.00	.0047	10.00	.0076	23.50
F098	0.0000	3.00	.0017	12.00	.0040	15.50	.0074	27.00	.0050	21.50		0.00
F099	0.0000	3.00	.0016	6.00	.0036	6.00	.0068	8.00	.0041	4.00	.0070	4.00
F95b	<.002	0.00	.002	26.00	.004	15.50	.007	16.50	.006	34.00	.008	29.50
MEDIAN CONC.	.0000		.0018		.0040		.0070		.0050		.0074	

PARAMETER: 48091 Cadmium mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.023	17.00	.104	16.00	.050	18.00	.094	16.00
F002	.027 H	34.00	.107	23.00	.051	26.00	.097	25.50
F003	.023	17.00	.104	16.00	.049	11.00	.093	14.00
F008	.024	24.00	.11	29.50	.05	18.00	.09	7.50
F009	.025	32.00	.104	16.00	.051	26.00	.097	25.50
F010	.023	17.00	.109	26.50	.051	26.00	.096	21.00
F011	.0239	21.00	.107	23.00	.0507	22.50	.0986	29.00
F013	.021	7.50	.105	18.50	.050	18.00	.090	7.50
F014	.014 EL	2.50	.110	29.50	.049	11.00	.099	30.00
F015	.024	24.00	.109	26.50	.051	26.00	.096	21.00
F019	.024	24.00	.111	32.00	.049	11.00	.096	21.00
F020	.023	17.00	.105	18.50	.049	11.00	.094	16.00
F024	.024	24.00	.12 H	35.00	.056	34.50	.10	32.00
F026	.0291 VH	35.00	.0989	9.00	.0489	8.00	.0901	9.00
F030	.019 L	4.00	.084 VL	3.50	.041 L	2.00	.076 VL	2.00
F031	.0080 EL	1.00	.0725 EL	2.00	.055	33.00	.10	32.00
F032	.023	17.00	.099	10.50	.049	11.00	.092	12.50
F033	.023	17.00	.100	12.50	.050	18.00	.094	16.00
F035	.0222	10.00	.1	12.50	.0498	14.00	.0977	28.00
F036	.0247	30.00	.0714 EL	1.00	.0507	22.50	.0917	11.00
F037	.030 VH	36.00	.117 H	34.00	.056	34.50	.116 VH	35.00
F038	.0245	28.00	.11	29.50	.052	31.00	.1	32.00
F046	.025	32.00	.115	33.00	.054	32.00	.103	34.00
F047	.0200	5.00	.0944	6.00	.0446	3.00	.0785 VL	3.00
F048	.0246	29.00		0.00		0.00		0.00
F051	.0223	11.00	.1074	25.00	.0511	29.00	.0973	27.00
F061	.014 EL	2.50	.084 VL	3.50	.031 EL	1.00	.072 EL	1.00
F069	.022	9.00	.107	23.00	.050	18.00	.095	18.00
F080	.0226	12.00	.102	14.00	.0500	18.00	.092	12.50
F082	.025	32.00	.099	10.50	.048	6.00	.091	10.00
F093	.024	24.00	.110	29.50	.050	18.00	.096	21.00
F094	.021	7.50	.098	7.00	.046	4.00	.088	5.00
F095	.0208	6.00	.0987	8.00	.0483	7.00	.0884	6.00
F097	.0227	13.00	.106	20.50	.0519	30.00	.0969	24.00
F098		0.00		0.00		0.00		0.00
F099	.0244	27.00	.0918 L	5.00	.0464	5.00	.0828 L	4.00
F95b	.023	17.00	.106	20.50	.051	26.00	.096	21.00
MEDIAN CONC.	.0230		.1050		.0500		.0950	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	155.50	15.550	10					ICPMS
F002	208.00	23.111	9	H				AAS, 10X
F003	123.00	13.667	9					ICP 5X
F008	181.00	20.111	9					GFAAS, AAS
F009	237.50	26.389	9					
F010	218.00	24.222	9					11-12 GFA 6-10 ICP
F011	209.00	20.900	10					ICPMS
F013	182.00	20.222	9					ICP
F014	160.50	17.833	9	EL				
F015	204.50	25.563	8	H				ICP
F019	195.00	24.375	8	H				ICP
F020	138.00	15.333	9					GFAAS-ICP
F024	234.50	26.056	9	H				ICP-AES
F026	91.50	9.150	10	L L VH				ICP
F030	21.00	3.000	7	L L VLL VL	BIASED LOW	-19.87	.0001	ICP
F031	98.50	10.944	9	VLVL ELEL				GFAAS
F032	120.00	13.333	9					ICP 20X
F033	149.50	16.611	9					ICP
F035	122.50	13.611	9	L				ICP-AES
F036	92.00	9.200	10	EL				GFAAS
F037	293.50	32.611	9	VHH VH	BIASED HIGH	15.69	.0003	GFAAS
F038	220.00	24.444	9					GFAAS T
F046	270.50	30.056	9		BIASED HIGH	8.87	.0000	ICPMS
F047	143.00	14.300	10	VL				ICP-MS
F048	181.00	25.857	7					GFAAS
F051	124.50	13.833	9					ICPMS
F061	8.00	2.000	4	L ELVLELEL	INSUFFICIENT DATA			ICP
F069	155.50	17.278	9					GFAAS
F080	145.50	16.167	9					ICP
F082	156.00	17.333	9					ICPMS
F093	207.50	20.750	10	H				ICP
F094	87.50	9.722	9					ICP
F095	73.00	8.111	9		BIASED LOW	-6.27	.0001	ICP
F097	190.00	21.111	9					ICPMS
F098	79.00	15.800	5					NOTFOUND
F099	72.00	7.200	10	L L	BIASED LOW	-12.68	.0008	AAS-FURNACE
F95b	206.00	22.889	9					ICP

OVERALL AVERAGE
RANK IS 17.705

LAB NO.	TOTAL RANK	AVERAGE RANK	NO. SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	8.00	2.000	4	LELVLELEL	INSUFFICIENT DATA			ICP
F030	21.00	3.000	7	LLVLLVL	BIASED LOW	-19.87	.0001	ICP
F099	72.00	7.200	10	LL	BIASED LOW	-12.68	.0008	AAS-FURNACE
F095	73.00	8.111	9		BIASED LOW	-6.27	.0001	ICP
F026	91.50	9.150	10	LLVH				ICP
F036	92.00	9.200	10	EL				GFAAS
F094	87.50	9.722	9					ICP
F031	98.50	10.944	9	VLVLELEL				GFAAS
F032	120.00	13.333	9					ICP 20X
F035	122.50	13.611	9	L				ICP-AES
F003	123.00	13.667	9					ICP 5X
F051	124.50	13.833	9					ICPMS
F047	143.00	14.300	10	VL				ICP-MS
F020	138.00	15.333	9					GFAAS-ICP
F001	155.50	15.550	10					ICPMS
F098	79.00	15.800	5					NOTFOUND
F080	145.50	16.167	9					ICP
F033	149.50	16.611	9					ICP
F069	155.50	17.278	9					GFAAS
F082	156.00	17.333	9					ICPMS
F014	160.50	17.833	9	EL				
F008	181.00	20.111	9					GFAAS, AAS
F013	182.00	20.222	9					ICP
F093	207.50	20.750	10	H				ICP
F011	209.00	20.900	10					ICPMS
F097	190.00	21.111	9					ICPMS
F95b	206.00	22.889	9					ICP
F002	208.00	23.111	9	H				AAS, 10X
F010	218.00	24.222	9					11-12 GFA 6-10 ICP
F019	195.00	24.375	8	H				ICP
F038	220.00	24.444	9					GFAAS T
F015	204.50	25.563	8	H				ICP
F048	181.00	25.857	7					GFAAS
F024	234.50	26.056	9	H				ICP-AES
F009	237.50	26.389	9					
F046	270.50	30.056	9		BIASED HIGH	8.87	.0000	ICPMS
F037	293.50	32.611	9	VHHVH	BIASED HIGH	15.69	.0003	GFAAS

OVERALL AVERAGE
RANK IS 17.705

PARAMETER: 56091 Barium MG/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0030 BASIC ACCEPTABLE ERROR= .0030 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.022	18.00	.0039	9.50	.014	10.50	.030	17.50	.043	18.00	.012	13.00
F003	.0209	9.00	.0039	9.50	.0135	5.50	.0290	9.50	.0406	8.00	.0167 H	25.00
F008	.022	18.00	<.005	0.00	.014	10.50	.031	23.00	.044	22.50	.012	13.00
F010	.022	18.00	.004	16.00	.015	20.50	.031	23.00	.044	22.50	.013	19.50
F011	.0203	7.50	.0036	7.50	.0135	5.50	.0288	7.00	.0408	10.00	.0116	6.00
F014	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00
F015	.021	11.50	.004	16.00	.015	20.50	.029	9.50	.045	26.00	.013	19.50
F019	.022	18.00	.004	16.00	.015	20.50	.030	17.50	.045	26.00	.015	24.00
F020	.0194	4.00	.0034	5.00	.013	2.50	.0274	4.00	.0389	4.00	.0109	3.00
F024	.022	18.00	.004	16.00	.015	20.50	.032	25.00	.045	26.00	.013	19.50
F030	.021	11.50	.004	16.00	.014	10.50	.029	9.50	.040	6.50	.011	4.50
F031	.026 H	24.00	.004	16.00	.016	24.00	.027	3.00	.040	6.50	.010	1.50
F032	.020	5.50	.0036	7.50	.014	10.50	.029	9.50	.041	12.00	.012	13.00
F033	.028 H	25.00	.005	21.50	.014	10.50	.030	17.50	.041	12.00	.012	13.00
F035	.02	5.50	.003	2.50	.013	2.50	.028	5.00	.039	5.00	.011	4.50
F037	.013 VL	1.00	<.01	0.00	<.01	0.00	.022 L	1.00	.038	2.00	<.01	0.00
F038	.025	23.00	<.010	0.00	.017	25.00	.034	26.00	.043	18.00	.014	23.00
F046	.022	18.00	.004	16.00	.014	10.50	.031	23.00	.044	22.50	.012	13.00
F047	.0203	7.50	.0050	21.50	.0146	16.50	.0298	12.00	.0434	20.00	.0137	22.00
F051	.0210	11.50	.0030	2.50	.0131	4.00	.0284	6.00	.0407	9.00	.0117	7.00
F061	<.01 EL	0.00	<.01	0.00	<.01	0.00	<.01 EL	0.00	<.01 EL	0.00	<.01	0.00
F068		0.00		0.00		0.00		0.00	.038	2.00		0.00
F069	.021	11.50	.003	2.50	.014	10.50	.030	17.50	.043	18.00	.012	13.00
F080	<.0014 EL	0.00	.0040	16.00	.0146	16.50	.0301	21.00	.0425	16.00	.0122	17.00
F093	.022	18.00	.004	16.00	.015	20.50	.030	17.50	.044	22.50	.012	13.00
F094	.018	2.00	<.003	0.00	.012	1.00	.026	2.00	.038	2.00	.010	1.50
F095	.0193	3.00	.0035	6.00	.0142	15.00	.0299	13.50	.0417	14.00	.0119	9.00
F097	.022	18.00	.0039	11.00	.014	10.50	.0299	13.50	.041	12.00	.0118	8.00
F95b	.022	18.00	.003	2.50	.015	20.50	.030	17.50	.042	15.00	.013	19.50
MEDIAN CONC.	.0210		.0040		.0140		.0299		.0417		.0120	

PARAMETER: 56091 Barium MG/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.229	21.00	.134	13.00	.079	13.50	.151	14.50
F003	.223	15.50	.135	15.50	.0787	12.00	.149	11.00
F008	.232	27.00	.14	24.00	.083	24.50	.157	25.50
F010	.231	24.50	.140	24.00	.084	28.00	.157	25.50
F011	.214	8.00	.129	8.00	.076	8.00	.144	5.50
F014	.227	19.00	.138	20.00	.081	19.00	.154	19.50
F015	.229	21.00	.140	24.00	.082	21.50	.156	22.50
F019	.232	27.00	.141	27.50	.083	24.50	.157	25.50
F020	.206	4.50	.122	3.00	.072	3.50	.137	2.00
F024	.24	29.00	.14	24.00	.085	29.00	.16	28.00
F030	.210	6.50	.126	4.00	.074	7.00	.139	4.00
F031	.206	4.50	.128	7.00	.079	13.50	.147	10.00
F032	.221	14.00	.127	5.50	.078	9.50	.146	8.00
F033	.220	12.50	.140	24.00	.080	17.50	.150	12.00
F035	.21	6.50	.127	5.50	.073	5.50	.144	5.50
F037	.223	15.50	.132	10.00	.073	5.50	.153	18.00
F038	.229	21.00	.137	18.00	.083	24.50	.156	22.50
F046	.232	27.00	.141	27.50	.083	24.50	.157	25.50
F047	.219	11.00	.138	20.00	.0783	11.00	.146	8.00
F051	.2154	9.00	.1356	17.00	.0792	15.00	.1505	13.00
F061	.18 VL	1.00	.09 EL	1.00	.04 EL	1.00	.11 EL	1.00
F068	.216	10.00	.134	13.00	.065 L	2.00	.180 VH	29.00
F069	.231	24.50	.138	20.00	.082	21.50	.155	21.00
F080	.220	12.50	.134	13.00	.0816	20.00	.152	16.50
F093	.230	23.00	.146	29.00	.078	9.50	.154	19.50
F094	.198	2.00	.120	2.00	.072	3.50	.138	3.00
F095	.203	3.00	.131	9.00	.0793	16.00	.146	8.00
F097	.224	17.00	.133	11.00	.0836	27.00	.151	14.50
F95b	.226	18.00	.135	15.50	.080	17.50	.152	16.50
MEDIAN CONC.	.2230		.1350		.0792		.1510	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	148.50	14.850	10					ICPMS
F003	120.50	12.050	10	H				ICP 5X
F008	188.00	20.889	9					ICP
F010	221.50	22.150	10		BIASED HIGH*	3.55	.0005	ICP
F011	73.00	7.300	10					ICPMS
F014	77.50	19.375	4		INSUFFICIENT DATA			
F015	192.00	19.200	10					ICP
F019	226.50	22.650	10		BIASED HIGH*	3.75	.0007	ICP
F020	35.50	3.550	10		BIASED LOW	-8.34	-.0001	ICP
F024	235.00	23.500	10		BIASED HIGH	6.64	-.0002	ICP-AES
F030	80.00	8.000	10					ICP
F031	110.00	11.000	10	H				GFAAS
F032	95.00	9.500	10					ICP 20X
F033	165.50	16.550	10	H				ICP
F035	48.00	4.800	10		BIASED LOW	-5.42	-.0004	ICP-AES
F037	53.00	7.571	7	VL L				ICP
F038	201.00	22.333	9		BIASED HIGH*	1.20	.0025	ICP Scan
F046	207.50	20.750	10					ICP
F047	149.50	14.950	10					ICP-MS
F051	94.00	9.400	10					ICPMS
F061	4.00	1.000	4	EL ELEL VLELELEL	INSUFFICIENT DATA			ICP
F068	56.00	11.200	5	L VH				IC
F069	160.00	16.000	10					ICP
F080	148.50	16.500	9	EL				ICP
F093	188.50	18.850	10					ICP
F094	19.00	2.111	9		BIASED LOW	-10.34	-.0002	ICP
F095	96.50	9.650	10					ICP
F097	142.50	14.250	10					ICPMS
F95b	160.50	16.050	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 13.898

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	4.00	1.000	4	ELELELVLELELEL	INSUFFICIENT DATA			ICP
F094	19.00	2.111	9		BIASED LOW	-10.34	-.0002	ICP
F020	35.50	3.550	10		BIASED LOW	-8.34	-.0001	ICP
F035	48.00	4.800	10		BIASED LOW	-5.42	-.0004	ICP-AES
F011	73.00	7.300	10					ICPMS
F037	53.00	7.571	7	VLL				ICP
F030	80.00	8.000	10					ICP
F051	94.00	9.400	10					ICPMS
F032	95.00	9.500	10					ICP 20X
F095	96.50	9.650	10					ICP
F031	110.00	11.000	10	H				GFAAS
F068	56.00	11.200	5	LVH				IC
F003	120.50	12.050	10	H				ICP 5X
F097	142.50	14.250	10					ICPMS
F001	148.50	14.850	10					ICPMS
F047	149.50	14.950	10					ICP-MS
F069	160.00	16.000	10					ICP
F95b	160.50	16.050	10					ICP
F080	148.50	16.500	9	EL				ICP
F033	165.50	16.550	10	H				ICP
F093	188.50	18.850	10					ICP
F015	192.00	19.200	10					ICP
F014	77.50	19.375	4		INSUFFICIENT DATA			
F046	207.50	20.750	10					ICP
F008	188.00	20.889	9					ICP
F010	221.50	22.150	10		BIASED HIGH*	3.55	.0005	ICP
F038	201.00	22.333	9		BIASED HIGH*	1.20	.0025	ICP Scan
F019	226.50	22.650	10		BIASED HIGH*	3.75	.0007	ICP
F024	235.00	23.500	10		BIASED HIGH	6.64	-.0002	ICP-AES

* 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 13.898

Barium

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;82091

PARAMETER: 82091 Lead mg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0020 BASIC ACCEPTABLE ERROR= .0020 CONCENTRATION ERROR INCREMENT= .1000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.0003	7.00	.0033	20.50	.0039	12.50	.0070	16.50	.015	19.50	.023	22.50
F002	<.002	0.00	.0030	14.00	.0035	7.00	.0072	20.00	.0145	15.00	.024	26.00
F003	.0002	3.00	.0032	17.50	.0035	7.00	.0061	7.50	.0131	6.00	.022	18.00
F008	<.001	0.00	.003	14.00	.004	18.00	.007	16.50	.015	19.50	.021	12.00
F009	.004 VH	13.00	.004	24.50	.007 H	27.00	.010 H	29.00	.021 VH	33.00	.028 H	30.50
F010	<.0003	0.00	.0029	8.50	.0041	24.00	.0075	23.00	.0172	27.00	.023	22.50
F011	<.0002	0.00	.0032	17.50	.0038	11.00	.0068	12.00	.0146	16.00	.0225	21.00
F013	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00
F014	.001	11.00	.005	27.50	.004	18.00	.007	16.50	.015	19.50	.022	18.00
F015	<.0005	0.00	.0035	22.00	.0039	12.50	.0073	21.50	.0164	25.00	.025	28.50
F019	<.03	0.00	<.03	0.00	<.03	0.00	<.03	0.00	<.03	0.00	<.03	0.00
F020	<.001	0.00	.003	14.00	.004	18.00	.007	16.50	.014	10.00	.022	18.00
F024	<.001	0.00	.004	24.50	.005	25.00	.009	28.00	.018	28.00	.024	26.00
F026	-.008 EL	1.00	-.0063 EL	1.00	-.0051 EL	1.00	-.0037 EL	1.00	.0008 EL	1.00	.0058 EL	1.00
F030	<.06	0.00	<.06	0.00	<.06	0.00	<.06	0.00	<.06	0.00	<.06	0.00
F031	<.001	0.00	.004	24.50	.004	18.00	.008	25.00	.019 H	30.00	.025	28.50
F032	<.004	0.00	.005	27.50	.004	18.00	.008	25.00	.015	19.50	.022	18.00
F033	.002	12.00	.003	14.00	.004	18.00	.007	16.50	.015	19.50	.021	12.00
F035	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.02 VH	31.50	.02	7.50
F036	.0002	3.00	.0029	8.50	.0014 L	2.00	.0029 VL	2.00	.0057 EL	2.00	.0152 VL	2.00
F037	<.001	0.00	.0026	6.00	.0102 EH	28.00	.0082	27.00	.0120	4.50	.0184	6.00
F038	<.001	0.00	.002	3.50	.002	3.00	.004 L	3.00	.011 L	3.00	.018	4.50
F046	.0003	7.00	.003	14.00	.004	18.00	.007	16.50	.014	10.00	.024	26.00
F047	.0008	10.00	.0040	24.50	.0056	26.00	.0073	21.50	.0182	29.00	.0285 VH	32.00
F051	.0006	9.00	.0029	8.50	.0035	7.00	.0063	10.00	.0141	13.00	.0216	15.00
F061	<.05	0.00	<.05	0.00	<.05	0.00	<.05	0.00	.016	24.00	.016 L	3.00
F069	<.001	0.00	.002	3.50	.003	4.00	.006	5.00	.015	19.50	.021	12.00
F080	<.006	0.00	<.006	0.00	<.006	0.00	.006	5.00	.017	26.00	.028 H	30.50
F082	.0003	7.00	.0029	8.50	.0034	5.00	.0061	7.50	.014	10.00	.021	12.00
F093	<.001	0.00	.002	3.50	.004	18.00	.006	5.00	.014	10.00	.021	12.00
F094	<.005	0.00	<.005	0.00	<.005	0.00	<.005	0.00	.012	4.50	.018	4.50
F095	<.001	0.00	.002	3.50	.004	18.00	.008	25.00	.014	10.00	.022	18.00
F097		0.00	.0033	19.00	.0040	23.00	.0070	13.00	.0143	14.00	.0232	24.00
F098	.0002	3.00	.0033	20.50	.0037	10.00	.0064	11.00	.0156	23.00		0.00
F099	.0002	5.00	.0029	11.00	.0037	9.00	.0061	9.00	.0134	7.00	.0207	9.00
F95b	<.01	0.00	<.01	0.00	<.01	0.00	<.01	0.00	.02 VH	31.50	.02	7.50
MEDIAN CONC.	.0003		.0030		.0040		.0070		.0150		.0220	

PARAMETER: 82091 Lead mg/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.110	20.00	.086	20.00	.163	25.50	.296	10.00
F002	.117	27.50	.087	23.00	.165	27.50	.310	24.50
F003	.109	16.00	.088	24.50	.159	17.00	.302	18.50
F008	.12	29.50	.09	28.50	.16	21.00	.31	24.50
F009	.10	8.00	.08	9.50	.14 L	3.00	.30	15.50
F010	.125 H	32.00	.110 EH	34.00	.177 H	34.00	.317	29.00
F011	.107	14.00	.0850	16.00	.157	15.50	.293	9.00
F013	.117	27.50	.089	26.00	.155	13.00	.315	28.00
F014	.127 H	33.00	.086	20.00	.148	7.00	.299	12.50
F015	.11	20.00	.1 H	33.00	.17	31.00	.32	30.50
F019	.10	8.00	.07 L	3.00	.16	21.00	.30	15.50
F020	.112	24.00	.081	12.50	.152	10.50	.302	18.50
F024	.11	20.00	.085	16.00	.16	21.00	.31	24.50
F026	.0956 L	4.00	.0758	5.00	.1507	9.00	.3078	22.00
F030	.09 VL	2.00	.06 EL	2.00	.12 EL	1.00	.25 VL	2.00
F031	.135 VH	35.00	.12 EH	35.00	.17	31.00	.32	30.50
F032	.104	12.00	.080	9.50	.152	10.50	.287	6.00
F033	.110	20.00	.086	20.00	.160	21.00	.300	15.50
F035	.11	20.00	.09	28.50	.17	31.00	.31	24.50
F036	.0612 EL	1.00	.0541 EL	1.00	.128 VL	2.00	.207 EL	1.00
F037	.1039	11.00	.0767	6.00	.1543	12.00	.2926	8.00
F038	.098	5.00	.08	9.50	.16	21.00	.311	27.00
F046	.12	29.50	.091	32.00	.17	31.00	.33	32.50
F047	.130 VH	34.00	.0909	31.00	.192 VH	35.00	.371 EH	35.00
F051	.1054	13.00	.0855	18.00	.1592	18.00	.3035	20.00
F061	.102	10.00	.083	14.00	.147	6.00	.365 VH	34.00
F069	.115	26.00	.090	28.50	.165	27.50	.300	15.50
F080	.121	31.00	.088	24.50	.157	15.50	.290	7.00
F082	.110	20.00	.078	7.00	.150	8.00	.280	5.00
F093	.114	25.00	.090	28.50	.156	14.00	.306	21.00
F094	.093 L	3.00	.075 L	4.00	.142	4.00	.267 L	3.00
F095	.100	8.00	.085	16.00	.161	24.00	.299	12.50
F097	.108	15.00	.0863	22.00	.163	25.50	.298	11.00
F098		0.00		0.00		0.00		0.00
F099	.0993	6.00	.0810	12.50	.1460	5.00	.2799	4.00
F95b	.11	20.00	.08	9.50	.17	31.00	.33	32.50
MEDIAN CONC.	.1100		.0855		.1592		.3020	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	174.00	17.400	10					ICPMS
F002	184.50	20.500	9					AAS, 10X
F003	135.00	13.500	10					ICP 5X
F008	183.50	20.389	9					GFAAS, AAS
F009	193.00	19.300	10	VH H H VHH L				
F010	234.00	26.000	9	H EHH	BIASED HIGH	6.40	.0034	11-16 GFA 17-20ICP
F011	132.00	14.667	9					ICPMS
F013	94.50	23.625	4		INSUFFICIENT DATA			ICP
F014	183.00	18.300	10	H				
F015	224.00	24.889	9	H				GFAAS-ICP
F019	47.50	11.875	4	L	INSUFFICIENT DATA			ICP
F020	142.00	15.778	9					GFAAS
F024	213.00	23.667	9					ICP-AES
F026	46.00	4.600	10	ELELELELELELL	BIASED LOW*	4.59	-.0127	ICP
F030	7.00	1.750	4	VLELELVL	INSUFFICIENT DATA			AAS
F031	257.50	28.611	9	H VHEH	BIASED HIGH	6.59	.0056	GFAAS
F032	146.00	16.222	9					ICP 20X
F033	168.50	16.850	10					ICP
F035	143.00	23.833	6	VH				ICP-AES
F036	24.50	2.450	10	L VLELVLELELVLEL	BIASED LOW	-29.78	-.0019	GFAAS
F037	108.50	12.056	9	EH				GFAAS
F038	79.50	8.833	9	L L				GFAAS T
F046	216.50	21.650	10					ICPMS
F047	278.00	27.800	10	VHVH VHEH	BIASED HIGH	21.93	-.0015	ICP-MS
F051	131.50	13.150	10					ICPMS
F061	91.00	15.167	6	L VH				ICP
F069	141.50	15.722	9					GFAAS
F080	139.50	19.929	7	H				ICP
F082	90.00	9.000	10					ICPMS
F093	137.00	15.222	9					ICP
F094	23.00	3.833	6	L L L	BIASED LOW	-10.95	-.0018	ICP
F095	135.00	15.000	9					ICP
F097	166.50	18.500	9					ICPMS
F098	67.50	13.500	5					NOTFOUND
F099	77.50	7.750	10		BIASED LOW	-7.53	-.0001	AAS-FURNACE
F95b	132.00	22.000	6	VH				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 16.327

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F030	7.00	1.750	4	VLELELVL	INSUFFICIENT DATA			AAS
F036	24.50	2.450	10	LVLELVLELELVLEL	BIASED LOW	-29.78	-.0019	GFAAS
F094	23.00	3.833	6	LLL	BIASED LOW	-10.95	-.0018	ICP
F026	46.00	4.600	10	ELELELELELELL	BIASED LOW*	4.59	-.0127	ICP
F099	77.50	7.750	10		BIASED LOW	-7.53	-.0001	AAS-FURNACE
F038	79.50	8.833	9	LL				GFAAS T
F082	90.00	9.000	10					ICPMS
F019	47.50	11.875	4	L	INSUFFICIENT DATA			ICP
F037	108.50	12.056	9	EH				GFAAS
F051	131.50	13.150	10					ICPMS
F003	135.00	13.500	10					ICP 5X
F098	67.50	13.500	5					NOTFOUND
F011	132.00	14.667	9					ICPMS
F095	135.00	15.000	9					ICP
F061	91.00	15.167	6	LVH				ICP
F093	137.00	15.222	9					ICP
F069	141.50	15.722	9					GFAAS
F020	142.00	15.778	9					GFAAS
F032	146.00	16.222	9					ICP 20X
F033	168.50	16.850	10					ICP
F001	174.00	17.400	10					ICPMS
F014	183.00	18.300	10	H				
F097	166.50	18.500	9					ICPMS
F009	193.00	19.300	10	VHHHVHHL				
F080	139.50	19.929	7	H				ICP
F008	183.50	20.389	9					GFAAS, AAS
F002	184.50	20.500	9					AAS, 10X
F046	216.50	21.650	10					ICPMS
F95b	132.00	22.000	6	VH				ICP
F013	94.50	23.625	4		INSUFFICIENT DATA			ICP
F024	213.00	23.667	9					ICP-AES
F035	143.00	23.833	6	VH				ICP-AES
F015	224.00	24.889	9	H				GFAAS-ICP
F010	234.00	26.000	9	HEHH	BIASED HIGH	6.40	.0034	11-16 GFA 17-20ICP
F047	278.00	27.800	10	VHVHVHEH	BIASED HIGH	21.93	-.0015	ICP-MS
F031	257.50	28.611	9	HVHEH	BIASED HIGH	6.59	.0056	GFAAS

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

OVERALL AVERAGE
RANK IS 16.327

Lead

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;33095

PARAMETER: 33095 Arsenic ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 1.0000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.66	5.00	.72	8.00	.48	2.00	.55	5.00	.67	5.00	1.0	7.00
F002	.6	3.00	.8	11.00	.5	4.00	.6	6.00	.7	8.00	1.1	13.00
F003	.7	7.00	.5	2.00	.4	1.00	.5	3.50	.6	3.00	.9	1.00
F008	1.	16.50	<1.	0.00	<1.	0.00	<1.	0.00	1.	17.50	1.	7.00
F009	1.	16.50	2. H	20.50	1.	14.00	2. H	17.00	2. H	21.00	3. VH	22.00
F010	.7	7.00	.7	5.00	.7	12.00	.8	14.00	.6	3.00	1.2	17.50
F011	.8	9.00	.9	13.50	.6	9.00	.7	10.50	.9	15.00	1.1	13.00
F014	2.0 H	20.50	1.5	19.00	1.3	16.00	1.5	16.00	1.7	20.00	2.0	20.50
F019	1.	16.50	1.	16.50	<1.	0.00	<1.	0.00	<1.	0.00	1.	7.00
F020	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00
F030	.7	7.00	.7	5.00	<.4	0.00	.7	10.50	.7	8.00	1.0	7.00
F031	.6	3.00	.7	5.00	.5	4.00	.5	3.50	.6	3.00	1.0	7.00
F035	.9	12.00	.9	13.50	.6	9.00	.7	10.50	.8	12.50	1.3	19.00
F037	6.88 EH	22.00	.73	9.00	.80	13.00	.87	15.00	.83	14.00	1.17	16.00
F038	.6	3.00	.7	5.00	.5	4.00	.4	2.00	.7	8.00	1.	7.00
F046	1.	16.50	1.	16.50	<1.	0.00	<1.	0.00	1.	17.50	2.	20.50
F047	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	1.	7.00
F051	.5	1.00	.4	1.00	<.4	0.00	<.4	0.00	.5	1.00	1.0	7.00
F061	.9	12.00	1.1	18.00	1.2	15.00	.1	1.00	1.0	17.50	1.2	17.50
F069	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	1.	17.50	1.	7.00
F080	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00
F082	1.1	19.00	.82	12.00	.65	11.00	.71	13.00	.69	6.00	.91	2.00
F093	2. H	20.50	2. H	20.50	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00
F094	.9	12.00	.7	5.00	.6	9.00	.7	10.50	.8	12.50	1.1	13.00
F095	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00
F098	.943	14.00	.754	10.00	.556	6.00	.610	7.00	.708	10.00		0.00
F099	.847	10.00	.909	15.00	.569	7.00	.631	8.00	.755	11.00	1.157	15.00
F95b	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
MEDIAN CONC.	.9000		.8000		.6000		.7000		.7550		1.0500	

PARAMETER: 33095 Arsenic ug/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.7	10.50	17.7	16.50	6.2	9.50	12.4	10.50
F002	2.6	8.50	17.5	15.00	6.5	11.00	12.4	10.50
F003	2.5	6.50	15.8	3.00	6.1	7.50	11.8	6.00
F008	3.	17.50	19.	20.00	7.	17.50	13.	17.00
F009	4.	25.00	20.	23.50	8.	23.50	15.	24.00
F010	3.0	17.50	17.4	14.00	6.9	16.00	12.8	12.50
F011	3.0	17.50	20.3	25.00	6.2	9.50	13.0	17.00
F014	3.9	24.00	19.9	22.00	7.7	21.00	14.2	22.00
F019	3.	17.50	17.	11.00	8.	23.50	13.	17.00
F020	1.8	1.00	13.3 L	2.00	5.9	4.00	10.9	3.00
F030	2.6	8.50	16.	5.00	5.4	3.00	11.	4.00
F031	1.9	2.00	18.	18.00	6.6	12.00	13.	17.00
F035	2.8	12.00	17.2	13.00	6.8	14.00	11.4	5.00
F037	3.60	23.00	16.69	9.00	6.83	15.00	12.36	9.00
F038	2.7	10.50	19.7	21.00	7.3	20.00	13.6	21.00
F046	3.	17.50	20.	23.50	8.	23.50	16. H	25.50
F047	2.	4.00	23. VH	26.00	8.	23.50	16. H	25.50
F051	3.0	17.50	17.7	16.50	7.0	17.50	13.4	20.00
F061	3.3	22.00	16.4	8.00	7.1	19.00	14.9	23.00
F069	2.	4.00	17.	11.00	6.	5.50	8. VL	1.50
F080	<2.	0.00	5.6 EL	1.00	<2. EL	0.00	12.8	12.50
F082	3.0	17.50	16.	5.00	5.1	2.00	12.	8.00
F093	3.	17.50	16.	5.00	6.	5.50	8. VL	1.50
F094	2.5	6.50	16.3	7.00	6.1	7.50	11.9	7.00
F095	2.	4.00	17.	11.00	5.	1.00	13.	17.00
F098		0.00		0.00		0.00		0.00
F099	2.838	13.00	18.40	19.00	6.611	13.00	12.81	14.00
F95b	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
MEDIAN CONC.	2.8380		17.3000		6.6110		12.8050	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	79.00	7.900	10					HGAAS
F002	90.00	9.000	10					HY-AAS
F003	40.50	4.050	10		BIASED LOW*	-7.41	-.1270	ICP-TOT
F008	113.00	16.143	7					HY
F009	207.00	20.700	10	H H H VH	BIASED HIGH*	9.92	.9239	
F010	118.50	11.850	10					Hydride A.A.
F011	139.00	13.900	10					HY-AAS
F014	201.00	20.100	10	H	BIASED HIGH*	8.38	.7625	
F019	109.00	15.571	7					HY-AAS
F020	10.00	2.500	4	L	INSUFFICIENT DATA			HY-AA
F030	58.00	6.444	9		BIASED LOW*	-9.98	-.0657	AAS
F031	74.50	7.450	10					HGAAS
F035	120.50	12.050	10					HYD AAS
F037	145.00	14.500	10	EH				GFAAS
F038	101.50	10.150	10					HVAAS
F046	161.00	20.125	8	H	BIASED HIGH	17.66	.1671	ICPMS
F047	86.00	17.200	5	VH H				ICP-MS
F051	81.50	10.188	8					ICPMS
F061	153.00	15.300	10					HVAAS
F069	46.50	7.750	6	VL				HYD, AAS
F080	13.50	6.750	2	ELEL	INSUFFICIENT DATA			ICP
F082	95.50	9.550	10					ICPMS
F093	70.50	11.750	6	H H VL				ICP
F094	90.00	9.000	10					ICP
F095	33.00	8.250	4		INSUFFICIENT DATA			ICP
F098	47.00	9.400	5					NOTFOUND
F099	125.00	12.500	10					AAS-MHS
F95b	0.00	*******	0		INSUFFICIENT DATA			ICP

* 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 11.805

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F95b	0.00	*******	0		INSUFFICIENT DATA			ICP
F020	10.00	2.500	4	L	INSUFFICIENT DATA			HY-AA
F003	40.50	4.050	10		BIASED LOW*	-7.41	-.1270	ICP-TOT
F030	58.00	6.444	9		BIASED LOW*	-9.98	-.0657	AAS
F080	13.50	6.750	2	ELEL	INSUFFICIENT DATA			ICP
F031	74.50	7.450	10					HGAAS
F069	46.50	7.750	6	VL				HYD, AAS
F001	79.00	7.900	10					HGAAS
F095	33.00	8.250	4		INSUFFICIENT DATA			ICP
F002	90.00	9.000	10					HY-AAS
F094	90.00	9.000	10					ICP
F098	47.00	9.400	5					NOTFOUND
F082	95.50	9.550	10					ICPMS
F038	101.50	10.150	10					HVAAS
F051	81.50	10.188	8					ICPMS
F093	70.50	11.750	6	HHVL				ICP
F010	118.50	11.850	10					Hydride A.A.
F035	120.50	12.050	10					HYD AAS
F099	125.00	12.500	10					AAS-MHS
F011	139.00	13.900	10					HY-AAS
F037	145.00	14.500	10	EH				GFAAS
F061	153.00	15.300	10					HVAAS
F019	109.00	15.571	7					HY-AAS
F008	113.00	16.143	7					HY
F047	86.00	17.200	5	VHH				ICP-MS
F014	201.00	20.100	10	H	BIASED HIGH*	8.38	.7625	
F046	161.00	20.125	8	H	BIASED HIGH	17.66	.1671	ICPMS
F009	207.00	20.700	10	HHHVH	BIASED HIGH*	9.92	.9239	

* 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 11.805

PARAMETER: 34095 Selenium ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 1.0000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.17	1.00	.51	5.00	.69	2.00	.85	4.00	1.1	9.00	1.8	7.00
F003	.3	3.50	1.1	12.00	<.2	0.00	<.2	0.00	8.5 EH	17.00	1.6	5.00
F008	<1.	0.00	<1.	0.00	1.	9.00	1.	8.00	1.	5.00	2.	12.50
F009	<1.	0.00	<1.	0.00	<1.	0.00	1.	8.00	1.	5.00	2.	12.50
F010	.3	3.50	.5	3.50	.8	4.50	1.0	8.00	1.3	11.00	1.9	8.00
F011	1.0	6.50	1.0	10.00	1.0	9.00	1.0	8.00	1.0	5.00	2.0	12.50
F020	<.5	0.00	<.5	0.00	<.5	0.00	4.3 EH	16.00	2.2 H	15.50	.8 L	1.00
F030	<.2	0.00	<.2	0.00	<.4	0.00	<.2	0.00	<.2	0.00	<.4 L	0.00
F031	<.2	0.00	.3	1.00	.6	1.00	.8	2.50	1.0	5.00	.9	2.00
F035	<.4	0.00	.7	7.00	.9	6.00	1.1	12.00	1.7	12.00	2.3	17.00
F037	<1.0	0.00	<1.0	0.00	<1.0	0.00	<1.0	0.00	1.08	8.00	1.42	4.00
F038	<.5	0.00	.5	3.50	.8	4.50	1.	8.00	1.2	10.00	2.	12.50
F046	1.	6.50	.7	7.00	1.	9.00	1.	8.00	2.	13.50	2.	12.50
F047	2. VH	9.00	1.	10.00	2.	13.00	3. VH	15.00	2.	13.50	3.	19.00
F051	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	2.0	12.50
F061	.2	2.00	.4	2.00	.7	3.00	.6	1.00	.9	1.50	1.4	3.00
F069	<1.	0.00	<1.	0.00	<1.	0.00	1.	8.00	1.	5.00	2.	12.50
F080	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00
F082	1.2	8.00	1.0	10.00	1.4	12.00	1.4	13.00	2.2 H	15.50	2.5	18.00
F093	<1.	0.00	<1.	0.00	1.	9.00	2.	14.00	<1.	0.00	2.	12.50
F094	.4	5.00	.7	7.00	1.0	9.00	.8	2.50	.9	1.50	1.7	6.00
F095	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00
F95b	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
MEDIAN CONC.	.4000		.7000		1.0000		1.0000		1.1000		2.0000	

PARAMETER: 34095 Selenium ug/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.8	8.50	12.1	10.00	10.9	6.00	21.0	13.00
F003	.2 EL	1.50	10.8	5.00	11.5	8.50	20.3	11.00
F008	3.	10.50	14.	19.00	12.	12.00	22.	16.00
F009	3.	10.50	15. H	20.00	14.	18.50	23.	19.50
F010	2.7	7.00	12.4	12.00	11.3	7.00	19.7	8.50
F011	4.0	16.50	13.0	14.50	12.0	12.00	23.0	19.50
F020	15.4 EH	19.00	4.6 EL	1.00	8.3 L	1.00	1.7 EL	2.00
F030	<.2 EL	0.00	<.2 EL	0.00	<.2 EL	0.00	.3 EL	1.00
F031	.2 EL	1.50	12.	8.50	10.	4.00	22.	16.00
F035	3.4	15.00	13.3	17.00	12.2	14.00	20.4	12.00
F037	2.56	6.00	11.06	7.00	9.93	2.00	19.70	8.50
F038	3.2	13.50	13.	14.50	12.3	15.00	23.1	21.00
F046	4.	16.50	17. VH	21.00	15. H	20.00	29. EH	22.00
F047	7. EH	18.00	11.	6.00	10.	4.00	14. VL	3.00
F051	3.2	13.50	12.2	11.00	11.5	8.50	22.4	18.00
F061	2.4	5.00	13.7	18.00	12.6	16.00	19.4	7.00
F069	<1. VL	0.00	10.	4.00	10.	4.00	18.	5.00
F080	<3.	0.00	5.5 EL	2.00	<3. EL	0.00	16.1 L	4.00
F082	3.1	12.00	9.6	3.00	12.	12.00	22.	16.00
F093	2.	3.50	12.	8.50	13.	17.00	20.	10.00
F094	2.8	8.50	13.0	14.50	11.9	10.00	21.1	14.00
F095	2.	3.50	13.	14.50	14.	18.50	19.	6.00
F95b	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
MEDIAN CONC.	3.0000		12.2000		11.9500		20.3500	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	65.50	6.550	10					HGAAS
F003	63.50	7.938	8	EH EL				ICP-TOT
F008	92.00	11.500	8					HY
F009	94.00	13.429	7	H				
F010	73.00	7.300	10					Hydride
F011	113.50	11.350	10					ICPMS
F020	55.50	7.929	7	EHH L EHELL EL				HY-AA
F030	1.00	1.000	1	L ELELELEL	INSUFFICIENT DATA			AAS
F031	41.50	4.611	9	EL	BIASED LOW*	7.08	-1.0306	HGAAS
F035	112.00	12.444	9					HYD AAS
F037	35.50	5.917	6					GFAAS
F038	102.50	11.389	9					HVAAS
F046	136.00	13.600	10	VHH EH				ICPMS
F047	110.50	11.050	10	VH VH EH VL				ICP-MS
F051	63.50	12.700	5					ICPMS
F061	58.50	5.850	10					HVAAS
F069	38.50	6.417	6	VL				HYD, AAS
F080	6.00	3.000	2	ELELL	INSUFFICIENT DATA			ICP
F082	119.50	11.950	10	H				ICPMS
F093	74.50	10.643	7					ICP
F094	78.00	7.800	10					ICP
F095	42.50	10.625	4		INSUFFICIENT DATA			ICP
F95b	0.00	*******	0		INSUFFICIENT DATA			ICP

* 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 9.387

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F95b	0.00	*******	0		INSUFFICIENT DATA			ICP
F030	1.00	1.000	1	LELELELEL	INSUFFICIENT DATA			AAS
F080	6.00	3.000	2	ELELL	INSUFFICIENT DATA			ICP
F031	41.50	4.611	9	EL	BIASED LOW*	7.08	-1.0306	HGAAS
F061	58.50	5.850	10					HVAAS
F037	35.50	5.917	6					GFAAS
F069	38.50	6.417	6	VL				HYD, AAS
F001	65.50	6.550	10					HGAAS
F010	73.00	7.300	10					Hydride
F094	78.00	7.800	10					ICP
F020	55.50	7.929	7	EHHLEHELLEL				HY-AA
F003	63.50	7.938	8	EHEL				ICP-TOT
F095	42.50	10.625	4		INSUFFICIENT DATA			ICP
F093	74.50	10.643	7					ICP
F047	110.50	11.050	10	VHVHEHVL				ICP-MS
F011	113.50	11.350	10					ICPMS
F038	102.50	11.389	9					HVAAS
F008	92.00	11.500	8					HY
F082	119.50	11.950	10	H				ICPMS
F035	112.00	12.444	9					HYD AAS
F051	63.50	12.700	5					ICPMS
F009	94.00	13.429	7	H				
F046	136.00	13.600	10	VHHEH				ICPMS

* 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 9.387

Selenium

NOT FOUND - PROG,STUDY,LAB,PARAM=FPTM ;0067;F098 ;47095

PARAMETER: 47095 Silver ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= .2000

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<.005	0.00	.85	8.00	.65	5.00	.99	10.00	1.6	10.50	1.8	5.00
F003	<.1	0.00	.8	4.50	.7	7.50	.9	8.00	1.5	6.00	2.	13.50
F010	<.1	0.00	.9	9.50	1.0	12.50	1.3	14.00	1.9	12.50	2.0	13.50
F011	<.1	0.00	.8	4.50	.6	3.50	.8	5.00	1.5	6.00	1.8	5.00
F015	<.5	0.00	.8	4.50	.7	7.50	.7	2.50	1.4	4.00	1.8	5.00
F020	<.1	0.00	.8	4.50	.8	10.00	1.0	12.00	1.9	12.50	1.9	9.00
F030	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00
F033	<.5	0.00	.6	1.00	.6	3.50	.7	2.50	1.3	2.00	1.6	3.00
F035	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00
F037	<.5	0.00	.77	2.00	.51	1.00	.82	7.00	1.52	8.00	1.95	11.00
F038	<.1	0.00	.9	9.50	.7	7.50	.8	5.00	1.5	6.00	1.9	9.00
F046	<1.	0.00	2.	14.00	1.	12.50	1.	12.00	2.	14.50	2.	13.50
F047	.02	2.00	1.00	12.00	.87	11.00	.91	9.00	1.54	9.00	1.86	7.00
F051	<.3	0.00	1.0	12.00	.7	7.50	.8	5.00	1.6	10.50	1.9	9.00
F061	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F069	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	2.	14.50	2.	13.50
F080	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00
F093	4. VH	3.00	1.	12.00	9. EH	14.00	1.	12.00	<1.	0.00	1.	1.00
F094	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F095	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00	.8	1.00	1.3	2.00
F098	.0029	1.00	.834	7.00	.547	2.00	.672	1.00	1.340	3.00		0.00
F95b	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	4. H	16.00
MEDIAN OR *TARGET CONC.	*0.0000		.8420		.7000		.8600		1.5200		1.9000	

PARAMETER: 47095 Silver ug/L

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.66	2.00	7.7	9.00	11.1	14.00	20.7	11.00
F003	<1.	0.00	6.	2.00	10.	7.00	19.	5.00
F010	.9	9.00	10.2	19.00	13.9	18.00	23.4	15.00
F011	.7	4.00	7.8	10.00	11.0	12.00	20.6	10.00
F015	.7	4.00	7.3	6.50	10.	7.00	20.	7.50
F020	.8	7.50	9.4	17.00	14.5 H	20.00	24.5	18.00
F030	<8.	0.00	<8.	0.00	8.	1.50	<8. EL	0.00
F033	<.5	0.00	7.2	5.00	10.	7.00	20.	7.50
F035	<3.	0.00	7.	4.00	11.	12.00	22.	13.00
F037	.60	1.00	8.37	13.00	11.91	16.00	20.90	12.00
F038	.7	4.00	7.3	6.50	9.5	4.00	17.	1.50
F046		0.00	10.	18.00	14.	19.00	24.	16.00
F047	.75	6.00	7.43	8.00	10.1	10.00	17.8	3.00
F051	.8	7.50	8.5	14.50	11.7	15.00	22.1	14.00
F061	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F069	<1.	0.00	8.	11.50	11.	12.00	20.	7.50
F080	<4.	0.00	8.	11.50	10.	7.00	18.	4.00
F093	1.	10.00	9.	16.00	8.	1.50	25.	19.00
F094	<5.	0.00	6.	2.00	10.	7.00	20.	7.50
F095	<.5	0.00	8.5	14.50	12.5	17.00	24.4	17.00
F098		0.00		0.00		0.00		0.00
F95b	<2.	0.00	6.	2.00	9.	3.00	17.	1.50
MEDIAN OR *TARGET CONC.	.7250		7.8000		10.5500		20.6000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	74.50	8.278	9					ICPMS
F003	53.50	6.688	8					ICP
F010	123.00	13.667	9		BIASED HIGH	16.73	.2659	GFA
F011	60.00	6.667	9					ICPMS
F015	48.50	5.389	9					GFAAS
F020	110.50	12.278	9	H				GFAAS
F030	1.50	1.500	1	EL	INSUFFICIENT DATA			ICP
F033	31.50	3.938	8		BIASED LOW*	-2.44	-.2098	ICP
F035	29.00	9.667	3		INSUFFICIENT DATA			ICP-AES
F037	71.00	7.889	9					GFAAS
F038	53.00	5.889	9					GFAAS T
F046	119.50	14.938	8		BIASED HIGH	17.80	.4072	GFAAS
F047	77.00	7.700	10					ICP-MS
F051	95.00	10.556	9					ICPMS
F061	0.00	*******	0		INSUFFICIENT DATA			ICP
F069	59.00	11.800	5					GFAAS
F080	22.50	7.500	3		INSUFFICIENT DATA			ICP
F093	88.50	9.833	9	VH EH				ICP
F094	16.50	5.500	3		INSUFFICIENT DATA			ICP
F095	51.50	10.300	5					ICP
F098	14.00	2.800	5		BIASED LOW	-99.92	.8475	NOTFOUND
F95b	22.50	5.625	4	H	INSUFFICIENT DATA			ICP

* 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 8.486

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	0.00	*******	0		INSUFFICIENT DATA			ICP
F030	1.50	1.500	1	EL	INSUFFICIENT DATA			ICP
F098	14.00	2.800	5		BIASED LOW	-99.92	.8475	NOTFOUND
F033	31.50	3.938	8		BIASED LOW*	-2.44	-.2098	ICP
F015	48.50	5.389	9					GFAAS
F094	16.50	5.500	3		INSUFFICIENT DATA			ICP
F95b	22.50	5.625	4	H	INSUFFICIENT DATA			ICP
F038	53.00	5.889	9					GFAAS T
F011	60.00	6.667	9					ICPMS
F003	53.50	6.688	8					ICP
F080	22.50	7.500	3		INSUFFICIENT DATA			ICP
F047	77.00	7.700	10					ICP-MS
F037	71.00	7.889	9					GFAAS
F001	74.50	8.278	9					ICPMS
F035	29.00	9.667	3		INSUFFICIENT DATA			ICP-AES
F093	88.50	9.833	9	VHEH				ICP
F095	51.50	10.300	5					ICP
F051	95.00	10.556	9					ICPMS
F069	59.00	11.800	5					GFAAS
F020	110.50	12.278	9	H				GFAAS
F010	123.00	13.667	9		BIASED HIGH	16.73	.2659	GFA
F046	119.50	14.938	8		BIASED HIGH	17.80	.4072	GFAAS

* 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 8.486

PARAMETER: 51095 Antimony ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.21	3.00	.67	7.00	.18	2.00	.23	3.00	5.1	9.00	1.5	7.00
F003	.3	4.50	.5	3.50	.8	7.00	.9	6.00	1.1 VL	1.00	1.5	7.00
F011	.2	1.50	.7	8.00	.2	3.50	.2	1.50	5.5	11.50	1.6	9.50
F014	1.5	7.00	1.7	11.00	1.3	8.00	1.2	8.00	6.9	15.00	3.0	15.00
F020	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00	5.4	10.00	.8	1.00
F031	.2	1.50	.6	5.50	.1	1.00	.2	1.50	5.5	11.50	1.6	9.50
F035	<.2	0.00	.2	1.00	<.2	0.00	<.2	0.00	4.3	3.00	1.	2.00
F038	<.1	0.00	.6	5.50	.3	5.00	<.1	0.00	4.5	5.00	1.4	3.50
F046	.3	4.50	.9	10.00	.2	3.50	.3	4.00	6.	13.50	2.	12.50
F047	.40	6.00	.75	9.00	.34	6.00	.43	5.00	4.37	4.00	1.47	5.00
F051	<.3	0.00	.5	3.50	<.3	0.00	<.3	0.00	5.0	7.00	1.5	7.00
F069	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	6.	13.50	2.	12.50
F080	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00	<.5 EL	0.00	<.5	0.00
F093	2. H	8.00	2.	12.00	<1.	0.00	<1.	0.00	4.	2.00	2.	12.50
F094	<.4	0.00	.4	2.00	<.4	0.00	1.1	7.00	5.0	7.00	1.4	3.50
F095	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	5.	7.00	2.	12.50
F95b	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
MEDIAN CONC.	.3000		.6350		.2500		.3650		5.0000		1.5000	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.22	5.00	9.9	6.00	10.4	8.50	20.1	8.00
F003	2.5 VH	9.00	10.8	11.00	9.7	5.00	18.9	4.00
F011	.2	2.50	10.7	10.00	11.4	11.00	21.5	12.00
F014	1.2	8.00	12.6	14.00	12.9	15.00	23.2	15.00
F020	<.5	0.00	10.1	8.00	13.0	16.00	23.3	16.00
F031	.2	2.50	11.	12.00	12.	13.00	22.	13.00
F035	<.2	0.00	9.	2.50	9.8	6.00	19.6	7.00
F038	.2	2.50	9.4	5.00	9.1	3.00	17.7	2.00
F046	.2	2.50	12.	13.00	12.	13.00	23.	14.00
F047	.40	6.00	9.28	4.00	9.60	4.00	17.9	3.00
F051	<.3	0.00	10.4	9.00	10.8	10.00	20.3	9.00
F069	<1.	0.00	13.	15.50	12.	13.00	19.	5.50
F080	<.5	0.00	4.7 VL	1.00	2.1 EL	1.00	10.4 EL	1.00
F093	<1.	0.00	13.	15.50	9.	2.00	21.	11.00
F094	.6	7.00	10.0	7.00	10.4	8.50	20.5	10.00
F095	<2.	0.00	9.	2.50	10.	7.00	19.	5.50
F95b	<30.	0.00	<30.	0.00	<30.	0.00	<30.	0.00
MEDIAN CONC.	.2200		10.2500		10.4000		20.2000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	58.50	5.850	10					ICPMS
F003	58.00	5.800	10	VL VH				ICP-TOT
F011	71.00	7.100	10					ICPMS
F014	116.00	11.600	10		BIASED HIGH	10.74	1.1107	
F020	51.00	10.200	5					HY-AA
F031	71.00	7.100	10					HGAAS
F035	21.50	3.583	6		BIASED LOW*	-1.14	-.5895	HYD AAS
F038	31.50	3.938	8		BIASED LOW	-12.25	.0853	HVAAS
F046	90.50	9.050	10					ICPMS
F047	52.00	5.200	10					ICP-MS
F051	45.50	7.583	6					ICPMS
F069	60.00	12.000	5		BIASED HIGH*	-8.84	1.7675	HYD, AAS
F080	3.00	1.000	3	EL VLELEL	INSUFFICIENT DATA			ICP
F093	63.00	9.000	7	H				ICP
F094	52.00	6.500	8					ICP
F095	34.50	6.900	5					ICP
F95b	0.00	*******	0		INSUFFICIENT DATA			ICP

* 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 7.146

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F95b	0.00	*******	0		INSUFFICIENT DATA			ICP
F080	3.00	1.000	3	ELVLELEL	INSUFFICIENT DATA			ICP
F035	21.50	3.583	6		BIASED LOW*	-1.14	-.5895	HYD AAS
F038	31.50	3.938	8		BIASED LOW	-12.25	.0853	HVAAS
F047	52.00	5.200	10					ICP-MS
F003	58.00	5.800	10	VLVH				ICP-TOT
F001	58.50	5.850	10					ICPMS
F094	52.00	6.500	8					ICP
F095	34.50	6.900	5					ICP
F031	71.00	7.100	10					HGAAS
F011	71.00	7.100	10					ICPMS
F051	45.50	7.583	6					ICPMS
F093	63.00	9.000	7	H				ICP
F046	90.50	9.050	10					ICPMS
F020	51.00	10.200	5					HY-AA
F014	116.00	11.600	10		BIASED HIGH	10.74	1.1107	
F069	60.00	12.000	5		BIASED HIGH*	-8.84	1.7675	HYD, AAS

* 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 7.146

PARAMETER: 83095 Bismuth ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<.005	0.00	.34	3.00	.70	1.50	.85	3.00	6.7	3.00	1.2	1.00
F011	.20	1.00	.3	1.50	.7	1.50	.80	2.00	5.4	1.00	1.4	2.00
F020	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F038	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00
F047	<.05	0.00	.30	1.50	1.00	3.00	.27	1.00	7.46	4.00	1.62	3.00
F080	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00
F093	3. H	2.00	4. VH	4.00	2.	4.00	4. VH	4.00	10. H	5.00	4. H	4.00
F095	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	6.	2.00	<2.	0.00
MEDIAN OR *TARGET CONC.	*0.0000		.3200		.8500		.8250		6.7000		1.5100	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.64	2.00	12.4	4.00	6.9	4.00	12.7	3.00
F011	1.10	3.00	10.3	2.00	6.10	3.00	11.5	1.00
F020	<20.	0.00	<20.	0.00	<20.	0.00	<20.	0.00
F038	<100.	0.00	<100.	0.00	<100.	0.00	<100.	0.00
F047	.21	1.00	4.06 EL	1.00	2.18 L	1.00	14.5	4.00
F080	<15.	0.00	<15.	0.00	<15.	0.00	15.7	5.00
F093	3. H	4.00	19. EH	5.00	16. EH	5.00	18. H	6.00
F095	<2.	0.00	11.	3.00	6.	2.00	12.	2.00
MEDIAN OR *TARGET CONC.	.8700		11.0000		6.1000		13.6000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	24.50	2.722	9					ICPMS
F011	18.00	1.800	10					ICPMS
F020	0.00	*******	0					ICP
F038	0.00	*******	0					ICP Scan
F047	19.50	2.167	9	ELL				ICP-MS
F080	5.00	5.000	1					ICP
F093	43.00	4.300	10	H VH VHH H H EHEHH				ICP
F095	9.00	2.250	4					ICP

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

OVERALL AVERAGE
RANK IS 2.767

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F020	0.00	*******	0					ICP
F038	0.00	*******	0					ICP Scan
F011	18.00	1.800	10					ICPMS
F047	19.50	2.167	9	ELL				ICP-MS
F095	9.00	2.250	4					ICP
F001	24.50	2.722	9					ICPMS
F093	43.00	4.300	10	HVHVHHHHEHEHH				ICP
F080	5.00	5.000	1					ICP

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

OVERALL AVERAGE
RANK IS 2.767

Bismuth

PARAMETER: 92095 Uranium ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 2.0000 BASIC ACCEPTABLE ERROR= 2.0000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.35	2.00	1.58	3.00	.05	1.00	.05	2.00	.06	2.50	2.52	3.00
F010	<5.	0.00	<5.	0.00	<5.	0.00	7. EH	6.00	<5.	0.00	5. H	8.00
F011	.3	1.00	1.5	1.00	<.1	0.00	<.1	0.00	.1	4.00	2.4	1.00
F019	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F046	.4	4.00	1.6	4.00	<.1	0.00	1.6	5.00	.06	2.50	2.7	5.00
F047	.74	7.00	1.73	6.00	<.01	0.00	.01	1.00	.02	1.00	3.02	6.00
F051	.50	6.00	1.53	2.00	.11	3.00	.12	4.00	.11	5.50	2.5	2.00
F080	.43	5.00	1.77	7.00	.10	2.00	.09	3.00	.11	5.50	3.08	7.00
F095	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00	<10.	0.00
F097	.39	3.00	1.63	5.00		0.00		0.00		0.00	2.69	4.00
MEDIAN CONC.	.4000		1.6000		.1000		.1050		.0800		2.6950	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.10	2.00	8.8	3.00	18.9	4.00	35.0	5.00
F010	6. EH	6.00	10.	7.00	19.	5.00	33.	2.00
F011	.1	2.00	8.5	2.00	17.9	3.00	34.0	4.00
F019	<50.	0.00	<50.	0.00	<50.	0.00	<50.	0.00
F046	.1	2.00	9.2	4.00	19.3	6.00	37.9	7.00
F047	<.01	0.00	10.4	8.00	22.1	9.00	38.8	8.00
F051	.29	4.00	8.3	1.00	17.3	2.00	33.2	3.00
F080	.46	5.00	9.65	6.00	20.7	8.00	38.9	9.00
F095	<10.	0.00	<10.	0.00	10. VL	1.00	20. EL	1.00
F097		0.00	9.27	5.00	20.5	7.00	36.3	6.00
MEDIAN CONC.	.1950		9.2350		19.0000		35.0000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	27.50	2.750	10					ICPMS
F010	34.00	5.667	6	EH H EH				
F011	18.00	2.250	8					ICPMS
F019	0.00	*******	0					ICP
F046	39.50	4.389	9					ICPMS
F047	46.00	5.750	8					ICP-MS
F051	32.50	3.250	10					ICPMS
F080	57.50	5.750	10					ICP
F095	2.00	1.000	2	VLEL				ICP
F097	30.00	5.000	6					ICPMS

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

OVERALL AVERAGE
RANK IS 4.159

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F019	0.00	*******	0					ICP
F095	2.00	1.000	2	VLEL				ICP
F011	18.00	2.250	8					ICPMS
F001	27.50	2.750	10					ICPMS
F051	32.50	3.250	10					ICPMS
F046	39.50	4.389	9					ICPMS
F097	30.00	5.000	6					ICPMS
F010	34.00	5.667	6	EHHEH				
F080	57.50	5.750	10					ICP
F047	46.00	5.750	8					ICP-MS

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

OVERALL AVERAGE
RANK IS 4.159

Uranium

PARAMETER: 93095 Lithium ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.5000 BASIC ACCEPTABLE ERROR= 1.5000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	2.1	2.00	.7	1.50	1.2	2.50	1.4	2.50	4.4	6.00	1.6	2.00
F003	3.6	5.00	.7	1.50	1.2	2.50	1.4	2.50	4.8	8.00	1.	1.00
F010	10. EH	7.00	<10.	0.00	<10.	0.00	<10.	0.00	10. EH	11.00	10. EH	6.00
F011	2.0	1.00	.8	3.00	1.1	1.00	1.3	1.00	4.3	5.00	1.7	3.00
F019	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00
F030	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	4.	2.50	<4.	0.00
F038	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00	<15.	0.00
F046	3.	4.00	1.	5.00	2.	5.00	2.	5.00	5.	9.50	2.	5.00
F047	<1. L	0.00	<1.	0.00	<1.	0.00	<1.	0.00	2. L	1.00	<1.	0.00
F068		0.00		0.00		0.00		0.00	4.1	4.00		0.00
F069	4.0	6.00	5. EH	6.00	<4.	0.00	<4.	0.00	5.	9.50	<4.	0.00
F080	<2.	0.00	<2.	0.00	<2.	0.00	<2.	0.00	<2. L	0.00	<2.	0.00
F094	<3.	0.00	<3.	0.00	<3.	0.00	<3.	0.00	4.	2.50	<3.	0.00
F095	2.2	3.00	.9	4.00	1.3	4.00	1.5	4.00	4.7	7.00	1.9	4.00
MEDIAN CONC.	3.0000		.8500		1.2000		1.4000		4.4000		1.8000	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	1.1	2.50	13.9	5.00	10.	8.50	17.9	4.00
F003	1.	1.00	15.	10.00	10.	8.50	19.	9.50
F010	<10.	0.00	20. VH	14.00	20. EH	13.00	20.	12.00
F011	1.1	2.50	14.1	7.00	9.8	6.00	18.3	8.00
F019	<3.	0.00	7. EL	1.00	10.	8.50	7. EL	1.00
F030	<4.	0.00	14.	6.00	9.	3.00	18.	5.50
F038	<15.	0.00	16.	12.00	<15.	0.00	24. H	14.00
F046	2.	5.00	16.	12.00	11.	12.00	21.	13.00
F047	<1.	0.00	12.	3.00	9.	3.00	18.	5.50
F068		0.00	14.2	8.00	9.6	5.00	18.2	7.00
F069	<4.	0.00	16.	12.00	10.	8.50	19.	9.50
F080	<2.	0.00	10. L	2.00	7. L	1.00	14. L	2.00
F094	<3.	0.00	13.	4.00	9.	3.00	17.	3.00
F095	1.4	4.00	14.7	9.00	10.3	11.00	19.5	11.00
MEDIAN CONC.	1.1000		14.1500		10.0000		18.2500	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	36.50	3.650	10					ICPMS
F003	49.50	4.950	10					ICP 5X
F010	63.00	10.500	6	EH EHEH VHEH				A.A.
F011	37.50	3.750	10					ICPMS
F019	10.50	3.500	3	EL EL				ICP
F030	17.00	4.250	4					ICP
F038	26.00	13.000	2	H				ICP Scan
F046	75.50	7.550	10					AE
F047	12.50	3.125	4	L L				ICP-MS
F068	24.00	6.000	4					IC
F069	51.50	8.583	6	EH				ICP
F080	5.00	1.667	3	L L L L				ICP
F094	12.50	3.125	4					ICP
F095	61.00	6.100	10					ICP

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

OVERALL AVERAGE
RANK IS 5.605

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F080	5.00	1.667	3	LLLL				ICP
F047	12.50	3.125	4	LL				ICP-MS
F094	12.50	3.125	4					ICP
F019	10.50	3.500	3	ELEL				ICP
F001	36.50	3.650	10					ICPMS
F011	37.50	3.750	10					ICPMS
F030	17.00	4.250	4					ICP
F003	49.50	4.950	10					ICP 5X
F068	24.00	6.000	4					IC
F095	61.00	6.100	10					ICP
F046	75.50	7.550	10					AE
F069	51.50	8.583	6	EH				ICP
F010	63.00	10.500	6	EHEHEHVHEH				A.A.
F038	26.00	13.000	2	H				ICP Scan

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

OVERALL AVERAGE
RANK IS 5.605

PARAMETER: 94095 Berylium ug/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Interlab QA for Trace Metals

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= 1.0000 BASIC ACCEPTABLE ERROR= 1.0000 CONCENTRATION ERROR INCREMENT= .1500

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<.1	0.00	1.3	13.50	.4	7.50	.55	9.00	4.7	8.50	1.5	7.00
F003	<.05	0.00	1.26	12.00	.34	6.00	.41	6.00	4.36	2.00	1.6	11.00
F008	<1.	0.00	1.	4.00	<1.	0.00	<1.	0.00	5.	14.00	1.	2.00
F010	<1.	0.00	1.	4.00	<1.	0.00	<1.	0.00	5.	14.00	2.	14.50
F011	<.1	0.00	1.2	10.00	.3	2.50	.4	4.00	4.6	7.00	1.5	7.00
F015	1.	1.00	1.	4.00	<1.	0.00	<1.	0.00	5.	14.00	1.	2.00
F019	<4.	0.00	<4.	0.00	<4.	0.00	<4.	0.00	5.	14.00	<4.	0.00
F020	<1.	0.00	1.	4.00	<1.	0.00	<1.	0.00	4.4	3.50	1.5	7.00
F030	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	3. L	1.00	1.	2.00
F032	<.01	0.00	1.18	8.00	.31	5.00	.38	2.00	4.53	6.00	1.50	7.00
F033	<.1	0.00	1.2	10.00	.3	2.50	.4	4.00	4.4	3.50	1.5	7.00
F035	<.1	0.00	1.1	7.00	.3	2.50	.3	1.00	4.5	5.00	1.4	4.00
F038	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00	<5.	0.00
F046	<.1	0.00	1.	4.00	.4	7.50	.5	7.50	5.	14.00	2.	14.50
F047	<.1	0.00	.8	1.00	<.1	0.00	1.4	10.00	6.0	17.00	2.6 H	16.00
F051	<.5	0.00	<.5	0.00	<.5	0.00	<.5	0.00	4.7	8.50	1.8	13.00
F061	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00	<8.	0.00
F069	<.5	0.00	1.3	13.50	.5	9.00	.5	7.50	4.8	10.50	1.6	11.00
F080	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00	<7.	0.00
F094	<1.	0.00	<1.	0.00	<1.	0.00	<1.	0.00	<1. EL	0.00	<1.	0.00
F095	<.1	0.00	1.2	10.00	.3	2.50	.4	4.00	4.8	10.50	1.6	11.00
MEDIAN OR *TARGET CONC.	*0.0000		1.1400		.3100		.4050		4.7000		1.5000	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.3	3.50	5.2	11.00	10.5	11.50	19.2	9.00
F003	.5	5.00	5.4	13.00	10.5	11.50	20.1	17.00
F008	<1.	0.00	5.	8.50	10.	5.50	20.	14.00
F010	<1.	0.00	5.	8.50	11.	16.50	20.	14.00
F011	.2	1.00	5.1	10.00	10.3	9.50	19.0	8.00
F015	1.	7.00	6.	16.00	11.	16.50	20.	14.00
F019	<4.	0.00	6.	16.00	11.	16.50	20.	14.00
F020	<1.	0.00	4.8	4.50	9.6	3.00	18.0	4.00
F030	2. H	10.00	4.	1.00	8.	1.00	16.	2.00
F032	.27	2.00	4.89	6.00	10.3	9.50	19.5	11.00
F033	<.1	0.00	4.6	2.00	9.8	4.00	18.0	4.00
F035	1.7 H	9.00	5.3	12.00	10.9	13.00	20.8	19.00
F038	<5.	0.00	<5.	0.00	11.	16.50	20.	14.00
F046	.3	3.50	6.	16.00	11.	16.50	22.	21.00
F047	1.3	8.00	4.7	3.00	12.8	20.00	21.2	20.00
F051	<.5	0.00	4.9	7.00	10.2	7.50	18.7	7.00
F061	<8.	0.00	<8.	0.00	<8.	0.00	7. EL	1.00
F069	<.5	0.00	4.8	4.50	10.2	7.50	19.4	10.00
F080	<7.	0.00		0.00	8.9	2.00	18.3	6.00
F094	<1.	0.00	<1. EL	0.00	10.	5.50	18.	4.00
F095	.8	6.00	5.7	14.00	11.0	16.50	20.6	18.00
MEDIAN OR *TARGET CONC.	.6500		5.0000		10.4000		19.5000	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	80.50	8.944	9					ICPMS
F003	83.50	9.278	9					ICP 5X
F008	48.00	8.000	6					ICP
F010	71.50	11.917	6					ICP
F011	59.00	6.556	9					ICPMS
F015	74.50	9.313	8					ICP
F019	60.50	15.125	4		INSUFFICIENT DATA			ICP
F020	26.00	4.333	6		BIASED LOW*	-8.04	.0763	ICP
F030	17.00	2.833	6	L H	BIASED LOW	-21.06	.1734	ICP
F032	56.50	6.278	9					ICP 20X
F033	37.00	4.625	8		BIASED LOW*	-7.79	.0739	ICP
F035	72.50	8.056	9	H				ICP-AES
F038	30.50	15.250	2		INSUFFICIENT DATA			ICP Scan
F046	104.50	11.611	9					ICPMS
F047	95.00	11.875	8	H				ICP-MS
F051	43.00	8.600	5					ICPMS
F061	1.00	1.000	1	EL	INSUFFICIENT DATA			ICP
F069	73.50	9.188	8					ICP
F080	8.00	4.000	2		INSUFFICIENT DATA			ICP
F094	9.50	4.750	2	EL EL	INSUFFICIENT DATA			ICP
F095	92.50	10.278	9					ICP

* 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 8.474

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F061	1.00	1.000	1	EL	INSUFFICIENT DATA			ICP
F030	17.00	2.833	6	LH	BIASED LOW	-21.06	.1734	ICP
F080	8.00	4.000	2		INSUFFICIENT DATA			ICP
F020	26.00	4.333	6		BIASED LOW*	-8.04	.0763	ICP
F033	37.00	4.625	8		BIASED LOW*	-7.79	.0739	ICP
F094	9.50	4.750	2	ELEL	INSUFFICIENT DATA			ICP
F032	56.50	6.278	9					ICP 20X
F011	59.00	6.556	9					ICPMS
F008	48.00	8.000	6					ICP
F035	72.50	8.056	9	H				ICP-AES
F051	43.00	8.600	5					ICPMS
F001	80.50	8.944	9					ICPMS
F069	73.50	9.188	8					ICP
F003	83.50	9.278	9					ICP 5X
F015	74.50	9.313	8					ICP
F095	92.50	10.278	9					ICP
F046	104.50	11.611	9					ICPMS
F047	95.00	11.875	8	H				ICP-MS
F010	71.50	11.917	6					ICP
F019	60.50	15.125	4		INSUFFICIENT DATA			ICP
F038	30.50	15.250	2		INSUFFICIENT DATA			ICP Scan

* 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 8.474

FPHG STUDY 0067 DATA SUMMARY 1995-10-06 PAGE 1

PARAMETER: 80095 Mercury ug Hg/L

AQUATIC ECOSYSTEM PROTECTION BRANCH
NATIONAL WATER RESEARCH INSTITUTE
BURLINGTON ONTARIO

NWRI Ecosystem Interlab QA for Mercury

LOWER LIMIT FOR USE OF BASIC ACCEPTABLE ERROR= .0200 BASIC ACCEPTABLE ERROR= .0200 CONCENTRATION ERROR INCREMENT= .1250

SAMPLE	1		2		3		4		5		6	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	<.02	0.00	.054	3.00	.19	11.50	.30	10.50	.47	15.00	.02 L	1.50
F002	.015	3.00	.058	4.00	.160	4.00	.270	4.00	.410	6.00	.028	3.00
F003	.019	4.00	.063	8.00	.187	10.00	.314	14.00	.451	14.00	.036	5.00
F006	.03	8.00	.08	13.50	.22	17.00	.35	18.00	.52 H	18.00	.05	9.50
F007	.013	2.00	.048	2.00	.130 L	2.00		0.00	.320 VL	2.00	.029	4.00
F010	<.1	0.00	.2 EH	17.00	<.1 VL	0.00	.3	10.50	.4	4.50	<.1	0.00
F011	.02	5.50	.06	6.00	.18	7.50	.30	10.50	.43	10.50	.05	9.50
F015	<.05	0.00	.074	12.00	.198	13.00	.316	15.00	.434	12.00	.054	12.00
F020	<.05	0.00	.10 H	16.00	.21	15.50	.30	10.50	.44	13.00	<.05	0.00
F030	<.2	0.00	<.2	0.00	<.2	0.00	.2 VL	2.00	1.4 EH	19.00	<.2	0.00
F032	.021	7.00	.065	9.00	.174	5.00	.288	6.00	.417	7.00	.038	6.00
F033	.02	5.50	.07	10.50	.18	7.50	.28	5.00	.42	8.50	.05	9.50
F035	.04 H	9.00	.08	13.50	.19	11.50	.3	10.50	.4	4.50	.05	9.50
F037	.01	1.00	.06	6.00	.15	3.00	.25	3.00	.37	3.00	.02 L	1.50
F038	.07 EH	11.00	.07	10.50	.18	7.50	.3	10.50	.43	10.50	<.05	0.00
F046	<.05	0.00	.06	6.00	.18	7.50	.32	16.50	.50	16.50	.14 EH	14.00
F051	.06 EH	10.00	.09	15.00	.20	14.00	.32	16.50	.50	16.50	.08 H	13.00
F080	<.02	0.00	.029 L	1.00	.037 EL	1.00	.129 EL	1.00	.184 EL	1.00	.042	7.00
F095	<.1	0.00	<.1	0.00	.21	15.50	.29	7.00	.42	8.50	<.1	0.00
MEDIAN OR *TARGET CONC.	*.0170		.0650		.1800		.3000		.4300		.0460	

SAMPLE	7		8		9		10	
LAB NO	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK	REPORTED VALUE	RANK
F001	.14	11.50	.28	16.00	.43	15.00	.57	17.00
F002	.123	5.00	.210	5.00	.358	4.00	.468	5.00
F003	.139	9.00	.254	13.00	.419	13.00	.456	4.00
F006	.17	16.00	.29	17.00	.47 H	17.00	.65 VH	19.00
F007	.100 L	2.50	.177 L	1.00	.295 VL	2.00	.387 VL	2.00
F010	.1 L	2.50	.2 L	3.00	.4	10.50	.5	8.50
F011	.14	11.50	.24	7.50	.37	5.50	.51	10.50
F015	.172	17.00	.267	14.00	.395	9.00	.511	12.00
F020	.13	6.50	.25	10.50	.37	5.50	.51	10.50
F030	<.2	0.00	.2 L	3.00	.5 H	19.00	.4 L	3.00
F032	.134	8.00	.237	6.00	.374	7.00	.488	6.00
F033	.15	14.00	.25	10.50	.40	10.50	.53	15.00
F035	.14	11.50	.24	7.50	.38	8.00	.5	8.50
F037	.11	4.00	.20 L	3.00	.34	3.00	.49	7.00
F038	.14	11.50	.25	10.50	.43	15.00	.55	16.00
F046	.13	6.50	.25	10.50	.43	15.00	.62 H	18.00
F051	.22 EH	18.00	.38 EH	18.00	.49 H	18.00	.52	13.50
F080	.086 VL	1.00	<.02 EL	0.00	.152 EL	1.00	.271 EL	1.00
F095	.16	15.00	.27	15.00	.41	12.00	.52	13.50
MEDIAN OR *TARGET CONC.	.1395		.2500		.4000		.5100	

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F001	101.00	11.222	9	L				CVAAS
F002	43.00	4.300	10		BIASED LOW*	-6.27	-.0094	CVAAS
F003	94.00	9.400	10					Auto CV
F006	153.00	15.300	10	H H VH	BIASED HIGH	22.86	-.0046	AAII-UV
F007	19.50	2.167	9	L VL L L VLVL	BIASED LOW	-24.31	-.0051	
F010	56.50	8.071	7	EHVL L L				
F011	84.50	8.450	10					CVAAS
F015	116.00	12.889	9					CVAF
F020	88.00	11.000	8	H				CVAAS
F030	46.00	9.200	5	VLEH L H L				AAS
F032	67.00	6.700	10					CVAAS
F033	96.50	9.650	10					CVAAS
F035	94.00	9.400	10	H				CVAAS
F037	34.50	3.450	10	L L	BIASED LOW*	-7.10	-.0174	
F038	103.00	11.444	9	EH				CVAAS
F046	110.50	12.278	9	EH H				CVAAS
F051	152.50	15.250	10	EH H EHEHH	BIASED HIGH*	2.58	.0459	CVAAS
F080	14.00	1.750	8	L ELELEL VLELELEL	BIASED LOW	-54.63	-.0012	Dig. CVAAS
F095	86.50	12.357	7					CV Fluor

* 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 9.176

LAB NO.	TOTAL RANK	AVERAGE RANK	NO.SAMPLES RANKED	SUMMARY OF FLAGGING	BIAS STATEMENT	BIAS % SLOPE	BIAS BLANK	METHOD CODING
F080	14.00	1.750	8	LELELELVLELELEL	BIASED LOW	-54.63	-.0012	Dig. CVAAS
F007	19.50	2.167	9	LVLLLVLVL	BIASED LOW	-24.31	-.0051	
F037	34.50	3.450	10	LL	BIASED LOW*	-7.10	-.0174	
F002	43.00	4.300	10		BIASED LOW*	-6.27	-.0094	CVAAS
F032	67.00	6.700	10					CVAAS
F010	56.50	8.071	7	EHVLLL				
F011	84.50	8.450	10					CVAAS
F030	46.00	9.200	5	VLEHLHL				AAS
F035	94.00	9.400	10	H				CVAAS
F003	94.00	9.400	10					Auto CV
F033	96.50	9.650	10					CVAAS
F020	88.00	11.000	8	H				CVAAS
F001	101.00	11.222	9	L				CVAAS
F038	103.00	11.444	9	EH				CVAAS
F046	110.50	12.278	9	EHH				CVAAS
F095	86.50	12.357	7					CV Fluor
F015	116.00	12.889	9					CVAF
F051	152.50	15.250	10	EHHEHEHH	BIASED HIGH*	2.58	.0459	CVAAS
F006	153.00	15.300	10	HHVH	BIASED HIGH	22.86	-.0046	AAII-UV

* 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 9.176

Mercury

ENVIRONMENT CANADA LIBRARY, BURLINGTON
3 9055 1016 6327 5

Date Due

BRODART, INC. Cat. No. 23 233 Printed in U.S.A.

NATIONAL WATER RESEARCH INSTITUTE
P.O. BOX 5050, BURLINGTON, ONTARIO L7R 4A6

Environment Canada Environnement Canada

Canada

INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX
C.P. 5050, BURLINGTON (ONTARIO) L7R 4A6

Think Recycling!

Pensez à recycler !